

THE BULB BOOK

JOHN WEATHERS









THE BULB BOOK



THE BULB BOOK

OR

BULBOUS AND TUBEROUS PLANTS
FOR THE OPEN AIR, STOVE, AND
GREENHOUSE

CONTAINING PARTICULARS AS TO DESCRIPTIONS
CULTURE, PROPAGATION, ETC., OF PLANTS
FROM ALL PARTS OF THE WORLD HAVING
BULBS, CORMS, TUBERS, OR RHIZOMES

(ORCHIDS EXCLUDED)

BY JOHN WEATHERS

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SHRUBS," "BEAUTIFUL GARDEN FLOWERS," "SCHOOL, COTTAGE, AND
ALLOTMENT GARDENING," ETC.

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THIS VOLUME ON
BULBOUS AND TUBEROUS PLANTS
FROM ALL PARTS OF THE GLOBE
IS DEDICATED

TO

WILLIAM WATSON

CURATOR OF THE ROYAL GARDENS, KEW

IN RECOGNITION OF HIS ACHIEVEMENTS AS A CULTIVATOR
AND AUTHOR, AND OF HIS EFFORTS TO PROMOTE THE
WELFARE OF PROFESSIONAL HORTICULTURISTS

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FOREWORDS

There was a time when bulbous plants of all kinds received the attention of a considerable section of horticulturists. Dean Herbert was the high priest of the cult, among the most notable of his disciples being Wilson Saunders, Joad, Michael Foster, Peter Barr, Sir Charles Strickland, and Max Leichtlin. They collected and cultivated bulbous plants in the same spirit as predominates among the leading fanciers of orchids to-day. But with this difference, there wasn't any gambling in bulbs. There are, of course, certain kinds of bulbs which rank among the most popular garden plants; but there are scarcely any collectors of species outside botanical gardens. Bulbous plants of the Lily, Iris, and Amaryllis families are both numerous and varied. Many of them are reputedly difficult to cultivate, yet not more so than orchids used to be. The worst in this respect are the species which grow naturally in intense sunshine and have a definite period of dry rest. Such are many of the Crinums, Buphanes, and the Xiphoid Irises. Years ago, bulb fanciers would meet and discuss the merits and requirements of their favourites in the most enlightening and stimulating manner. But how many of the present-day cultivators show any inclination to do this? The plants are out of favour, presumably because they are not easy to manage, an objection that is generally dissipated by a better knowledge of the essential requirements. Gardening that is worthy of the name has higher aims than the cultivation of the vulgar crowd of plants which anybody can manage. The development of orchids as garden plants may be taken as a proof of what can be accomplished by persevering experiment.

*Such genera as *Lilium*, *Gladiolus*, *Tulipa*, *Narcissus*, *Hyacinthus*, *Crocus*, *Iris*, *Galanthus*, *Hippeastrum*, and *Nerine* have been to a large extent conquered by the arts of cultivation and breeding; and there*

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are many more which by the application of the same arts would yield equally successful results. For example, there is an almost unworked mine of wealth in *Crinum*, *Watsonia*, *Cyrtanthus*, *Hæmanthus*, *Hymenocallis*, *Phædranassa*, *Zephyranthes*, *Ornithogalum*, and *Oxalis*, genera that are particularly rich in species of horticultural merit. They and many others are practically unknown only because they have never had their opportunity. It is only recently that *Freesia*, *Lachenalia*, and *Nerine* have caught the popular eye; and the oldest of us can remember the advent of *Narcissus* as the glory of the British garden in spring.

Mr Weathers' book is, in my opinion, a praiseworthy attempt to open up the bulb world to the horticultural explorer. During his many years' service at Kew, Mr Weathers had exceptional opportunities to acquire a knowledge of the contents of the large collection there, and the notes and drawings then and afterwards made he has now turned to useful account. I take the liberty to recommend his book to all cultivators who take an intelligent interest in plants that are attractive, either in floral characters, habit, or peculiarities of form—qualities which are prominent in the majority of the species which he has described and figured.

W. WATSON.

INTRODUCTION.

THE cultivation of all kinds of plants having bulbs, corms, tubers, or rhizomes is now so extended that a volume devoted entirely to this important phase of Horticulture may be looked upon almost as a necessity. Coming as these plants do from all parts of the world, it requires no little skill on the part of the gardener—professional as well as amateur—to succeed in their cultivation. The inclusion of tuberous and rhizomatous plants in this volume makes it more comprehensive than if it were confined to bulbous plants proper, all of which belong to one of the two great groups of flowering plants known as Monocotyledons. As almost any plant with a swollen root-stock or thickish creeping roots is called “bulbous” in popular parlance, plants with such peculiarities have been considered in the present work. In this way about fifty different natural orders of flowering plants alone have been included; and these fifty orders include over four hundred different genera, and some three thousand different species and varieties. It will thus be seen that even in this age of specialities, the bulbous and tuberous-rooted plants form quite a respectable, if not indeed an extensive group by themselves.

Considering these plants from a geographical point of view, it will be noticed by a reference to their native countries that they not only come from every part of the globe—from the tropical, subtropical, and temperate regions—but also from the highest altitudes and the lowest plains. In such a range of bulbous vegetation, many temperatures, climatic differences, and soil variations naturally exist. The gardener therefore has to make himself more or less acquainted with the peculiar requirements of any particular plant, if he wishes to achieve anything like success. He must recognise that a plant from the tropics is not necessarily a subject to be grown in a hothouse or a greenhouse, unless it comes from the plains, or is found only at low elevations. Many mistakes

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have been made in the past because the various altitudes at which plants grow naturally were either unknown or were ignored. Thus it happened that plants from the tops of the Andes of Ecuador, Colombia, or Peru, although within the Tropic of Capricorn and beneath an equatorial sun, were found to die with warm house treatment, while they flourished under a temperate or almost hardy regime. The proper temperature, etc., for a plant in cultivation may be therefore more easily gauged if the gardener possesses accurate information as to the condition in which it grows in a state of nature. Owing to these variations of altitude and temperature, it has become necessary to divide bulbous plants into four main groups, namely: hardy, half-hardy, greenhouse, and hothouse or stove. In the following pages under each genus such particulars as to the native habitat of each species are given as will enable the gardener to arrive at a decision as to the temperature most likely to suit his plants.

While temperature of course plays an important part in plant cultivation, the questions of soils, moisture, drought, etc., have also to be considered. Here again a knowledge of the local natural surroundings will give one a fairly good idea as to what compost should be used, and whether much or little water is to be given. A plant that grows naturally in a peaty or marshy soil would be likely to flourish in a similar compost, but would in all probability die in a very short time if planted in heavy clay or coarse sand, although it might do fairly well in a moist loamy soil. On the other hand, plants from desert regions where sandy wastes abound will probably require a hot, dryish atmosphere, although they may enjoy moisture at the root during the period of active growth. Others again from the lower elevations of tropical regions can scarcely be given too much heat and moisture in conjunction with a rich and unctuous soil. To enable the gardener to judge which set of conditions is most likely to suit any particular group of bulbous or tuberous plants, this volume has been specially written, and the author hopes that it may prove itself worthy of frequent reference on the part of the intelligent cultivators in all parts of the British Islands.

A glance at the page of Contents will give the reader a kind of bird's-eye view of the scope of the work. In the descriptive portion the various genera and species have been dealt with in alphabetical order, as it is probably the most generally convenient. Those plant-lovers, however, of a studious or analytical turn of mind, will find

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the natural relationships of the different genera by turning to the Chapter on Classification.

The derivation of the names of the genera and the natural orders or families to which they belong have been given, in the hope that the information will be not only interesting in itself, but also of an instructive character.

It is also hoped that the numerous drawings (many of which are reproduced from sketches made twenty-three and twenty-four years ago) will serve a similar purpose, and help to make clear any little obscurities in the text. With a view to encouraging still further research, references to coloured plates and good figures in standard botanical and horticultural works have also been added after the descriptions of many species and varieties.

JOHN WEATHERS.

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BULBS, CORMS, TUBERS, RHIZOMES

OUTSIDE the ranks of botanists and skilled gardeners, much uncertainty and no little confusion prevail as to what constitutes a bulb, a corm, a tuber, or a rhizome. It may be well therefore to say a few words about each, with a view to making things plainer in regard to these matters.

BULBS.—A bulb is a special kind of bud bearing a number of thickened fleshy or scaly *leaves* closely packed together and seated upon a flattened compressed or disc-like woody stem, from the under-surface and edges of which roots are produced during growth. Examples of true bulbs that will fit this description may be seen in the Onion, Tulip, Hyacinth, Daffodil, Snowdrop, Squill, the Snowflakes, and many others. In most cases the fleshy leaves are rolled round each other; the bulbs are then said to be *tunicated*. In the case of the Liliums, however, in which the thickened leaves are overlapping each other in a spiral fashion round the main axis, the bulbs are said to be *scaly* or *imbricated*. The drawings will give a good idea as to the difference between “tunicated” and “imbricated” or “scaly bulbs.” Figs. 1 to 3 represent the former; Fig. 4 represents the latter.

CORMS.—These are often described as “solid” bulbs, owing to the fact that in many cases they bear a superficial resemblance to bulbs proper. In many cases, however (*e.g.*, the tuberous Begonia and the Cyclamen), the term “corm” is very loosely and erroneously used when speaking of the tubers of these plants. The one obvious difference between a true bulb and a true corm is, that the latter is quite *solid*, and has neither tunicated, imbricated, nor scaly leaves seated on a compressed disc-like stem, a section of which is shown in Fig. 1. The corm is a rounded or flattish *stem* on which traces of the leaf-stalks or bases may be seen. Another great difference

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between the bulb and the corm consists in different methods of growth. Many bulbs will grow for years and produce numerous offsets. Corms, however, dwindle away and shrivel up each year after having yielded up their store of nourishment for the production of new flowers and leaves; and their place is taken

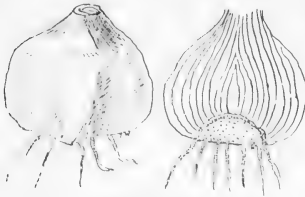


FIG. 1.—*Galtonia candicans*, bulb section of same. (3.)

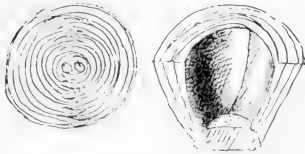


FIG. 2.—*Scilla sibirica*, cross and vertical sections of bulb.

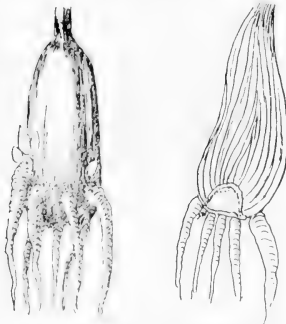


FIG. 3.—*Nothoscordum*, bulb and section.

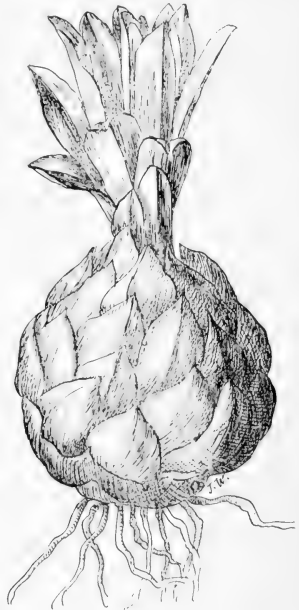


FIG. 4.—Imbricated or scaly bulb of *Lillium candidum*. (3.)

by quite new corms, which have been developed by the action of the leaves in the daylight. Thus, the corms of *Crocus* (Fig. 5) and *Gladiolus* (Fig. 6), etc., that are put into the soil are *not* the same as those that are taken up after growth has ceased. They are quite new vegetative creations.

Although corms and bulbs differ from each other in structure and

BULBS, CORMS, TUBERS, RHIZOMES

vegetation, it is remarkable that both of them are confined to one particular class of flowering plants—that known botanically as *Monocotyledons*. These are plants that are easily recognised by having (1) leaves with parallel or curvilinear veins; (2) the parts of the flowers (*i.e.*, the petals,

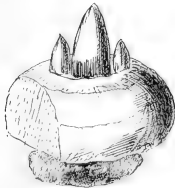


FIG. 5.—Crocus, showing new corm on top of old one.

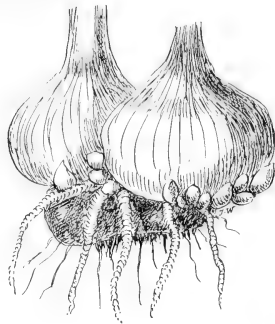


FIG. 6.—Gladiolus, two new corms over old one, with "spawn" at base.

stamens, and carpels) arranged in three's or six's; and (3) when raised from seed, by having only *one* seed-leaf.

If these characteristics are borne in mind there will be no difficulty in distinguishing a true bulb or a true corm.

TUBERS.—A tuber may be described as a short and more or less thickened or swollen shoot or stem furnished with "eyes" or buds.



FIG. 7.—*Oxalis crenata*.



FIG. 8.—*Tropaeolum tuberosum*. ($\frac{1}{2}$.)

EXAMPLES OF TUBERS.

Good examples are seen in the Potato and the Jerusalem Artichoke; others are the tuberous Begonia, the Cyclamen, the Anemone, Ranunculus, Aconite, the Arum Lily, Caladium, some *Tropaeolums*, etc. The Dahlia and herbaceous *Pæony* are examples in which the true roots are swollen and of a tuberous nature, but they contain no vegetative buds. These are borne at the base of the old flower-stems, portions of which should be always retained when the plants are lifted and stored away. Examples of tubers are shown in Figs. 7, 8, and 9.

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It should be noted that while all true bulbs and corms are confined to the Monocotyledons, tuberous plants have a much wider range. They are to be found not only amongst Monocotyledons, but also amongst the other great group of flowering plants known as *Dicotyledons*. These are generally recognised by having (1) net-veined leaves; (2) parts of the flower (*i.e.*, the sepals, petals, stamens, carpels) in four's or five's, or multiples of them; (3) and when raised from seed, by having *two* seed-leaves. An apparent con-

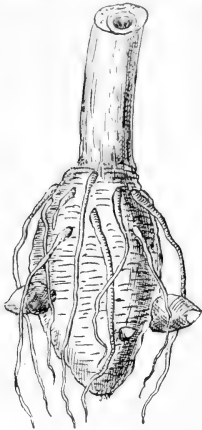


FIG. 9.—*Richardia althiopica*. ($\frac{1}{2}$.)

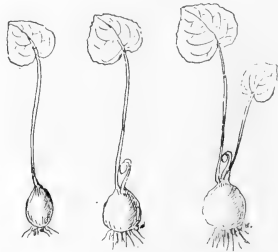


FIG. 10.—Seedling *Cyclamen*, showing aberration from ordinary dicotyledonous type.

tradition to this arrangement is seen in the seedlings of *Cyclamen*, as shown in the sketch (Fig. 10). When the seeds first germinate, only one seed-leaf is apparent; later, a second one much smaller than the first appears, and with advance in age one leaf succeeds another rapidly until the top of the tuber is furnished with a good supply.

RHIZOMES.—A rhizome is a shoot or stem that grows more or less horizontally, and usually beneath the surface of the soil. Many plants have rhizomes, some thickened and somewhat tuberous, others slender. Good examples of plants with thick rhizomes are the German and Florentine Irises or "Flags" (Fig. 11), and Solomon's Seal (Fig. 12); while the Lily of the Valley (see Fig. 99, p. 149) may be taken as an example of a plant with slender rhizomes.

In the *Tritonia* or *Montbretia* (Fig. 13) we have an example of plant in which both corms and rhizomes are developed. It will be seen from the sketch that the corms are not actually placed upon each other as in the *Crocus* and *Gladiolus*, but are separated by a kind of runner-like rhizome, some joints of which swell into a corm if sufficient nourishment has been elaborated by the leaves.

BULBS, CORMS, TUBERS, RHIZOMES

While it is easy in many cases to distinguish the true bulbs, corms, tubers, and rhizomes, there are instances in which the swollen portion of the plant seems to be intermediate between one or the other. The root-stock of the Tigridias or Tiger Flowers, for example, is called a "corm," but a reference to

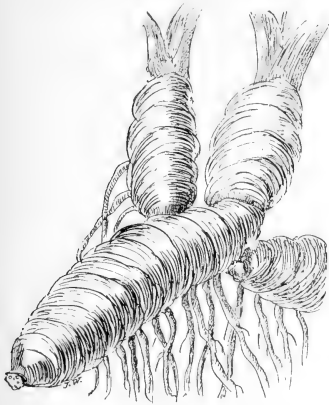


FIG. 11.—Rhizomes of German Iris. ($\frac{1}{2}$.)

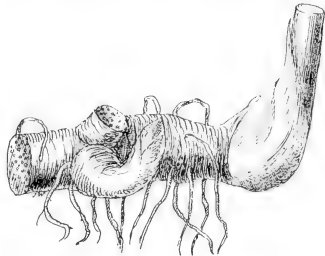


FIG. 12.—Rhizomes of Solomon's Seal. ($\frac{1}{3}$.)

Fig. 14 shows that it is more like an ordinary tunicated bulb.



FIG. 13.—Corms and rhizomes of *Tritontia* (*Montbretia*) *crocosmiflora*. ($\frac{1}{2}$.)

The root-stocks of *Erythronium* (Fig. 15), *Colchicum* (Fig. 16), and *Bulbocodium* (Figs. 17 and 18) are also known as corms. It will be seen, however, that

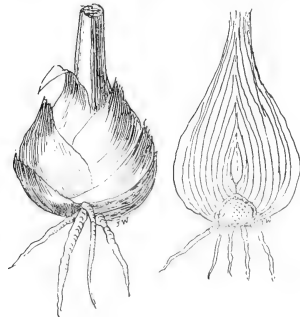


FIG. 14.—*Tigridia*, bulb and section of same. ($\frac{1}{2}$.)

the vegetation of these plants is not like that of the *Crocus* or

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Gladiolus. The new corms, instead of developing *on top* of the old ones, are produced at a lower depth from a downward growth.



FIG. 15.—Corm or bulb of *Erythronium*, showing new lower growth to right.



FIG. 16.—Corm of *Colchicum*, showing new growth to left.

In this way there is no likelihood of the new corms coming too near the surface to be injured by frost, etc.



FIGS. 17, 18.—Corm and section of *Bulbocodium*, showing new lower growths at side.

This volume is devoted to those plants which have either bulbs, corms, tubers or tuberous roots, and rhizomes, and therefore embraces many families of flowering plants (both Monocotyledons and Dicotyledons) from all parts of the world. Orchids—a large and important family requiring a volume to themselves—are excluded.

FUNCTIONS OF BULBS, CORMS, TUBERS, AND RHIZOMES

Apart from the plants described in this volume being characterised by having either bulbs, corms, tubers, or rhizomes, they all agree in one important respect—they are all *herbaceous* plants and they are all *perennial*. That is to say, their aerial parts (flower-stems and

FUNCTIONS OF BULBS, CORMS, ETC.

leaves) are soft and herb-like in texture, and there is nothing *woody* about them as seen in trees and shrubs, and their underground organs may live for several years. The possible exceptions are *Beschorneria* and *Testudinaria*, which have swollen woody bases. It will prevent misunderstanding to state that *perennial* herbaceous plants¹ may be divided into various groups. Thus they may be either (1) *hardy*, (2) *half-hardy*, or (3) *tender*—each group requiring different culture, treatment, and temperature. Again, herbaceous perennials may be either (1) *deciduous*, in which the floral stems and leaves die down every year, and the root-stock has a period of rest (as in Tulips, Daffodils, Hyacinths, Begonias, Pæonies, Solomon's Seal, Arum Lilies, etc., etc.); or they may be (2) *evergreen*, in which the plants are always in a state of growth, and have foliage at all periods of the year (as with *Paneratiums*, many *Crinum*s, some *Irises*, etc.).

It may be well to bear these distinctions in mind, as there is a popular and consequently erroneous impression that *all* herbaceous plants are *hardy* and die down to the ground each year.

We may now consider why certain plants are provided with bulbs, corms, tubers, or rhizomes. We have already seen that the normal stem has been reduced in the case of the bulb to a very small compass—a mere disc-like mass with the thick fleshy leaves densely arranged upon it. If a bulb of a Tulip, Hyacinth, or Daffodil is cut through vertically and compared with a ripened bud of a Horse-chestnut, Lilac, or Ash, it will be seen that they are all very similar in structure. In the centre will be found the miniature flower-stem with its incipient blossoms packed away into the smallest possible compass, and carefully protected with the enveloping scales—really leaves specially modified for this particular purpose. In the case of bulbs, however, which are detached and independent bodies (unlike the buds of the Horse-chestnut, etc.), the scale leaves are not only protectors; they are also storehouses in which food and nourishment have been stored away by the green aerial leaves before these withered and died. The corm or solid “bulb,” and also the tuber and rhizome utilise the stem, and not modified leaves, in which to store up their nourishment in the same way for the development of future growth. Consequently, season after season this work is going on, and as the older storehouses

¹ “Annuals” and “Biennials” of all kinds are necessarily herbaceous in character, but are not considered in this volume, as they have neither bulbs, corms, tubers, nor rhizomes.

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(either as bulbs, corms, tubers, or rhizomes) decay and die, they are replaced by new ones. If it were not so, especially in our climate, there would be great danger in many cases of the plants dying out altogether—especially as many of them are difficult or impossible to raise from seeds. When there seems to be any risk of a plant being unable to reproduce itself readily by means of seeds, Nature has endowed it with the power of multiplying itself in other ways which are considered under the Chapter on “Propagation.”

The point to bear in mind, however, at present is that the new bulbs, corms, tubers, or rhizomes underground can only be produced by the healthy assimilative action of the leaves, and the absorptive powers of the roots.

CONTRACTILE ROOTS

In connection with the annual reproduction of new corms in such plants as *Crocus*, *Gladiolus*, etc., it is interesting to notice a very extraordinary action of the roots. During the period of growth if a corm of a *Gladiolus* or *Tritonia* (Fig. 19) be taken out of the ground carefully it will be noticed that there are two kinds of



FIG. 19.—*Tritonia Pottii*, showing new corms and contractile roots.

roots present—(1) the fibrous feeding or absorbing roots, and (2) thicker ringed roots. The latter play a very important part in keeping the new corms at a proper distance beneath the surface of the soil. It is obvious that by the superposition of the new corms on top of the old ones year after year, there would be a danger eventually of them coming through the surface of the ground. They would thus be exposed to the dangers of frost, etc. It is well known, however, that neither corms nor bulbs, no matter how many years they

have been in the soil, ever come through the ground. On the contrary, they seem to bury themselves deeper and deeper, thus keeping away from the frost, and in surroundings several degrees warmer than the soil immediately at the surface.

CULTIVATION IN THE OPEN AIR

Corms and bulbs are kept down in the soil in this way by means of special roots called "contractile." These are the thickish ringed roots referred to and shown in the sketches (see Figs. 3, 6, 14, 19). It appears that when the new corms or bulbs have developed fairly well, these contractile roots have already pushed their way deeper into the soil, lower than the older corms. In due course they begin to contract, and in this way they exert sufficient force to pull down the new corms to a lower level, perhaps even lower than the parents were the previous season. The marvellous power possessed by these contractile roots is one of the most mysterious functions of bulbous plants, and it is only another instance showing how carefully and beautifully everything was thought of "at the beginning."

CULTIVATION IN THE OPEN AIR

SOILS AND COMPOSTS

If this volume were confined to the consideration of hardy plants alone, it would be a comparatively simple matter dealing with the soil. But as we are dealing not only with hardy plants that may be always grown in the open air, but also with those that must be sheltered in a greenhouse and hothouse and are often grown in pots, it becomes necessary to take a wider view of the subject, treating the outdoor cultivation and the indoor separately.

Generally speaking, most of the hardy bulbous, tuberous, and rhizomatous plants (of which a list is given at p. 32) will flourish in any well-drained, deeply dug or trenched and well-manured garden soil. Indeed, some like the tuberous Sunflowers, the *Bocconias*, the *Aconites*, *Doronicums*, *Hemerocallis*, etc., will grow in any but the very worst sour and swampy soil, so vigorous is the action of their roots. Advantage may be taken of such coarse or free-growing plants to improve soil that is generally regarded as poor and infertile. They will find not only nourishment in it, but owing to the action of their rapidly spreading roots, they bring about a much better condition of the impoverished soil after a season or two of growth.

No one, however, wishes to be saddled with poor and hungry or swampy soil if better can be had. The ideal garden soil is one called loam—a fairly well-balanced mixture of clay and sand, with a fair amount of humus (or decayed organic material), and a certain

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proportion of lime. Such a soil will be easy to dig or trench; will retain a sufficient amount of the necessary moisture without becoming water-logged with sour and stagnant liquid; and will give generally good results. According to the different kinds of plants grown, however, it may have to be modified in places to meet certain peculiarities. Thus, the addition of more peat or leaf soil may be necessary for some plants, while more sand, grit, loam, or clay may be required for others.

For true bulbous plants, anything savouring of wet, heavy, clayey soil is unsuitable. It is cold, wet, and stodgy, and very difficult to turn over. But if bulbous plants are to be grown in such a soil, turned over it must be, and that to a depth of 2 or 3 feet into the bargain. To bring a heavy, wet, clayey soil into anything like a proper tilth, it should be trenched about 3 feet deep, bringing the soaked and soddened bottom soil to the surface, there to be relieved of its sour and superfluous moisture, and to have its clods and particles sweetened and broken down by exposure to the weather. Very few people possess the courage to do this; and the great majority—speaking with all the confidence of those who have never done such a thing—will at once condemn the operation as being unsound both in theory and in practice. Rather than do it once, they prefer to be troubled for years with a cold, wet, and hungry subsoil that robs the upper layer of all its heat and most of its value for growing purposes. Bulbous or other plants on such a miserable soil reflect its condition in their own wretched appearance.

Where, however, a wet or clayey soil has been deeply trenched, and has had a good supply of manure, and grit or sand incorporated with it, a wonderful improvement takes place even in a few months. The superfluous water trickles downwards to the lower regions and no longer steals the sun's heat from the roots of the plants; the temperature is consequently raised, and this in turn reacts upon the tender living material (the protoplasm in the tips of the roots of the plants). The grit will absorb the heat from the sun, and the clayey particles and manure will hold it between them and prevent its rapid radiation at night-time. The gases of the atmosphere—the oxygen, nitrogen, and carbonic acid—will enter more readily into the soil, and in conjunction with the rain and moisture will dissolve the mineral and metallic food so necessary for the growth of plants. By day and by night the temperature of a heavy soil treated in the way mentioned will be more equable, being neither too hot nor too cold, nor too wet or too dry. Another advantage is that there will be comparatively

CULTIVATION IN THE OPEN AIR

few weeds, and if the hoe is kept fairly well in use, there will be little or no trouble from insect pests.

An improvement in a wet, heavy soil may be accelerated by the addition of quicklime to the surface after trenching and manuring. About a bushel of quicklime may be spread in small heaps over every 30 square yards of ground. Each little heap should be covered with some of the wet soil and left for about ten days. During this time the moisture from the soil will be absorbed by the lime, which thus becomes slaked and powdery. It is then easy to spread the heaps of soil and slaked lime evenly over the surface, but not dug in. As time goes on the lime gradually dissolves and sinks into the soil, and, coming in contact with the buried manure, liberates fresh food, and encourages the development of those mysterious soil bacteria which are so essential to good cultivation.

Whenever a new garden is being started, or where it is intended to renovate an old one and do things properly, it will be found best to adopt the practice of deep cultivation. All surface weeds and rubbish can be easily disposed of by burying them in the trenches as the work proceeds—the rank, green, and undecayed refuse being put at the very bottom, the best-rotted material being retained for placing in the last trench near the top.

Once a garden soil has been treated somewhat in the way indicated, there will be no necessity to disturb it so deeply again for some few years. Indeed it would be impossible to do so when once it is cropped with bulbous and other plants that are to remain for years.

In the case of old gardens and old flower-borders, however, that have become overgrown with plants, and in which the upper soil has become more or less exhausted, the best thing to do is to have all plants and bulbs taken out, preferably in early autumn, and then have the ground deeply trenched and manured, bringing the under-soil to the surface, and placing the top spit beneath to give it a rest and time to recuperate its lost strength.

DEPTH FOR PLANTING BULBS

In the following pages it will be noticed that the usual sizes or diameters of most of the bulbous plants are given, and that these vary from $\frac{1}{2}$ inch to 2, 3, 4, or more inches. So far as planting bulbs that are to be grown under glass is concerned there is practically no question of depth involved, as they are nearly all so placed in the

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soil that the tops are either level with the surface, slightly below it, or a little above it.

In the case of hardy bulbs, however, that are grown in the open air and are planted in the autumn, the conditions are not identical. There is no protection from frost on the surface of the soil, and rats and mice and other marauders would more easily destroy bulbs on or near the surface. The main point involved, however, is one of protection from frost. As the bulbs vary so much in size, some being very small and some very large, it becomes necessary to plant them at various depths, according to their size. It would never do to plant a Crocus corm or Snowdrop bulb so deeply as the large bulb of a Liliun. But how is one to know the proper depth for the many kinds of bulbs in cultivation? By the adoption of this simple rule:—Plant a bulb, corm, or tuber in the open air at a depth about equal to three times its own diameter; or, in other words, cover the bulb, corm, or tuber with twice its own depth or diameter of soil.

CULTIVATION UNDER GLASS

Although the preparation of the soil for the reception of outdoor hardy bulbous and tuberous plants may entail a good deal of time and labour at first, it is easy when compared with the trouble and expense of cultivating plants in greenhouses and hothouses. Here the soil has to be brought from a distance, and the wise gardener will make arrangements to have stacks of good turfy loam (the top spit from a piece of pasture land), peat, and leaf-mould always at hand; in addition to which there should always be a good supply of sharp silver or river sand available. Different sizes of pots and pans must also be purchased; and sieves or riddles of $\frac{1}{4}$ -inch, $\frac{1}{2}$ -inch, and 1-inch mesh will also be handy for sifting and mixing the various composts that will be required from time to time.

The operations of growing plants in pots or even in borders or beds of soil under glass are much more intricate and detailed than those in the open air. The pots or other receptacles used should be quite clean to begin with, when any fresh potting is necessary. Pots that have been in use for a year or two often become covered with a greasy slime on the outside. This makes them not only unsightly, but also difficult to handle; besides which the passage of air through the pores of the burned clay is rendered difficult or impossible. This means a certain amount of harm to the roots

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of the plants, which require to have as much fresh air at their disposal for breathing purposes as the stems and leaves. Earthenware pots, etc., therefore, should be kept fairly clean, and this can only be done by washing them. In a garden, boys are generally utilised for the purposes of "potwashing," as well as other multifarious duties unsuitable for men. The usual method is to soak the dirty pots for a few hours or days in tubs or tanks of water. This loosens the slime and dirt, and it is then more easily removed with a fair amount of "elbow grease" and a scrubbing brush. In my young days in the nursery even a scrubbing brush was not provided, and the dirt had to be removed with a piece of old matting and some ashes from the ashpits. To wash 1000 3-in. pots (60's) or 800 5-in. pots was considered a fair day's work from 9 A.M. to 6 P.M., and stand them out to dry into the bargain. Potwashing is just as simple now as then, but the same importance is not attached to it—especially in market nurseries. In these a "rub round" with a wisp of hay or old matting is often sufficient except for some of the choicer crops. Potwashing-machines, however, are now in existence, and are used in some establishments, private and otherwise.

Crocking Pots.—This is another more or less essential operation when growing plants in pots. It consists in placing a layer of broken pieces of pots in the bottom of the pots, over a larger and flatter piece known technically as a "stopper." This stopper should be as flat as possible, but many gardeners like to have it curved with the convex side uppermost. The object of a flat stopper is to make it more difficult for worms to get into soil from the hole in the bottom. The presence of worms is most undesirable, owing to the runs or channels they make in the soil, and through which the water passes freely without wetting the main body of compost. Therefore a flat stopper is much more likely to keep them out than a curved one; and this is a point worth considering when plants are placed on earthen beds or stages, or in the open air for a time.

The main object of crocking pots is, of course, to secure adequate drainage for the soil. Unless the water is allowed to pass away freely, it would remain in the soil, and after a few more waterings had taken place, the hole in the bottom of the pot would become silted up and blocked. The result would be that no more fresh air could enter the soil, and this would become soured and poisonous to the roots of the plants owing to the fetid stagnant moisture and decaying organic material.

It is an easy matter to see when the drainage of a pot is

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imperfect. The water, instead of passing through the soil readily, will remain for hours on the upper surface, waiting to be evaporated by the heat of the atmosphere. Unless the bad drainage is soon rectified, the plants show signs of suffering, and if they could only speak, we should hear constant wailing from many badly watered plant-houses in the Kingdom. The lower leaves being the oldest, soon begin to assume a yellowish tint, and later on they drop off one by one until the youngest leaves and buds only are left. These too will soon give up the struggle if the drainage is not put right.

Watering.—The question of drainage is naturally bound up with that of watering. In the open air, as a rule, plants have to be satisfied with the moisture obtained from the clouds, and this may vary according to the district from twenty-five hundred tons to eighty hundred tons of water per acre in the course of the year, as stated at p. 31.

With indoor plants, however, the case is different. The rain cannot fall upon them or upon the soil; moisture must therefore be supplied in other ways. Water-tanks are usually built in the glass-houses, and the water is either laid on, or pumped from wells by windmills, or gas or oil engines. The actual application of water to the plants is usually by means of water-pots, although hose-pipes are often used in large commercial establishments, and are a great saving of time, labour, and money. Watering plants with the hose has the drawback that individual plants may be overlooked now and again, or if water-logged are apt to get more than is good for them.

When water-pots, however, are used, it takes much longer to get through with the work. The careful gardener looks at every plant, and his experienced eye will enable him to judge at once whether water is required or not. If he is not quite sure, he will either feel the surface soil with his fingers, or ring the pot with his knuckles. A more or less clear and hollow sound will indicate a dry soil, while a dull and less audible sound will denote that the soil is already moist enough for the time being. Generally speaking, when the soil is inclined to be dry it is given a good supply of water right up to the rim of the pot, pan, tub, or other receptacle holding the plant. If the gardener judges the soil to be wet enough to last until the next time the operation is due, no water is given to the plant. Picking out the wet and dry plants in this way necessitates care, attention, and keen observation

CULTIVATION UNDER GLASS

on the part of the gardener, and obviously occupies much more of his time than watering all over the plants with a hose would. The safe rule to follow when watering is—when dry, give a plant plenty; when wet enough to last till next time, give none. By following this rule, the plants will be kept in good health and a steady rate of growth.

With bulbous and tuberous plants perhaps a little more care and knowledge of their individual peculiarities are necessary than with fibrous-rooted ones. Many bulbous and tuberous plants require a period of rest at some particular period of the year. The gardener knowing this period, watches its approach and regulates his supplies of water accordingly. As the plants show signs of going to rest by the yellowing of the leaves and their gradually falling away, watering becomes less frequent, and more air and light are given to the plants to hasten the ripening process.

Again, after the resting period is at an end, and the bulbs or tubers show signs of new life, the plants will require more and more water until they are in the full vigour of their growth. It is this continual and gradual change from the active to the dormant state, and *vice versa*, that requires to be taken into consideration when giving water to the plants.

Syringing.—Besides supplying water properly to the roots of plants it is often necessary to apply it also to the stems and foliage, more especially perhaps with stove or hothouse plants, and in a lesser degree to greenhouse plants. It is well known that the drier the atmosphere the greater the amount of moisture evaporated from the millions of pores or stomata on the leaves of plants. Conversely, the more heavy laden the air is with moisture, the slower will be the evaporation from the leaf surfaces. According, therefore, to the humidity of the atmosphere surrounding stove and greenhouse plants will the operation of syringing be regulated. In hot dry weather it may be necessary to syringe three or four times a day, in addition to damping down the pathways and stages of the house. During the winter months, however, and during cold or dull spells of weather, there will not be the same necessity for so much syringing. The gardener, therefore, who wishes to grow his plants well under glass must be a kind of meteorologist or weather-prophet, and vary his work according to circumstances. What he does one day, and would be perfectly correct in doing, may be altogether wrong the next day, simply because the weather conditions were totally different.

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The main object of using the syringe is to counteract the process of evaporation that is going on unseen to the naked eye from the leaf stomata. "Unseen" is perhaps scarcely accurate, for it becomes obvious on a hot day (even when the soil around the root is quite moist) that unless the syringe is used to moisten the air, the leaves soon begin to droop. Why is this? Simply because the cells are being emptied by evaporation of the water that has been supplied to them by the roots. It may therefore happen, and frequently does happen, that the leaves of a plant will give off moisture much more quickly than the roots can absorb it from the soil. In such cases, therefore, it becomes not only necessary to syringe the foliage freely, but also to lessen the amount of sunshine by shading the glass with canvas, or smearing it with whitewash or other mixtures used for the purpose.

There are now many syringes on the market, but it is advisable to have those that give a fine mist-like spray, and are provided with suitable nozzles and bends. The finer the spray, the more perfect is the wetting of the foliage; and if insecticides or fungicides are used under other conditions, the more economically and effectively will they be distributed with a good syringe.

A secondary advantage of syringing plants is that the foliage is kept clean from dusty or sooty deposits. These if allowed to remain too long, block up the breathing pores (stomata) to a great extent, and thus interfere with the absorption of carbonic acid gas from the atmosphere during the daytime, as well as with the exhalation of oxygen from the tissues. Dust, dirt, or any other foreign deposit on the leaves and stems of plants, not only render breathing difficult, but as the supply of light is also diminished by their presence, the work of assimilating the food from the air and the soil is greatly impeded. The result sooner or later is a yellowish, sickly, dirty appearance of the whole plant.

Sponging.—This operation is often performed on the leaves and stems of plants grown under glass, when they happen to be badly affected by insect pests such as scale or mealy bug, or covered with dirt that cannot be readily removed by syringing. It consists in washing the leaf surfaces often with clean tepid water, but usually with a solution of soft soap, quassia chip, or nicotine, or some of the well-advertised insecticides and fungicides. The leaves are placed on the outstretched fingers and palm of one hand, and carefully washed with a sponge saturated in the solution. In this way pests and dirt are removed, more light and fresh air are given to the

LIFTING AND STORING BULBS

tissues, and consequently the whole plant becomes happier and healthier because cleaner and freed from its natural enemies. As a rule, there is not much difficulty in removing scaly pests, etc., from the leaves or stems of plants; but sometimes in very neglected cases it may be necessary to remove them first of all with a piece of pointed bamboo stick, afterwards sponging and washing in the usual way.

LIFTING AND STORING BULBS

Although these points are dealt with in special cases in this work, it may be as well to touch upon the subject in a general way. Many if not most bulbous plants are deciduous; that is, the leaves die away each year, and the bulbs, corms, tubers, or rhizomes, as the case may be, remain dormant or quiescent for a certain period. Other bulbous plants, however, present an evergreen appearance—many of the *Crinums* and *Pancratiums*, for example—and are consequently in a state of growth throughout the year, passing from weak to vigorous stages according to their nature and the season.

So far as deciduous bulbous plants are concerned, if grown in the open air, it matters little in many cases whether the bulbs or tubers are lifted annually, or whether they are left in the ground undisturbed for a number of years. Some, such as *Daffodils*, *Crocus*, *Snowdrops*, *Bluebells*, *Scillas*, *Chionodoxas*, *Muscaris*, some *Liliums* (e.g. *L. candidum*), *Fritillarias*, to mention only a few, are decidedly best left in the soil for some years when they are doing well, and if they have been planted in borders or shrubberies, or in grassland. In this way they increase and multiply naturally, and give more gorgeous displays of colour year after year, especially if they have been fed by placing a layer of some well-decayed manure over them after the leaves have died down.

Other bulbous plants like *Hyacinths*, *Tulips*, *Gladiolus*, and *Tigridia*, and some of the rarer and more tender kinds, are perhaps best lifted every year after the flowers are past their best. Unless it is desired to save seeds, this is usually the best time to lift bulbous plants. The foliage should show signs of yellowing, and this indicates that the work of assimilating food is nearly at an end for that particular season. When any of these bulbous plants are grown in formal beds on the lawn, it is almost essential to get them up and stored out of the way to make room for other plants to take their

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place, and to admit of the beds being redug and manured if necessary.

Having decided to take the bulbs out of the ground the operation is perhaps best performed with a fork. There would be too much danger of chopping the bulbs up if a spade were used. The tool should be driven down straight, so as to get it well below the bulbs, and the soil should be lifted and turned over or thrown forward very much in the same way as when digging potatoes. The bulbs should be picked out by hand into baskets or shallow boxes, in which they can be afterwards taken away and spread out to dry. In this way the soil can be removed from them easily in due course, and the process of grading the bulbs into the different sizes can be performed more readily. Bulbs or tubers lifted in the autumn like *Gladiolus*, *Montbretias*, *Tigridias*, *Watsonias*, etc., may be stored in dry soil, sand, or fibre, and kept in a frost-proof cellar until the spring. The bulbs of such plants as *Tulips*, *Daffodils*, *Hyacinths*, *Crocuses*, etc., that are taken up in spring or early summer, may be spread out in layers on shelves made of slating battens, or they may be stored away in shallow wooden trays that are now so much in use, and are very convenient for storing large numbers of bulbs into a small space. It will be necessary to keep bulbs of this character in cool, shady, and well-ventilated sheds, and it will be better if only one, or at the most two, layers of bulbs—certainly of the best bulbs—should be placed on each shelf.

Bulbous or tuberous plants grown in pots may be allowed to remain in the old soil during the dormant period. The pots, however, should be placed on their side and stacked away on top of each other as shown in the diagram. In this way, if placed under the stage of a greenhouse, the dripping water from the plants on the shelves will not touch the bulbs and cause them to rot. When the period of growth arrives, and this is generally indicated by the new green growth appearing at the tips of the bulbs, the bulbs may be shaken out of the old soil, and repotted into a fresh compost according to the instructions given under each genus.



By treating deciduous bulbous and tuberous plants as described above, they can be kept for many years in excellent condition.

PROPAGATION

PROPAGATION OF BULBOUS AND TUBEROUS PLANTS

Of the many methods of propagation known to gardeners, all except three—budding, grafting, and layering—are practised in connection with increasing the stock of bulbous, tuberous, and rhizomatous plants. Being all herbaceous in character, such methods as budding, grafting, and layering are not generally applicable, being reserved for woody plants. Occasionally Dahlias may be grafted on to the tuberous roots, and the tuberous roots of herbaceous Pæonies are often used as stocks on which the fibrous-rooted Tree or Moutan Pæonies are grafted. With these exceptions, however, the great bulk of bulbous and tuberous plants are increased by other methods. The principal of these are:—(1) Offsets; (2) Spawn or Cloves; (3) Scales; (4) Bulbils; (5) Division of the root-stock; (6) Cuttings; and (7) Seeds. It may be well to say something about each of these methods of propagation.

OFFSETS.—By far the greater number of plants having true bulbs and corms, and also most tuberous-rooted plants, are propagated by means of “offsets,” which are produced in greater or less numbers from the old stocks. In such genera as *Anemone*, *Aconitum*, *Chionodoxa*, *Colchicum*, *Crocus*, *Doronicum*, *Fritillaria*, *Galanthus*, *Gladiolus*, *Hyacinthus*, *Leucojum*, *Lilium*, *Montbretia*, *Muscari*, *Narcissus*, *Ornithogalum*, *Oxalis*, *Scilla*, *Tritonia*, *Tulipa*, etc., the parent bulbs or tubers produce offsets freely. When it becomes necessary to increase the stock, the old plants are lifted, usually in the dormant season, or just before growth recommences, and the offsets are detached from them. In all cases the offsets may be looked upon as vegetative growths or children representative of the vigour of the parent plant. They arise from the superabundance of nourishment elaborated from the soil and air by the healthy leaf-action of their parents. The original bulb, corm, or tuber being unable by itself to retain all the food sent down by the leaves, is necessarily compelled to build as it were separate annexes to accommodate the surplus material. In this way “offsets” arise, and if not interfered with, will in due course carry out the same principles of growth as their parents. This explains the way in which a few bulbs, corms, or tubers will in the course of a few years

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give rise to a numerous progeny, and occupy far more space in the garden than was originally allotted them.

As we shall see later on when discussing seeds, the production of these offsets are of great value to the gardener. Many bulbous and tuberous plants produce very little or no seed, consequently it would take many years to raise a large stock of plants of these were it not that they lent themselves readily to other methods of reproduction.

It may be taken as a general rule that bulbous and tuberous plants are raised by the readiest means at hand, and this happens in most cases to be "offsets." Every offset, large or small, if taken off at the right time and planted properly, has the makings of a new, complete, and independent flowering plant in it. As a rule these offsets are attached close to the parent bulb corm, or tuber; but occasionally, as in Tulips and in Montbretias, and in some Liliiums, they are produced at the end of a creeping runner-like body, or along a rhizome. This accounts for what is known as "dropping" in Tulips, in some cases of which the offsets are several inches lower down than the parent bulb.

As all offsets are not of equal size and value, they should be graded, the largest and best being planted in beds by themselves, the medium and smaller ones (which may take two or three years longer to reach the flowering stage) being also placed in special beds until they are large enough to be again transplanted.

SPAWN or CLOVES.—Some plants, such as the Gladiolus, not only produce a few new corms from the older shrivelled ones, but also several much smaller bodies around the base. These are popularly called "spawn," or individually "cloves" (see Fig. 6), and are akin vegetatively to the bulbils borne in the axils of the leaves of some Liliiums. These cloves may be stored away till spring-time in sandy soil, and then sown in special beds of gritty mould and covered with about 1 inch of soil. At the end of two or three years they will have attained the size of flowering corms, and may then be treated like those.

SCALES.—Apart from the offsets of the bulbs of Liliiums, many of the fleshy scale-leaves are broken away or detached in the process of lifting and replanting; each one of these scales may be utilised to produce a new bulb. If stuck more or less vertically into rich and very gritty soil, a little bud is soon produced at the base. In due course this little bud swells into a little bulb, and at the end of three or four years it will attain the flowering stage. Very often the scales are simply covered with an inch or two of sandy soil in a

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special bed, and left to look after themselves until they throw up flower-stems.

In the case of the florists' Hyacinth, although these little bulbs are not produced in the same way as on the *Lilium* scales, they can be induced to develop on the base of the old bulb. This is cut across in several places, and sometimes even the "disc" or woody base plate is cut out altogether. The old bulbs are then

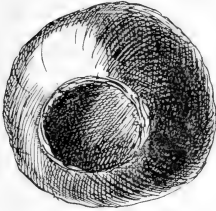


FIG. 20.—Hyacinth bulb,
back view.

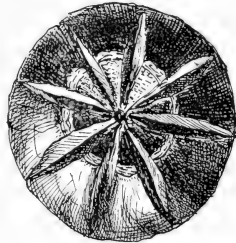


FIG. 21.—Hyacinth bulb, showing
cuts.

spread out to dry, and by and by small buds or bulblets are produced on the cut surfaces. When large enough to handle easily these baby bulbs are detached and planted an inch or two deep in rich and very sandy soil. The sketches show how the bulbs are cut across the base with a sharp knife, and how the young bulbs develop in the scars later on. Fig. 20 shows the base of a Hyacinth bulb before cutting. Fig. 21 shows how the bulb has four cuts made right across, making eight slits altogether. The cut surface soon heals up, and in due course a number of vegetative buds appear in the slits, as shown in Fig. 22. From these buds new Hyacinth bulbs are eventually produced.

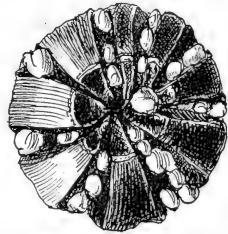


FIG. 22.—Hyacinth bulb, showing
buds in cuts.

BULBILS.—These are roundish vegetative growths often seen in the axils of the leaves on the aerial stems of some *Lilium*s and a few other plants. Why these bulbils should be produced is a mystery, but it is thought that they appear in cases where the conditions for reproduction by seeds or other methods are not favourable. By the end of the growing season these bulbils are

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thoroughly ripe, and separate themselves from the parent plant and are blown about and carried away by the wind until they settle down in some sheltered crevice—there to grow and bring forth new plants in due course. In cultivation when it is considered worth while, any bulbils may be sown in spring as if they were seeds, covering them with about twice or three times their own depth of soil. When taken from bulbous plants, they reach the flowering stage much quicker than seeds, but not nearly so quickly as offsets.

DIVISION OF THE ROOT-STOCK.—This is a simple and rapid method of increasing many kinds of tuberous and rhizomatous plants, as well as many fibrous-rooted herbaceous perennials. Such plants as Aconite, Pæony, Doronicum, Arum Lily, Caladium, and many others, produce numerous offsets or young growths from the parent root-stock, and these may be detached just before growth recommences, or when the plants are lifted or disturbed in autumn or spring, or other dormant period. Each detached portion so long as it has at least one bud attached will develop into a plant by itself in due course, treating it in the same way as recommended for the parent or established plant. Even with tufted plants like the Agapanthus, Hemerocallis, Schizostylis and others, if the main shoots are separated carefully so that each has a supply of roots, there will be no difficulty in establishing the separated portions. In the case of the German, Florentine, and other Irises, and in Solomon's Seal, the rhizomes may be so hard and thick that it may be necessary to cut them through with a strong, sharp knife, although as a rule they are easily enough broken. In dealing with such plants as Aspidistras, it is better to sever the rhizomes with a sharp knife, each portion having a bud or two attached. With Lilies of the Valley the rhizomes are easily separated, but it will be noticed that the thicker and fatter the buds are the more likelihood there is of having flowering shoots (see p. 149).

CUTTINGS.—With bulbous plants proper, *i.e.*, those belonging to the Monocotyledonous group, there is no opportunity of raising them from cuttings, neither can they be budded or grafted, as their stems possess no cambium layer like the Dicotyledons. Such tuberous-rooted plants, however, as Dahlia, Begonia, and Gloxinia are readily raised from cuttings of the young stems, or by means of the leaves, as described under each of those genera. Indeed, so far as this volume is concerned, these are about the only plants which

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can be propagated by stem or leaf cuttings, although they may also be increased by division of the roots, by cutting the tubers into pieces, or by seeds in the ordinary way.

SEEDS.—Most bulbous, tuberous, and rhizomatous plants may be raised from seed. There is, however, a wonderful difference in the length of time between the sowing of the seeds and the development of flowering plants. Thus, such dicotyledons as Begonias, Dahlias, Gloxinias, Cyclamen, etc., having tuberous roots or stems, may be easily brought to the flowering stage in the first year of their growth from seed. Many other plants in this group may take a year or two to accomplish their complete cycle of growth—that is, from the time the seed is sown until the flowers develop and ripen seed again; but with true bulbous monocotyledonous plants it may take from three to seven, eight, or ten years before a good flowering bulb or corm can be produced. There are a few exceptions to this rule, notably the Freesias and the Gladioli; but, generally speaking, it takes several years to raise flowering plants of such well-known bulbous plants as Daffodils, Tulips, Hyacinths, Liliiums, etc., from seeds. However, specialists do it, and wonderful creations have rewarded their skill and patience with such plants as Daffodils, Narcissi, Gladiolus, Liliium, Freesia, etc.

The difficulty of raising true bulbous plants from seed being thus so great and occupying so much time and attention, it is only natural that they should be propagated by the much easier and more simple method of offsets. When plants are increased by any other method than seed, there is one consolation, and that is the fact that any particular species or variety may be kept perfectly true and pure. When, however, plants are raised from seeds, and especially when they are readily fertilised by insects, there is always the chance of variation in colour, habit, and constitution in the progeny raised from the seeds of such plants.

Cross-fertilisation and Hybridising.—This knowledge of course is of the greatest value to the hybridist. Knowing how easily one species will cross or breed with another, he selects and controls the operation in the case of those species or varieties in which he is particularly interested. In this way by transferring the pollen from the stamens of a certain variety to the stigma of another, he effects what is known as crossing or hybridising. When the same species or variety is fertilised with the pollen from a similar species or variety, the process is simply known as cross-fertilisation, and roughly corresponds to the marriage of people

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of the same race or nationality. When, however, two quite distinct species or quite distinct varieties are fertilised with each other's pollen (the operation may often be carried out both ways, so that a "reverse" cross is produced) the plants are said to be hybridised, and if any progeny result they are said to be "hybrids." Hybridising is analogous to marriage between quite distinct races.

FORCING AND RETARDING BULBOUS PLANTS

For many years gardeners have been well acquainted with the effects of a high or a low temperature upon plant life, and advantage has been taken of this knowledge to bring some plants into flower before their natural period, or to prevent them from flowering until that period is over. The process by which plants are brought into early flower is known as "forcing," while that by which they are kept in check or suspended animation is known as "retarding." One process is really the antithesis of the other. Thus in the winter months when it is desired to have Tulips, Daffodils, Hyacinths, Crocuses, Gladiolus, Lilliums, etc., in flower, the plants are placed in a high temperature and in an atmosphere more or less charged with moisture. Before this stage is reached, however, the bulbs have been placed in pots or boxes of soil with the tops just showing in some cases, or the bulbs are only placed on the soil side by side in others. Hardy kinds are then stood outside in a sheltered spot and covered with about 6 inches of soil, ashes, or fibre, and left for a few or several weeks. This protects them from frost, and root action and top growth soon become established beneath the surface. This work is generally done during October and November, so that the bulbs shall be in different stages of development. When required for forcing those first placed in pots or boxes are brought into the hothouses first, as they will be most advanced in growth. For a few days but very little light is allowed on them, but the temperature may be as high as 70° to 80° F., and there will be also abundant moisture in the atmosphere. At the end of a few days the yellowish tint of the leaves or shoots begins to deepen into green. Then more light may be given, and the flower-stems having been drawn up by the absence of light now begin to swell the buds rapidly. In due course (according to the kind of plant that is being forced) the flowers begin to

FORCING AND RETARDING BULBOUS PLANTS

open, and as soon as they are in fit condition they are either cut and stood in water to be "bunched" for market, or taken into the house; or the entire plant or plants are transferred to cooler quarters in the conservatory or dwelling-room, or to any place they may be required.

Once plants have been forced in a high temperature they are generally regarded as of no further use, and are thrown away. Certainly they will not be of much value for flowering purposes for at least two or three seasons. If, however, they are planted out in some vacant piece of ground and left undisturbed for two or three seasons, it is astonishing how many bulbs of such plants as Tulips and Daffodils will recuperate, and reach the flowering stage in that time. Commercially it would scarcely pay to wait for these old forced bulbs to flower; and a new stock is purchased each season.

Retarding Bulbous Plants.—Many plants are now prevented from flowering at their natural period simply by placing them in a refrigerating chamber, in which the temperature is maintained a degree or two lower than freezing point (32° F.). In this way the protoplasm in the plant cells is kept in a state of suspended animation—or almost like hounds held in leash; they are anxious to start into growth but cannot do so until the temperature reaches the normal point. How long it would be possible to keep bulbous or other plants alive or unimpaired in vitality there are no statistics available; but it may be stated that many Liliums (chiefly *L. longiflorum*) are kept for eighteen months and two years in a cold chamber, and when taken out produce an excellent crop of flowers. Some large growers have their own retarding or refrigerating plant, while others prefer to pay a reasonable rent for the cold storage of their bulbs to some of the refrigerating companies.

Amongst bulbous and tuberous plants that may be readily "forced" or "retarded" are the following:—

Begonia.	Freesia.	Ixia.	Polianthes tuberosa.
Convallaria.	Gladiolus.	Leucojum.	Polygonatum multi-
Crocus.	Gloxinia.	Lilium.	florum.
Dicentra.	Hippeastrum.	Montbretia.	Richardia.
Eucharis.	Hyacinthus.	Narcissus.	Tulipa.

BULBOUS AND TUBEROUS PLANTS
FOR CUT FLOWERS

A very large number of bulbous and tuberous plants are cultivated for their cut flowers alone, and in many cases an enormous business is done in this way. One need only mention the millions of Daffodil and Narcissus blossoms that are sent to the markets every spring from the Scilly Islands, and the various market gardens around London and in the Provinces, to give an idea of what commerce is done. Of course almost any flower of a bulbous or tuberous plant may be used in a cut state, but there are many species the blooms of which are not adapted for this purpose, or else they are so fleeting in character that it is hardly worth while severing them from the plant. In this place we are only considering those kinds that are specially suitable for decorative purposes in the cut state, either privately or commercially.

There is one feature about cutting the flowers of bulbous plants, and that is, the benefit accruing to the plants themselves from the operation. If the blossoms are allowed to remain upon the plants until they wither, and seeds begin to form, a good deal of reserve material is taken out of the bulbs, tubers, corms, or rhizomes to enable the plants to ripen their seeds. It is obvious, therefore, that by cutting off the blooms when fresh, there will be no extra strain upon the plants. Consequently more reserve material will be available for the production of fine blooms the following year. It may therefore be said that cutting off the flowers really strengthens the plant, and enables it to produce for many years a good supply of blossom.

When bulbous plants are grown for cut flowers, either in market gardens or under glass, they are grown in hundreds, and hundreds of thousands, so that a supply shall be always available during the season. Sometimes the prices are very low, owing to an enormous quantity appearing on the market at the same time; but at other times fairly high prices are realised. Of late years efforts have been made to avoid gluts by keeping back or retarding the blooms until they were wanted, because experience shows that a steady market at a reasonable figure is better than a jumpy market, in which very high prices rule one day and very low ones the next.

In private gardens, of course, cut flowers are always a feature; and the gardener who is skilled enough to keep up a good and

BULBOUS PLANTS FOR COLD GREENHOUSES, ETC.

constant supply of blossom for the house, is a man worthy of a higher wage than is usually considered sufficient.

The following is a list of bulbous, tuberous, or rhizomatous plants that may be grown largely for the purposes of cut bloom:—

Alstrœmeria.	Iris, Spanish.
Arum Lily (Richardia).	Iris, German.
Amaryllis Belladonna.	Iris, Florentine.
Anemone.	Ixia.
Brodiaea.	Lilium.
Brevoortia.	Lily of the Valley (Convallaria).
Convallaria majalis (Lily of the Valley).	Montbretia.
Crinum Moorei.	Narcissus (Daffodils).
Dahlia.	Nerine.
Daffodils (Narcissus).	Ornithogalum.
Doronicum.	Pœonia.
Eucharis.	Polianthes tuberosa.
Freesia.	Polygonatum multiflorum (Solomon's Seal).
Fritillaria imperialis.	Ranunculus.
Galanthus nivalis (Snowdrop).	Richardia æthiopica.
Galtonia candicans.	Richardia Elliottiana.
Gladiolus.	Snowdrops (Galanthus).
Gypsophila paniculata.	Solomon's Seal (Polygonatum).
Hæmanthus.	Star of Bethlehem (Ornithogalum).
Hyacinthus.	Tritonia.
Hippeastrum.	Tulipa.

When cutting the flowers of bulbous or other plants, it is always well to cut either early in the morning, or late in the afternoon, or an hour or so before twilight. The cells in the blossoms will then be fairly well charged with moisture, and this will enable the flowers to last for a much longer period. If cut in the middle of the day, flowers do not retain their freshness nearly so long, the cells being less turgid, and therefore more flaccid, owing to evaporation.

BULBOUS PLANTS FOR COLD GREENHOUSES AND WINDOW-BOXES

There are now hundreds of greenhouses or glass structures without any heating apparatus, that are left in a cheerless condition during the winter and early spring months, chiefly through lack of knowledge as to how they might be utilised. By means of such hardy bulbous plants as Bulbocodiums, Chionodoxas, Scillas, Spring Crocuses, Dog's Tooth Violets (*Erythronium*), Dwarf Fritillarias,

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Hyacinths, Narcissi, Grape Hyacinths (*Muscari*), Sternbergias, Bulbous Irises, Winter Aconites (*Eranthis*) (all of which the reader should refer to in the body of the book), it is a comparatively simple matter to have a good supply of blossom at least early in the year. To secure this the bulbs of the various genera mentioned should be placed in pots or shallow pans in the autumn, say during September, October, and November. The pots or pans should be well drained and the compost should be of a light, rich, and gritty nature. Several bulbs according to size may be placed in each receptacle, and should be just covered with soil. For a month or six weeks, or even longer, they may be stood outside and covered with about 6 inches of soil, ashes, or fibre, just as if they were to be forced. When the roots have been well developed, and top growth is well established, the plants may be brought into the cold house (after washing and cleaning the outsides of the pots) and placed upon the stages. Here they will naturally be exposed to the light, and growth will then be slower and more sturdy than in the dark. Attention must be given to watering, but during the cold winter months this will be a small item. On all fine or genial days, the doors and ventilators of the greenhouse may be left open, and should only be closed on very cold or very windy days. Late in the afternoon the doors may be closed, and not opened again till after breakfast; and the ventilators may be shut right down on very cold nights, but left slightly open if the weather is at all favourable. In the event of very severe frosts setting in, it may be advisable to fill in the spaces on the stages between the pots with clean moss, dry leaves, or fine wood-wool, to prevent the frost getting to the roots; and a mat or two should be placed over the glass at night. Even with what are perfectly hardy plants when grown in the open air, these little precautions are necessary when they are grown in pots or pans in the way indicated.

The bulbous plants mentioned may also be utilised for the decoration of window-boxes during the winter months. They may be put into small pots and then plunged or buried in fibre or soil in the boxes, or they may be planted in the soil itself just as they would be in the open air. And they can be used either by themselves, or in mixtures, or in conjunction with such shrubs as Aucubas, Cupressus, Retinosporas, Golden Privet, Euonymus, etc.; or they may be top planted with Polyanthus, Primroses, Wallflowers, Double White Arabis, Yellow Alyssum, Violas, or Silenes, etc.—all of which, if planted in September or October, will come into blossom the following spring with the bulbous plants.

NATURALISING BULBOUS PLANTS

NATURALISING BULBOUS PLANTS IN GRASS- LAND AND SHRUBBERIES

Perhaps there is no better or more artistic way of improving the appearance of the landscape, especially during the early months of the year, than by the judicious planting of certain kinds of bulbs in the lawn or on grassland generally. Many kinds are admirably adapted for this purpose, inasmuch as they produce their blossoms from early January till the end of March, just the season when there is little growth of the herbage, and when it will not be necessary to use the lawn-mower. To secure an effect, it is necessary to plant hundreds and thousands according to the area of the lawn or grassland, and in most cases the work of planting should be done in autumn. By copying nature as closely as possible, far finer and more picturesque effects will be secured. Anything in the way of planting in straight lines or rows, or keeping one kind of bulbs away from another, should be avoided.

Perhaps one of the best methods of securing a natural appearance would be to mix the bulbs that are to be planted and then strew them over the ground. Some will be naturally closer together than others, but it is this very irregularity of distance that will produce the ultimate charm when the bulbs are in blossom. There will be masses of flowers in certain spots, while here and there between them will be stray blooms or smaller clusters. The bulbs having been strewn over the ground in the way indicated, they may be planted in holes made with a dibber. This will take some little time according to the number of bulbs used, but once the work is finished it will not require doing again perhaps for many a year. The holes made by the dibber can be filled in by brushing some fine soil over the grassy surface or by dropping a handful in where necessary.

Where new lawns are being made in the autumn, or when it is advisable to lift the turf to drain the soil beneath by deep digging or trenching, advantage may be taken of such operations to spread the bulbs over the ground before replacing the turf on top of it. In this way time and labour will be saved, and the soil beneath the turf will be all the better for the turning over it has received.

When it is intended to plant bulbous plants amongst trees in shrubberies, it will be well to remember that some trees and shrubs are evergreen whilst others are deciduous. Amongst such evergreen plants as Rhododendrons, Kalmias, Ericas, Pernettyas, Cherry

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and Portugal Laurels, the bulbous plants most suitable would be the taller-growing Liliums like *Auratum*, *Candidum*, *Excelsum*, *Par-dalinum*, *Giganteum*, *Hansonii*, *Humboldtii*, *Monadelpum*, *Speciosum*, *Superbum*, etc., together with *Fritillaria imperialis*, *Camassia esculenta*, *Galtonia candicans*, Solomon's Seal, etc. In this way the bulbous plants will find a foil in the evergreen foliage of the shrubs, and the latter when not in blossom will be made to look more cheerful by the flowers from the bulbs.

The following bulbous and tuberous plants may be regarded as specially suitable for naturalising in grasslands and shrubberies, those marked with an asterisk being better in woodlands, shrubberies, and banks than on the formal lawn:—

Autumn Crocus (<i>Colchicum</i>).	Milla.
Bulbocodium.	Muscari.
Chionodoxa.	*Narcissus.
Colchicum.	Puschkinia.
Crocus (Spring and Autumn).	Scilla sibirica.
<i>Eranthis hyemalis</i> (Winter Aconite).	Scilla festalis (Bluebell).
Erythronium (Dog's Tooth Violet).	Snowdrop (<i>Galanthus</i>).
Fritillaria.	Sternbergia.
<i>Galanthus</i> (Snowdrop).	*Tulipa.
* <i>Leucojum</i> .	Winter Aconite (<i>Eranthis</i>).
* <i>Lilium</i> .	

With deciduous trees and shrubs, it is generally best to utilise the dwarf early-flowering kinds of bulbous plants such as Scillas, Chionodoxas, Snowdrops, Crocuses, Winter Aconite (*Eranthis hyemalis*), to form a carpet of colour beneath them in the spring. They are particularly effective in beds or shrubberies beneath such trees and shrubs as Forsythias, Almonds and Peaches, Thorns, Azaleas, Witch Hazels (*Hamamelis*), Hazels, Laburnums, Magnolias, Mock Orange (*Philadelphus*), Plums, Cherries, Lilacs, Pyrus, Flowering Currant (*Ribes*), Spiræas, Viburnums, Dogwoods (*Cornus*), and Weigelas (or Diervillas). These plants having bare and leafless stems early in the year do not interfere to any extent with the light that is necessary for the bulbous plants beneath them; and by the time many of them are in full leaf and blossom, the bulbous plants will have gone to rest till the following season. It is thus seen how easy it is to convert a dreary shrubbery into a place of beauty, with the aid of bulbous plants that may be in flower almost throughout the year if a proper selection is made.

HARDY AND HALF-HARDY PLANTS

HARDY AND HALF-HARDY BULBOUS AND TUBEROUS PLANTS

Under this heading may be grouped all those plants having bulbs, corms, tubers, or rhizomes that may be grown in the open air in almost any part of the British Islands, that is between the 50th and 61st northern parallels of latitude, and from the 2nd degree of longitude east of Greenwich to the 11th west of Greenwich. Even within this area there will be a good deal of difference in the climate, due not only as to whether a place is north or south, but also to altitude and other causes, such as that of the Gulf Stream on the coast of Ireland and the west of Scotland. The mean annual temperature of England is 49°.5 F., that of Scotland 47°.5, and of Ireland 50°.0, so that the Emerald Isle is on the whole warmer and more equable than either England or Scotland. In Great Britain there is a difference of fully 6° between Falmouth in Cornwall and the Shetland Islands—chiefly owing to the difference in latitude. But in Ireland there is a difference of only 3° between the extreme north and south.

As to the annual rainfall, there is of course also great variation in different parts of the Kingdom. Where the country is flattish and free from hills the average annual rainfall in England is about 25 inches, and in similar parts of Scotland about 28 inches. In south-western districts, however, as much as 40 inches of rain fall annually; and in certain parts like the Western Highlands, the Isle of Skye, the Lake District, and in Wales, there is a rainfall of 80 inches and more in the course of the year—each inch of rain representing rather more than 100 tons of water to the acre.

In Ireland, as in Great Britain, there is also much variation in the annual rainfall. About one-half of the country—the eastern portion—has from 30 to 40 inches of rain yearly, the other or western half having from 40 to 50 inches. Dublin in the east has an average of 28 to 48 inches, while Kylemore in Galway has as much as 89.40 inches.

These geographical and meteorological facts are given, so that the reader may realise the varying conditions under which plants exist in the open air. In one part of the Kingdom plants will flourish, while in other parts the same species will be so tender or half-hardy that protection may be needed during the winter season. In the

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following pages it is stated whether plants are hardy, half-hardy, tender, or otherwise, so that the cultivator may have something to guide him in his operations.

The following genera are amongst those containing the most hardy bulbous and tuberous plants for open-air cultivation. The genera marked with an asterisk (*) have species with true bulbs or corms, and are all Monocotyledons. The other genera have tubers or rhizomes, and are either Monocotyledons or Diocotyledons:—

Abobra.	Caulophyllum.	Helianthus.
*Acis.	*Chionodoxa.	Helonias.
Acorus.	Chionographis.	Heloniopsis.
Aconitum.	*Chiono-Scilla.	Hemerocallis.
Agapanthus.	*Chlorogalum.	Hesperocallis.
*Allium.	Codonopsis.	*Hyacinthus.
Alstroemeria.	*Colchicum.	Incarvillea.
*Amaryllis.	Commelina.	*Iris.
Ampelopsis.	Conanthera.	*Ixia.
Anemone.	Convallaria.	*Ixiolirion.
*Anomatheca.	*Cooperia.	*Lapeyrousia.
Anthericum.	Corydalis.	Lathyrus.
*Antholyza.	*Crococoma.	Leontice.
Aphyllanthes.	*Crocus.	*Leucojum.
Apios.	Cyclamen.	Lewisia.
Arisarum.	Dahlia.	Liatris.
Arum.	Dicentra.	Libertia.
Asclepias.	*Dierama.	*Lilium.
Asphodeline.	Disporum.	*Lycoris.
Asphodelus.	Doronicum.	Lysichitum.
*Babiana.	Dracunculus.	Maianthemum.
Begonia.	Eranthis.	Medeola.
*Bessera.	Eremostachys.	Megarhiza.
Biarum.	Eremurus.	Melanthium.
*Bloomeria.	*Erythronium.	*Merendera.
*Bobartia.	*Eucomis.	*Milla.
Bocconia.	*Ferraria.	Mirabilis.
Bongardia.	*Fritillaria.	*Montbretia.
*Brodiaea.	Funkia.	*Moræa.
*Bravoia.	*Gagea.	*Muscari.
*Brevoortia.	*Galanthus.	*Narcissus.
Bryonia.	*Galtonia.	*Nemastylis.
*Bulbine.	Gentiana.	Nothoscordum.
*Bulbocodium.	Geranium.	Nuphar.
Calla.	*Gladiolus.	Nymphæa.
*Calochortus.	Glyphosperma.	*Ornithogalum.
*Camassia.	Gypsophila.	Ostrowskia.
Canarina.	Hablitzia.	Othonna.
Canna.	Haylockia.	Oxalis.

TENDER BULBOUS AND TUBEROUS PLANTS

Pachyrhizus.	Sanguinaria.	Tricyrtis.
Pæonia.	Saxifraga.	Trillium.
Phlomis.	Schizostylis.	*Tritonia.
Phytolacca.	*Scilla.	Tropæolum.
Podophyllum.	Sisyrinchium.	*Tulbaghia.
Polygonatum.	*Sparaxis.	*Tulipa.
Polygonum.	*Sprekelia.	*Urginea.
Polymnia.	*Sternbergia.	Uvularia.
*Puschkinia.	Symphytum.	*Veltheimia.
Ranunculus.	Tamus.	Veratrum.
Reineckia.	*Tecophilæa.	Wachendorfia.
*Rigidella.	Thalictrum.	*Watsonia.
Roscoëa.	Thladiantha.	*Zephyranthes.
Sagittaria.	*Tigridia.	Zygadenus.
Salvia.		

TENDER BULBOUS AND TUBEROUS PLANTS

The plants in this group are such that they cannot be grown in the open air, even during the summer months, with any degree of success. They are natives of the tropical and subtropical parts of the globe, and are mostly found at low elevations where the heat and moisture are often great. It must be borne in mind that plants from the same geographical region may be quite different in their natures, and would consequently require different cultural treatment. Thus, a species from the high mountain tops at altitudes of 10,000 or 12,000 feet, would be quite hardy in our climate, in comparison with other species from the same latitude, but found at the base of the mountains or on the plains. This accounts for many plants from the mountain ranges of Central America being hardy or almost hardy in the British Isles, while others at a lower elevation require to be grown in a stove or greenhouse.

As the terms "stove" and "greenhouse" are frequently used in this work, it may be as well to explain to the amateur what is meant by them. A "stove" house is a very warm greenhouse—one with a good supply of hot-water pipes, so that even in severe winters it may be possible to maintain a night or minimum temperature of at least 60°-65° F. This can only be done by proper attention to stoking the furnaces. As a rule a "stove" house is also a moist one, that is, the atmosphere is constantly kept in a state of humidity either by throwing water on the floors ("damping down" as gardeners call it) or by the frequent use of the syringe or hose-pipe. Water-tanks are built in the houses, so that a liberal supply of water is always

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available. Of course, the amount of moisture in the atmosphere will be regulated largely according to the season, and the plants that are grown. During the spring and summer months, for example, the thermometer will often register over 90° and 100° F. in a stove during the daytime, and the humidity of the atmosphere will be palpable to anyone entering, especially when spectacles are worn, as the vapour immediately condenses on the cooler glasses.

Notwithstanding the heat and moisture, it is essential to have such hothouses properly ventilated, otherwise the air would become so foul and stagnant that neither plants nor gardeners would be able to live in it. The modern horticultural builder, in conjunction with the gardener, knows exactly how to arrange the boilers, pipes, and ventilators, so that a maximum amount of heat may be secured at the least cost. At the same time, by proper ventilation, the air will be purified, and but little heat will be allowed to escape.

The "greenhouse" is a glass-house also supplied with hot-water pipes and boilers; but as plants requiring less heat and moisture are grown in it, there is no necessity to maintain such high temperatures. During the summer months, say from April till October, no fire-heat whatever need be used, as the glass will retain during the night-time much of the heat acquired during the day. During the winter months, from October till the end of March, a certain amount of artificial heat must be infused so as to maintain a night temperature of 45°-55° F. When some plants that are on the border line between hardy and half-hardy, or somewhat tender, are grown, very little artificial heat is required during the winter season, just sufficient to keep the frost out. Plants of this character are often wintered in cold frames and given plenty of air and light on all favourable occasions, the only protection they require being a mat or two thrown over the glass at night when the frost is likely to be severe.

The following genera embrace bulbous, tuberous, or rhizomatous plants that are usually grown under glass either in a "stove" or "greenhouse." The genera marked with an asterisk (*) are all monocotyledons, and have true bulbs or corms. The cultural details are given under each genus in the body of the work:—

Achimenes.	Androcymbium.	*Blandfordia.
*Albuca.	Anigozanthos.	Boussingaultia.
Alocasia.	*Anoiganthus.	*Bowiea.
Alpinia.	Arisæma.	*Brunsvigia.
*Amموcharis.	Aspidistra.	*Buphane.
Amomum.	Begonia.	Burbridgea.
Amorphophallus.	Beschorneria.	Caladium.

FREAKS OF BULBOUS AND TUBEROUS PLANTS

*Calliphruria.	*Eurycles.	*Melasphærule.
*Callipsyche.	Eustephia.	Monochilus.
*Calostemma.	*Freesia.	Nelumbium.
Canna.	*Geissorhiza.	*Nerine.
*Chlidanthus.	Gesnera.	Niphæa.
Clivia.	*Gethyllis.	Nymphæa.
Colocasia.	Globba.	Oxalis.
*Cooperia.	Gloriosa.	*Pancratium.
*Crinum.	Gloxinera.	*Phædranassa.
Curculigo.	Gloxinia.	*Placea.
Curcuma.	Gonioscypha.	*Plagiolirion.
*Cyanella.	*Griffinia.	*Polianthes.
Cyclamen.	*Hæmanthus.	Richardia.
Cypella.	Hæmodorum.	*Rigidella.
Cyphia.	Hedychium	Sagittaria.
*Cyrтанthus.	*Herbertia.	Sandersonia.
Datura.	*Herreria.	Sauromatum.
Daubenyia.	Hesperantha.	Sinningia.
Dichopogon.	*Hessea.	*Sprekelia.
Dioscorea.	*Hippeastrum.	*Stenomesson.
*Dipcadi.	*Homeria.	*Strumaria.
Dipladenia.	*Hymenocallis.	*Syringodea.
Dracontium.	*Hypoxis.	Testudinaria.
*Drimia.	Icacina.	*Tulbaghia.
*Drimiopsis.	Ipomæa.	*Urceocharis.
Eichhornia.	*Ixiolirion.	*Urceolina.
*Elisena.	*Lachenalia.	*Urginea.
Eranthemum.	*Littonia.	*Vallota.
Eriopermum.	Maranta.	Wurmbea.
*Eucharis.	*Marica.	Xanthosoma.
*Eucrosia.	*Massonia.	Zingiber.

FREAKS OF BULBOUS AND TUBEROUS PLANTS

From time to time growers of bulbous and tuberous plants meet with specimens in their collections that exhibit some abnormal feature. The science of these departures from the normal has been called "teratology," and scientific men have been frequently puzzled as to the causes that give rise to these peculiarities or monstrosities. They are much more frequent probably than botanists are aware, and there is scarcely a season passes that one may not see some unusual development in nurseries and large establishments where hundreds and thousands of a particular kind of plant are grown. Of course, bulbous and tuberous plants are not the only ones that

produce freaks. All classes of plants vary in the same way at some time or another, and are regarded as commonplace, though curious, by those who grow them. Many instances of roots, stems, leaves, sepals, petals, stamens, pistils, and ovaries having been distorted in some way have been recorded, not only in the late Dr Masters' work on *Vegetable Teratology*, but also in the pages of the horticultural and botanical press and journals. As might be expected, the flowers, being usually the most conspicuous and ornamental parts of a plant, have been noticed most frequently, but other parts, especially the flower-stems, have also been noted from time to time. To give a few instances:—

Flower-Stems.—In some instances, notably in *Liliums* especially *L. auratum*), the ordinary roundish stem is frequently broadened out into a thin, flattish body, an examination of which shows at once that several stems have fused or united together, and as each one produces its own blossoms, the result is an enormous mass of bloom. This fusion or union of several stems into one is called *fasciation*, and is quite a common feature in the ordinary garden Asparagus.



FIG. 23.—Tulip with three flowers on one stem.

Instances of fasciation have also been noted in the flower-stems of *Agapanthus umbellatus*, *Oxalis crenata*, and several florists' Tulips. In the case of the Tulip, there is usually only one flower on one stalk, but by fusion or fasciation, examples bearing as many as seven flowers have been met with—the stems being united part of the way, and then branching towards the top. Fig. 23 shows a Tulip having three flower-stems, more or less fused together.

In some Liliaceous and Iridaceous plants bulbils (see p. 21) form naturally in the axils of the stem leaves. In many, however, this character is undeveloped, and is probably only dormant, owing

FREAKS OF BULBOUS AND TUBEROUS PLANTS

to the necessary conditions or surroundings being absent. Occasionally, however, we get underground growths like corms being reproduced on the aërial stems. Examples of this have been met with in some *Watsonias*, where it has been reported that "corms" have been borne in the axils of the leaves.

In some orchids (e.g. *Phalænopsis Schilleriana* and others), young plants develop for some reason on the flower-stems after the blooms have withered. Something similar has been recorded in the case of the genus *Marica*, in which numerous small plants had developed on the scapes. These plants when detached grew freely, but did not come into blossom so quickly as those raised in the ordinary way.

It has been recorded by Mr. W. Hales, of Chelsea Physic Garden, that in the case of *Achimenes grandiflora* numbers of greenish catkin-like tubers were produced in the axils of the leaves. This case is probably on all fours with what happens when these plants are raised from leaf-cuttings. A reference to the drawing at p. 56 will show that these catkin-like tubers develop as a matter of course from the base of the leaves of *Achimenes*, when they are inserted as cuttings in a suitable compost and temperature.

The "doubling" of flowers, it is now well known, is due to the suppression or rather modification of the stamens and pistils. These are morphologically only modified leaves, and it is therefore not unnatural that under certain conditions, chiefly when there is no great necessity to develop ripened seeds, some bulbous plants have these organs broadened out into coloured petals. The double Daffodils and Narcissi, double Tulips, double Liliiums, double Snowdrops, etc., are well-known examples. Fig. 24 shows a curious development in the flower of *Narcissus bicolor Horsfieldi*, which appeared a year or two ago in a market nursery at Isleworth. Not only are the usual six segments of the perianth multiplied into several narrow segments, but the number of stamens was also increased. Another plant of *N. Horsfieldi* bore two almost perfect flowers on one scape, as shown in Fig. 25.

In the case of the White Arum Lily (*Richardia æthiopica*) the spathes or floral envelopes, which are usually single, become double, as shown in the accompanying sketch (Fig. 26). The spathe is only a leaf modified for the purpose of protecting the columnar spathe on which the true flowers are seated; and the gradual change from green to white, or yellow, or other colour is easily seen during the period of growth. Fig. 27 shows how even a green leaf is sometimes modified into a pure white spathe.

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FIG. 24.—*Narcissus Horsfieldii*, with numerous perianth segments.

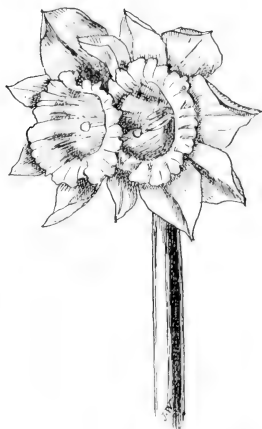


FIG. 25.—*Narcissus Horsfieldii*, twin-flowered.

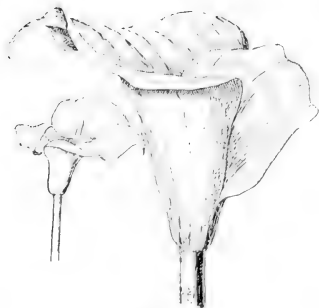


FIG. 26.—Arum Lily (*Richardia*), with double spathe. ($\frac{1}{3}$.)



FIG. 27.—Arum Lily, with leaf-like spathe.

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Analogous to this case of the Arum Lily is that of a Tulip, shown on Fig. 28, in which the leaf, instead of being a flat expansion remained tubular, and formed a kind of extinguisher over the flower. This case rather looks as if the flower was intended to be self-fertilised by being imprisoned in the tubular leaf.

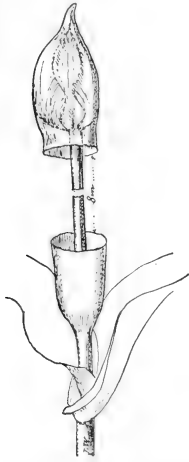


FIG. 28.—Tulip, showing flower encased in green tubular extinguisher-like leaf.

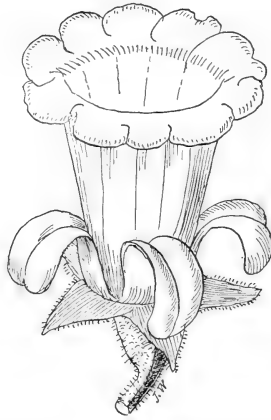


FIG. 29.—Gloxinia, with secondary corolla lobes.

Sometimes, as shown in the sketch of Gloxinia (Fig. 29), besides the sepals and petals proper, an extra whorl of organs appear. This is a case of proliferation somewhat resembling the duplication of corollas seen in the well-known biennial Canterbury Bell (*Campanula Medium Calycanthema*), and the perennial *C. persicifolia*, forms of the Columbine (*Aquilegia vulgaris*), etc.

In this connection mention might also be made of the Persian Cyclamen (*C. latifolium*), in the flowers of which "doubling" has taken place, and also in some forms of which peculiar outgrowths or crests have been developed on the surface of the petals. These are ornamental in many cases, and the characters have become fixed.

The tuberous Begonias have also exhibited this character during recent years. Not only have the flowers become very "double"

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by cultivation and selection, but in many instances "cresting" has become a fixed character, as in the Persian Cyclamen.

There is one unusual peculiarity about the tuberous *Begonias* worth recording. The flowers, as is well known, are monœcious, that is, the male (or staminate) and the female (or pistillate) flowers are quite distinct from each other although borne on the same plant. The stamens are borne in one flower; the pistils in the other.

It sometimes happens, however, that both organs (stamens and pistils) appear in the same blossom, as shown in the drawing (Fig. 30). It has also been recorded that a staminate or male flower has been observed to possess an ovary. In the



FIG. 30.—*Begonia* flower with stamens and pistils (hermaphrodite).

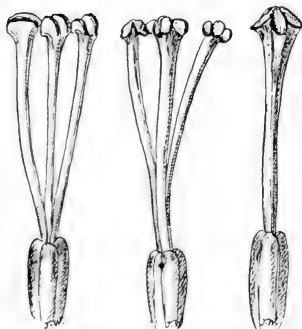


FIG. 31.—*Lillium*, showing two divided and one normal style. (2.)

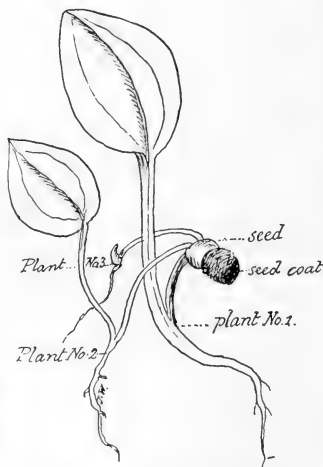


FIG. 32.—*Funkia*, showing three plants germinating from one seed.

species known as *B. umbraculifera* (see *Bot. Mag.* t. 7457), bisexual flowers are recorded.

Coming to the *gynæceum* or female portion of the flower, aberrations from the normal also occur. Fig. 31 shows the style and

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stigma of a *Lilium*. The left-hand sketch shows the style divided into three portions to the base, clearly indicating the usual trimerous character of the flowers. The central sketch shows the style divided only about half-way down, each branch having a stigma at the apex. The drawing to the right shows a normal, undivided style and stigma of the same *Lilium*.

Still more curious is the state of affairs represented by Fig. 32. This represents a Plantain Lily (*Funkia*) giving birth to three young plants from one seed. As a rule, each seed contains but one embryo, from which one plant only arises on germination. Some plants, however, appear to develop seeds in which more than one embryo is developed. I have been told that Mangolds are examples of this. The sketch clearly shows how three different plants began to grow, one after the other, each one springing from the same seed.

CLASSIFICATION OF BULBOUS AND TUBEROUS PLANTS

Scientists have divided the Vegetable Kingdom into five main groups, viz. :—

1. The **Myxothallophytes**.—These are organisms without green colouring matter, consisting of naked masses of protoplasm or plasmodia. They are reproduced by spores from which arise swarm-spores or myxamœbæ. These again unite into plasmodia. The best-known representative of this group is the Slime Fungus (*Plasmodiophora brassicæ*), which causes so much damage to the roots of the Cabbage, Wallflower, and Stock tribes, and other members of the natural order Cruciferae, by giving rise to the disease known as “Club Root” and “Fingers and Toes.”

2. The **Thallophytes**.—These are plants which show no distinct differentiation in tissue between roots, stems, shoots, and leaves. They include the Blue-green Algæ (*Cyanophyceæ*); the Bacteria of various kinds; the Diatoms; the Green Algæ (*Chlorophyceæ*); the Confervæ; the Seaweeds; and the Fungi. The last are important because of the numerous diseases which afflict the higher plants; amongst them being the Potato disease, the mildew of the Vine and Rose, the smut of Wheat, Oats, Barley, Rye, etc.

The Fungi also include the cultivated Mushroom (*Agaricus campestris*), the various “Toadstools” so-called, the Puff Balls, etc., etc.

A kind of intermediate or hybrid group between the Algæ and the Fungi is known as “Lichens.” The Algæ and Fungi live together—the Fungus living upon the organic food which the Alga obtains by means of its green colouring matter (*chlorophyll*); and the Fungus in return secures moisture and the food dissolved in it for its partner. This state of affairs is called “symbiosis,” and it appears that in Lichens the Fungus and the Alga could not live without one another.

3. The **Bryophytes**.—Here we have a distinct differentiation into elementary stems and leaves. The best-known plants in this group are the Mosses and Liverworts.

4. The **Pteridophytes**.—These show a greater advance in development, and roots, stems, leaves, and fructification are clearly

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marked off from each other. In this group are the Ferns, Club Mosses, Horsetails.

5. The **Phanerogams**.—This group includes all the plants which flower and produce seeds, and have also well-defined roots, stems, and leaves. This group is divided into two distinct sections, viz. :—
(a) The *Gymnosperms*, or naked-seeded plants, in which the ovules receive the pollen direct and are not enclosed in an ovary, as in the Cycads and Conifers; and (b) The *Angiosperms*, or hidden-seeded plants, in which the ovules are enclosed in ovaries, and the pollen can only reach them by means of a tube growing from the pollen-grain through the tissues of the carpel or pistil in the flower.

All the plants described in this work are "**Angiosperms**." They fall naturally into two distinct and easily recognised groups:—

I. **Monocotyledons**.—These are plants in which the flowers have their parts arranged in whorls or circles of three; in which the embryo or baby plant in the seed has only *one* seed-leaf or "cotyledon," and in which the main veins in the leaves are usually parallel with each other or curvilinear. There are a few exceptions, such as the Aroids and Yams (*Dioscorea*), which have net-veined leaves.

II. **Dicotyledons**.—These differ from the Monocotyledons in having the parts of the flower arranged in whorls or circles of four's or five's, the embryos have *two* seed-leaves or cotyledons, and the leaves are net-veined.

Another great distinction between Monocotyledons and Dicotyledons: in the former the perennial woody stems do not increase in diameter, owing to what are called the vascular bundles being scattered and not being thickened by the growth of a "cambium." In Dicotyledons the perennial woody stems have the vascular bundles arranged in a ring, and by means of the circle of cambium layers are enabled to increase in thickness year after year.

It should be pointed out that in this volume no plants with woody perennial stems are dealt with. All the bulbous, tuberous and rhizomatous plants described are "herbaceous" (*i.e.* non-woody) in character, and the aërial stems of a vast number, last only for one season of growth—long enough to develop leaves, flowers, and seeds—and then they die down naturally, leaving the basal portion in a resting condition until the next season of growth.

The following synopsis of the natural orders will enable the reader interested in classification of plants to determine into which group

any particular plant should be placed. This is the only convenient method in cases where the name of a plant is unknown, or in cases where a wrong name has been given. When the name of a plant is already known, all that is necessary is to turn to the pages where each genus is described in alphabetical order.

CLASS I.—MONOCOTYLEDONS.¹

DIVISION 1. PETALOIDEÆ.—Flowers quite regular (actinomorphic), parts arranged in whorls of 3—*i.e.*, 2 whorls making the perianth of 6 segments; 2 (or 1) whorls of stamens; and a whorl of 3 carpels united together. Ovary 3-celled, superior or inferior; seeds contain endosperm. Diagrammatically this may be represented as follows:—Perianth (petals) 3+3; Andrœcium (stamens) 3+3; Gynœcium (pistils or carpels) (3)—the latter figure being enclosed in brackets indicating that the carpels are united or “syncarpous.”

Nat. Ord. COMMELINACEÆ. *Characters.*—Leaves linear or lance-shaped, usually sheathing at the base. Flowers usually regular, hermaphrodite, in spikes or umbels. Perianth inferior. Stamens usually 6, hypogynous, sometimes only 3 perfect. Ovary superior.

Genera described.—COMMELINA, WELDENIA.

Nat. Ord. NAIADACEÆ. *Characters.*—Marsh or water plants with floating or submerged leaves. Flowers hermaphrodite, diœcious, or monœcious. Perianth segments 0, or 2-4. Stamens usually 1-4.

Genus described.—APONOGETON.

Nat. Ord. ALISMACEÆ. *Characters.*—Marsh or water plants with simple radical leaves and leafless flower-stems. Flowers hermaphrodite or unisexual, with an inferior perianth. Stamens 6, or 9, or more.

Genera described.—ALISMA, BUTOMUS, LIMNOCHARIS, SAGITTARIA.

Nat. Ord. LILIACEÆ. *Characters.*—Leaves cauline or radical. Inflorescence mostly terminal, solitary, racemose, spiked, umbellate or capitate. Flowers usually hermaphrodite and regular. Perianth inferior. Segments equal, free, or very rarely united at the very base. Stamens usually 6, hypogynous or attached to the perianth lobes. Styles usually united at the top. Ovary superior, many-seeded. Fruit berry-like.

¹ The meanings of the technical terms used will be found in the Glossary at the end of the work.

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Genera described.—SMILAX, ASPARAGUS, POLYGONATUM, SMILACINA, MAIANTHEMUM, CONVALLARIA, REINECKIA, ASPIDISTRA, ROHDEA, HEMEROCALLIS, PHORMIUM, BLANDFORDIA, FUNKIA, ASPHODELUS, ASPHODELINE, PARADISEA, BULBINE, CHLOROGALUM, BOWIEA, EREMURUS, ANTHERICUM, APHYLLANTHES, AGAPANTHUS, TULBAGHIA, MILLA, BREVOORTIA, BRODIAEA, BESSERA, BLOOMERIA, NOTHOSCORDUM, ALLIUM, MASSONIA, GALTONIA, LACHENALIA, DRIMIA, DIPCADI, ALBUCA URGINEA, VELTHEIMIA, MUSCARI, HYACINTHUS, PUSCHKINIA, CHIONODOXA, DRIMIOPSIS, EUCOMIS, SCILLA, CAMASSIA, ORNITHOGALUM, LILIUM, FRITILLARIA, TULIPA, ERYTHRONIUM, GAGEA, LLOYDIA, CALOCHORTUS, COLCHICUM, BULBOCODIUM, MERENDERA, NARTHECIUM, CHAMÆLIRIUM, CHIONOGRAPHIS, XEROPHYLLUM, HELONIOPSIS, HELONIAS, UVULARIA, GLORIOSA, TRICYRTIS, SANDERSONIA, TRILLIUM, LITTONIA, VERATRUM, ZYGADENUS, DISPORUM, MEDEOLA, ANDROCYMBIUM, ARTHROPODIUM, ANDROSTEPHIUM, DAUBENYA, DICHOPOGON, ERIOSPERMUM, GLYPHOSPERMA, GONIOSCYPHA, HERRERIA, HESPEROCALLIS, LEUCOCORYNE, MELANTHIUM, NOTHOSCORDUM, TRITELEIA, WURMBEA, TUPISTRA.

Nat. Ord. PONTEDERIACEÆ. *Characters*—Aquatic herbs. Flowers hermaphrodite, regular or irregular. Perianth inferior, 6-lobed. Stamens 6 or 3. Ovary superior.

Genus described.—EICHHORNEA.

Nat. Ord. AMARYLLIDEÆ. *Characters.*—Leaves linear or strap-shaped. Flowers hermaphrodite, usually regular. Perianth superior. Stamens usually 6, the filaments being sometimes united to form a cup. Ovary inferior.

Genera described.—HYPOXIS, CURCULIGO, NARCISSUS, GALANTHUS, LEUCOJUM, HESSEA, STERNBERGIA, ANOIGANTHUS, GETHYLLIS, COOPERIA, CHLIDANTHUS, HAYLOCKIA, ZEPHYRANTHES, SPREKELIA, HIPPEASTRUM, PLACEA, GRIFFINIA, CRINUM, AMARYLLIS, AMMOCHARIS, LYCORIS, BRUNSVIGIA, NERINE, STRUMARIA, VALLOTA, CYRTANTHUS, CLIVIA, HÆMANTHUS, BUPHANE, EUCROSIA, CALLIPSYCHE, EUCHARIS, CALLIPHURRIA, URCEOLINA, PHÆDRANASSA, STENOMESSON, PANCRATIUM, HYMENOCALLIS, ELISENA, EURYCLES, CALOSTEMMA, IXIOLIRION, BOMAREA, ALSTRÆMERIA, POLIANTHES, BRAVOA, BESCHORNERIA, EUSTEPHIA, PLAGIOLIRION.

Nat. Ord. HÆMODORACEÆ. *Characters.*—Leaves tufted, narrow, linear. Flowers hermaphrodite, usually regular in dense panicles, clusters, spikes or racemes. Perianth downy, 6-lobed. Stamens 6, usually all perfect. Ovary 3-celled.

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Genera described. — CONANTHERA, CYANELLA, HÆMODORUM, WACHENDORFIA, OPHIOPOGON, TECOPHILLÆA, ANIGOZANTHIOS.

Nat. Ord. IRIDEÆ. *Characters.*—Perennial herbs with usually smooth, radical, equitant, flat, linear or sword-like leaves in 2 rows, those of the stem alternate and sheathing. Flowers hermaphrodite, usually regular, borne on terminal bracteate spikes, umbels, corymbs, or panicles. Perianth superior; segments sometimes all nearly equal and alike, sometimes the 3 inner ones larger or smaller and unlike the 3 outer ones. Stamens 3, opposite the outer lobes or segments of the perianth. Ovary inferior. Stigmas often petal-like. Fruit a 3-lobed capsule with few or many seeds.

Genera described.—IRIS, TIGRIDIA, FERRARIA, CROCUS, LIBERTIA, SISYRINCHIUM, SCHIZOSTYLIS, DIERAMA, IXIA, LAPEYROUSIA, WATSONIA, BABIANA, CROCOSMA, TRITONIA, SPARAXIS, GLADIOLUS, ANTHOLYZA, ACIDANTHERA, CYPELLA, FREESIA, GALAXIA, GEISSORHIZA, HERBERTIA, HESPERANTHA, HEXAGLOTTIS, HOMERIA, MELASPILÆRULA, MORÆA, NEMASTYLIS, RIGIDELLA, SYRINGODEA, BELEMCANDA, ANOMATHECA, BOBARTIA.

Nat. Ord. TACCACEÆ. *Characters.*—Leaves large, radical, stalked entire or divided. Flowers regular, 2-sexed, borne in umbels, with large, leafy bracts. Perianth 6-lobed. Stamens 6, with very short filaments. Ovary inferior.

Genus described.—TACCA.

Nat. Ord. DIOSCOREACEÆ. *Characters.*—Stems climbing. Leaves alternate, net-veined. Flowers usually 1-sexed in axillary panicles or racemes. Perianth often bell-shaped. Stamens 6, free.

Genera described.—DIOSCOREA, TAMUS, TESTUDINARIA, TRICHOPUS.

Nat. Ord. SCITAMINEÆ. *Characters.*—Leaves parallel or curvilinear-veined, usually sheathing at the base. Flower usually hermaphrodite, irregular, in spikes, racemes, or panicles. Perianth superior, the outer portion calyx-like, the inner corolla-like. Stamens 6, often only 1 perfect, the others being changed into brightly-coloured staminodes. Ovary inferior, 3-celled.

Genera described.—COSTUS, AMOMUM, BURBIDGEA, CURCUMA, GASTROCHILUS, GLOBBA, KÆMPFERIA, LOWIA, MARANTA, MYROSMIA, ZINGIBER, ROSCOËA, THALIA, CANNA, HEDYCHIUM, ALPINIA.

DIVISION II. SPADICIFLORÆ.—Flowers small, 1-sexed, crowded on spikes or “spadiccs,” enclosed in one or more conspicuous sheaths or “spathes.” Ovaries superior.

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Nat. Ord. AROIDEÆ. *Characters.*—Leaves large, radical, usually net-veined. Flowers unisexual, borne on a spadix, enclosed or protected by a spathe, and often very fetid smelling. Perianth none, or composed of 4-8 hypogynous segments. Stamens few or many. Fruit a 1- or more celled, and 1- or more seeded berry.

Genera described.—ARISARUM, ARISÆMA, BIARUM, SAUROMATUM, ARUM, DRACUNCULUS, AMORPHOPHALLUS, COLOCASIA, ALOCASIA, CALADIUM, RICHARDIA, CALLA, DRACONTIUM, ACORUS, CYRTOSPERMA, CHLOROSPETHA, SYNANDROSPADIX, THOMSONIA, XANTHOSOMA, ARO-DENDRON, TYPHONIUM, SYMPLOCARPUS, LYSICHTUM, ANCHOMANES.

CLASS II.—DICOTYLEDONS.

DIVISION I. POLYPETALÆ.—Flowers with both calyx (sepals) and corolla (petals). Petals free or distinct from each other.

Series 1. THALAMIFLORÆ.—Sepals usually free. Petals often numerous. Stamens inserted on a torus or receptacle, hypogynous, numerous. Carpels free or united.

Nat. Ord. RANUNCULACEÆ. *Characters.*—Flowers regular or irregular, with 3-6 hypogynous deciduous sepals, usually imbricate in bud. Petals 3-15, hypogynous, in one or more rows, sometimes assuming very remarkable forms in Monkshood (*Aconitum*). Stamens usually numerous, hypogynous. Carpels numerous, 1-celled, free, or occasionally united into a many-celled pistil. Fruit consists of either dry, indehiscent achenes or follicles.

Genera described.—ANEMONE, RANUNCULUS, ERANTHIS, ACONITUM, PÆONIA, DELPHINIUM, THALICTRUM.

Nat. Ord. BERBERIDEÆ. *Characters.*—Flowers solitary, or in racemes or panicles. Sepals 2-6, deciduous, in a double row, surrounded with petal-like scales. Petals free, hypogynous, either equal in number to the sepals and opposite to them, or twice as many. Stamens 4-6 (rarely 8), in two whorls opposite the petals, hypogynous, free or sometimes monadelphous. Carpel solitary, free, 1-celled. Fruit a capsule or berry.

Genera described.—BONGARDIA, LEONTICE, CAULOPHYLLUM, PODO-PHYLLUM.

Nat. Ord. NYMPHÆACEÆ. *Characters.*—Water plants with large, long-stalked, heart-shaped or peltate leaves; and large, beautiful, and often sweet-scented flowers. Sepals, usually 4, free,

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or rarely adherent. Petals and stamens numerous, sometimes all free and hypogynous, often passing gradually one into another. The ovary is many-celled, with radiating stigmas, and numerous ovules, and is more or less surrounded by a large fleshy disc.

Genera described.—NUPHAR, NYMPHÆA, NELUMBium.

Nat. Ord. PAPAVERACEÆ. *Characters.*—Leaves alternate, entire, or lobed and cut without stipules. Flowers regular, usually nodding in bud, and borne singly on long stalks. Sepals 2 or 3, rarely 4, free, imbricate, caducous. Petals 4-6, rarely 8-12, hypogynous, free, in 2 or 3 series, imbricated and often crumpled, deciduous. Stamens numerous, hypogynous, with slender filaments and erect anthers. Ovary 1-celled, or 2-4-celled by prolonged placentas. Stigmas as many as placentas, radiating and sessile. Fruit a pod, dehiscing by pores or valves.

Genera described.—BOCCONIA, SANGUINARIA.

Nat. Ord. FUMARIACEÆ. *Characters.*—Leaves usually alternate, much divided, often with tendrils. Flowers irregular, purple, white, or yellow. Sepals 2, small, scale-like, deciduous. Petals 4, in two usually dissimilar pairs. Stamens 4, distinct, hypogynous, in 2 bundles (diadelphous) opposite the 2 outer petals, one of which is usually furnished with a spur; rarely all separate. Fruit either an indehiscent 1- or 2-seeded nut, or a 2-valved or succulent indehiscent many-seeded capsule.

The irregular flowers chiefly distinguish the Fumitory Order from the Poppy Order.

Genera described.—DICENTRA, CORYDALIS.

Nat. Ord. CARYOPHYLLEÆ. *Characters.*—Leaves always opposite and entire, stipules usually none. Sepals 4-5, persistent, distinct or cohering in a tube. Petals 4-5, hypogynous or slightly perigynous, entire, or frequently split into 2 parts. Stamens (8-10) usually twice as many as the petals, in two circles, of which the inner is often wanting. Fruit a 2-5-valved capsule with numerous seeds.

Genus described.—GYPSOPHILA.

Nat. Ord. PORTULACEÆ. *Characters.*—Succulent herbs. Leaves usually alternate, entire, often fleshy. Stipules scarious, sometimes changed into hairs, or absent. Flowers solitary, at the ends of the branches, in racemes, cymes, or panicles. Sepals usually 2, rarely 5, free, or adnate to the base of the ovary. Petals usually

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4-5, hypogynous, free, or united at the very base, imbricate, entire, often fleeting. Stamens inserted with the petals, varying in numbers. Carpels 3 or more; stigmas several, much divided.

Genera described.—LEWISIA, CLAYTONIA.

Nat. Ord. MALVACEÆ. *Characters.*—Leaves alternate, usually more or less palmately lobed or divided. Flowers regular, hermaphrodite. Sepals usually 5, more or less united at base. Petals 5, hypogynous, twisted in bud, free. Stamens numerous, usually with filaments more or less united, hypogynous.

Genus described.—CALLIRHOË.

Nat. Ord. STERCULIACEÆ. *Characters.*—Leaves usually alternate, often lobed. Flowers regular, 1- or 2-sexed. Calyx gamosepalous, 5-lobed. Petals 5. Stamens with filaments often united at the base into a cylindrical or urn-shaped tube.

Genus described.—HERMANNIA.

Series 2. DISCIFLOREÆ.—Flowers regular, with parts, usually in 5's. Calyx usually free from the ovary. Stamens inserted below or above or around a disc. Ovary usually superior. Carpels usually united (*syncarpous*).

Nat. Ord. GERANIACEÆ. *Characters.*—Leaves opposite or alternate, often 2-stipuled, toothed, lobed, dissected, very rarely entire. Peduncles often axillary, 1-flowered or with many-flowered umbels, rarely cymose or racemose. Flowers hermaphrodite, regular or irregular. Sepals 5, rarely fewer, free or sometimes united to the middle, imbricate, rarely valvate, the upper one spurred in some genera; persistent or rarely deciduous. Petals 5, or fewer by abortion, or absent; hypogynous or somewhat perigynous, variously imbricated, rarely twisted. Torus with 5 glands alternate with the petals, or glandless. Stamens usually 10, rarely more or less. Fruit either a 3-5-lobed capsule, or separating into cocci, rarely a berry.

Genera described.—TROPÆOLUM, OXALIS, GERANIUM.

Nat. Ord. AMPELIDEÆ. *Characters.*—Climbing plants with alternate, stalked, digitately-lobed leaves. Flowers regular, small, in cymes or panicles, usually opposite the leaves. Calyx 4-5-lobed or toothed. Petals 4-5, free or united. Stamens 4-5, opposite the petals. Fruit a berry.

Genera described.—AMPELOPSIS, CISSUS.

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Series. 3. CALYCIFLOREÆ.—Flowers regular or irregular, hermaphrodite or monœcious. Stamens united or free.

Nat. Ord. LEGUMINOSÆ. *Characters.*—Leaves with 2 large stipules, simple or often digitately or pinnately compound. Flowers irregular, usually hermaphrodite. Sepals usually 5, more or less united. Petals 5, unequal; the upper one (known as the “standard”) free, larger than the 2 side ones (known as the “wings”), which latter enclose and sometimes adhere to the 2 more or less united and upward curved lower ones (known as the “keel”). The keel usually encloses the 10 perigynous stamens, united in a sheath, or the upper one only free; rarely all free. Fruit a 1-celled, usually dehiscent pod, with one or more seeds.

Genera described.—LATHYRUS, AMICIA, APIOS, DOLICHOS.

Nat. Ord. SAXIFRAGACEÆ. *Characters.*—Leaves very variable. Flowers usually 2-sexed. Calyx usually 5-lobed. Petals usually 5. Stamens in 4's or 8's, 5's or 10's, with free filaments. Ovary usually of 2 distinct carpels more or less cohering or divergent.

Genus described.—SAXIFRAGA.

Nat. Ord. CUCURBITACEÆ. *Characters.*—Mostly climbing or prostrate herbs. The leaves alternate, simple, lobed or divided. The tendrils, when present, are lateral, solitary, simple or branched, and spirally twisted. Flowers monœcious or diœcious, white or yellow, rarely red or blue. Calyx-tube adnate to the ovary; lobes 5, rarely 3 or 6. Petals 5, rarely 3 or 6, free, or rarely gamopetalous, often confluent with the calyx. Stamens usually 3 (rarely 5, or 1, 2, or 4). Fruit inferior, usually fleshy, often large, berry-like, variable in form, and sometimes highly coloured.

Genera described.—THLADIANTHA, BRYONIA, ABOBRA, GERRARD-ANTHUS, CEPHALANDRA, MEGARHIZA, WILBRANDIA.

Nat. Ord. BEGONIACEÆ. *Characters.*—Leaves alternate, more or less unequal sided, entire or lobed, irregularly toothed. Flowers monœcious (*i.e.*, male and female separate, but on same plant). Male flowers with 2 large outer sepaloid, and 2 small inner petaloid segments. Stamens numerous, free or united. Female flowers with 2-10 segments. Ovary inferior, winged, usually 3-celled. Styles 2-4, with branched twisted stigmas.

Genus described.—BEGONIA.

DIVISION II. GAMOPETALÆ.—Petals more or less united.

Series 1. EPIGYNÆ.—Ovary inferior. Herbs, often with milky juice.

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Nat. Ord. COMPOSITÆ. *Characters.*—Leaves alternate, or sometimes opposite, without stipules. Flowers in heads surrounded by a number of more or less leafy bracts forming an involucre, each “head” being composed either of all ligulate florets or with ligulate and disc florets. Calyx superior, limb none, or feathery, or scaly, known as a “pappus.” Corolla tubular or ligulate. Stamens 4-5, with anthers united (syngenesious).

Genera described.—LIATRIS, HELIANTHUS, DAHLIA, BIDENS, DORONICUM, OTHONNA, POLYMNIA.

Nat. Ord. CAMPANULACEÆ. *Characters.*—Leaves usually alternate, without stipules, entire, toothed, or rarely lobed or toothed. Flowers gamopetalous, usually regular, tubular or bell-shaped. Stamens 5, epigynous or epipetalous. Ovary inferior or half-superior, 2-5-celled.

Genera described.—OSTROWSKYA, CODONOPSIS, CANARINA, CYPHIA.

Series 2. HYPOGYNÆ.—Ovary usually superior.

Nat. Ord. PRIMULACEÆ. *Characters.*—Leaves often all radical. Flowers regular or irregular, axillary or solitary. Calyx free, 4-9-lobed. Corolla hypogynous, usually gamopetalous, rotate, salver-shaped, or funnel-, or bell-shaped, 4-6-lobed. Stamens as many as corolla lobes. Ovary free, 1-celled.

Genus described.—CYCLAMEN.

Nat. Ord. OLEACEÆ. *Characters.*—Leaves usually opposite. Flowers regular, usually 2-sexed. Calyx usually 4-toothed or lobed. Corolla gamopetalous, usually 4-lobed. Stamens usually 2. Ovary superior.

Genus described.—ICACINA.

Nat. Ord. APOCYNACEÆ. *Characters.*—Plants, often climbers, with milky juice. Leaves opposite, entire. Stipules none. Flowers regular, hermaphrodite, solitary or in cymes. Calyx 4-5-lobed. Corolla gamopetalous, salver-shaped or funnel-shaped, lobes usually oblique, twisted in bud. Stamens 5, rarely 4, anthers free or united and adhering to the stigma. Style short, dilated, with a thickened entire or 2-cleft stigma often constricted in the middle. Fruit of 2 many-seeded follicles, a berry, or drupe.

Genus described.—DIPLADENIA.

Nat. Ord. ASCLEPIADEÆ. *Characters.*—Herbs, shrubs or undershrubs of climbing or creeping habit, often with milky juice.

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Leaves usually opposite, without stipules. Flowers hermaphrodite, regular. Calyx inferior, 5-lobed. Corolla gamopetalous, rotate, bell-shaped, or funnel- or salver-shaped. Stamens 5, free, or often united in a tube round the stigma. Pollen waxy.

Genera described.—ASCLEPIAS, BRACHYSTELMA, CEROPEGIA, FOCKEA.

Nat. Ord. GENTIANEÆ. *Characters.*—Leaves usually opposite, entire, without stalks or stipules, often strongly 3-5-nerved, and sometimes connate. Flowers usually regular, hermaphrodite, or very rarely polygamous by abortion, solitary, or in 2-3-forked cymes. Calyx inferior, with a bell-shaped or very short tube, and having 4-5 (rarely 6-10) lobes or segments. Corolla gamopetalous, hypogynous, funnel-, salver-, or bell-shaped, or rotate, with 4-5 (rarely 6-12) lobes mostly twisted in bud. Stamens equal in number to the corolla lobes, and inserted on the tube with free filaments. Ovary superior.

Genus described.—GENTIANA.

Nat. Ord. BORAGINEÆ. *Characters.*—Roughly pubescent or hairy plants, with leaves usually alternate, entire, toothed, or very rarely lobed. Flowers in crozier-like racemes or panicles, usually hermaphrodite. Calyx inferior, with a bell-shaped tube, usually with 5 teeth or lobes. Corolla gamopetalous, funnel-shaped, tubular, salver-, or bell-shaped, or somewhat rotate, with 5 lobes. Stamens equal in number to the corolla lobes and alternate with them.

Genus described.—SYMPHYTUM.

Nat. Ord. CONVOLVULACEÆ. *Characters.*—Plants or shrubs with weak, trailing, twining, or high climbing stems. Leaves alternate, often heart-shaped, entire, sinuate-toothed, palmately or rarely pinnately lobed or dissected. Stipules none. Flowers in axillary or terminal racemes, or solitary, regular, usually hermaphrodite. Calyx inferior, in 5 divisions. Sepals often free or slightly united at the base, much imbricated. Corolla gamopetalous, hypogynous, funnel-shaped, tubular, salver-, or bell-shaped, 5-lobed or nearly entire, plaited, convolute or twisted in bud. Stamens 5, inserted in the base of the corolla tube, and alternate with its segments; filaments often dilated at the base. Ovary superior. Style 1, usually divided at the top. Capsule 1-4-celled, few-seeded.

Genus described.—IPOMÆA.

Nat. Ord. SOLANACEÆ. *Characters.*—Herbs with alternate or nearly opposite, undivided, dissected, or lobed leaves. Flowers hermaphrodite, usually regular. Calyx inferior, gamosepalous,

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parted or toothed. Corolla gamopetalous, tubular, funnel-, salver-, or bell-shaped, or rotate, usually 5-lobed, often plaited. Stamens equal in number to the corolla lobes and alternate with them, attached to the tube.

Genus described.—**DATURA.**

Nat. Ord. GESNERACEÆ. *Characters.*—Leaves usually opposite, fleshy, wrinkled, without stipules. Flowers hermaphrodite, usually irregular, showy, in racemes, panicles, or solitary. Calyx usually gamosepalous with 5 teeth or lobes. Corolla gamopetalous, tubular, or broadly bell-shaped, usually 5-lobed. Stamens 4 or 2. Ovary 1-celled.

Genera described.—**ACHIMENES, GLOXINIA, SINNINGIA, GESNERA, NÆGELIA, ISOLOMA, GLOXINERA, NIPHÆA.**

Nat. Ord. BIGNONIACEÆ. *Characters.*—Leaves usually opposite, without stipules. Flowers hermaphrodite, more or less irregular, in terminal panicles. Calyx inferior, gamosepalous, entire, or lobed. Corolla gamopetalous, more or less tubular or funnel-shaped, with 5 spreading lobes. Stamens 5 unequal, 1 always (3 sometimes) sterile.

Genera described.—**INCARVILLEA, BIGNONIA.**

Nat. Ord. ACANTHACEÆ. *Characters.*—Leaves usually opposite, entire, without stipules. Flowers in branching spikes, usually irregular, hermaphrodite. Calyx usually 5-lobed. Corolla gamopetalous, with cylindrical or inflated tube, and 5 spreading lobes. Ovary 2-celled.

Genus described.—**ERANTHEMUM.**

Nat. Ord. VERBENACEÆ. *Characters.*—Leaves usually opposite or whorled, often toothed. Flowers usually 2-sexed, often irregular, usually in corymbs. Calyx tubular, 5-lobed. Corolla gamopetalous, 4-5 cleft. Fertile stamens usually 4 (2 long, 2 short). Ovary superior.

Genus described.—**MONOCHILUS.**

Nat. Ord. LABIATÆ. *Characters.*—Leaves usually opposite or in whorls. Flowers usually irregular, and borne in the leaf-axils. Calyx gamosepalous, ribbed. Corolla gamopetalous, 4-5 lobed, usually 2-lipped. Perfect stamens 4 (2 long, 2 short).

Genera described.—**EREMOSTACHYS, PHLOMIS, SALVIA.**

DIVISION III. MONOCHLAMYDEÆ.—Flowers often without sepals or petals (calyx and corolla), usually hermaphrodite.

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Nat. Ord. NYCTAGINEÆ. *Characters.*—Stems usually swollen at the joints. Leaves opposite or alternate, without stipules. Flowers usually hermaphrodite, regular, in panicles, corymbs, or cymes. Perianth inferior, tubular, salver-shaped or funnel-shaped, 3-5-toothed or lobed. Stamens 1 or more, hypogynous. Fruit 1-celled, 1-seeded.

Genus described.—MIRABILIS.

Nat. Ord. CHENOPODIACEÆ. *Characters.*—Leaves alternate, or sometimes opposite, without stipules. Flowers small, hermaphrodite, or 1-sexed. Calyx deeply divided, inferior. Stamens hypogynous or perigynous. Ovary superior, 1-celled; style simple or 2-3-lobed; or styles 2-5.

Genera described.—HABLITZIA, BOUSSINGAULTIA.

Nat. Ord. PHYTOLACCACEÆ. *Characters.*—Leaves alternate, entire; stipules none or small. Flowers hermaphrodite or 1-sexed, usually in racemes. Perianth inferior, 4-5 parted; petals usually absent. Stamens 4-20. Ovary superior, becoming a dry or berry-like fruit.

Genus described.—PHYTOLACCA.

Nat. Ord. POLYGONACEÆ. *Characters.*—Leaves usually alternate, variously shaped, lobed, or divided, often dilated at base and furnished with ochreate stipules. Perianth inferior, with 4-6 coloured lobes or segments. Stamens 6-9. Ovary superior, angled or compressed.

Genera described.—ANTIGONON, POLYGONUM.

Nat. Ord. ARISTOLOCHIACEÆ. *Characters.*—Climbing plants, more or less fetid smelling when bruised. Leaves alternate, stalked, often heart-shaped or lobed. Stipules none. Perianth 3-lobed. Stamens 6-12. Fruit capsular or berry-like.

Genera described.—ASARUM, ARISTOLOCHIA.

Nat. Ord. URTICACEÆ. *Characters.*—Leaves various. Flowers small, usually 1-sexed. Perianth 4-9 lobed. Stamens 4-9.

Genus described.—DORSTENIA.

DESCRIPTIONS, CULTURE, PROPAGATION, ETC., OF PLANTS WITH BULBS, CORMS, TUBERS, TUBEROUS ROOTS, OR RHIZOMES

Arranged in Alphabetical Order.

ABOBRA (the native Brazilian name). Nat. Ord. Cucurbitaceæ.—The best-known species is—

A. viridiflora.—A Brazilian climber with fleshy tuberous roots, and dark glossy green elegant leaves, sweet-scented pale green flowers, the females of which are succeeded by oval scarlet fruits about the size of a filbert.

This plant may be grown in the open air during the summer months, and in the autumn the tuberous roots may be lifted and stored in dry earth or sand in the same way as Dahlias. In warm sheltered spots in the south and west, if the roots are protected from cold rains, they may be allowed to remain in the soil, but this should be of a rich and gritty nature. The plants grow rapidly and soon trail over fences, arbours, trellises, etc. To secure a good display of the scarlet fruits, it is advisable to grow male and female plants together. Increased by division, seeds, and cuttings of the young shoots in spring.

ACHIMENES (*cheimaino*, to suffer from cold). Nat. Ord. Gesneraceæ.—A genus of hairy perennial herbs, closely related to the Gloxinias, and natives of Tropical America, chiefly from Brazil to Mexico. There are

about twenty species, having underground, scaly, catkin-like rhizomes, opposite leaves, a five-lobed corolla with a bent cylindrical tube, to the base of which four stamens are attached.

Achimenes were at one time more extensively grown than they are at



FIG. 33.—*Achimenes tubiflora*.

present. The varieties in cultivation have been raised by crossing and inter-crossing a few of the best

species like *A. longiflora*, *A. multiflora*, *A. tubiflora*, and others. They are all easily grown in a stove or warm greenhouse, having a fairly humid atmosphere. They are chiefly valuable for flowering during the summer months, but may be had by forcing into growth, or by retarding, at almost any period of the year. The stems die down naturally in the autumn, and the catkin-like rhizomes, the individual scales of which remind one of the granules of a hard-roed herring, remain dormant during the winter months. In this condition they are kept dry by placing the pots on their sides, or by shaking out the rhizomes and storing in gritty soil in a cool place, at least free from frost until required; but about 45° to 50° is the safest temperature.

When starting them into growth a mixture of sandy peat, and a little turfy loam, leaf-mould, and well-rotted manure is used for potting. To keep up a succession of blossom, batches of the scaly root-stocks should be potted up at intervals of five or six weeks, the first batch being started about the end of January or during February. Pots or pans of various sizes may be used according to taste. In all cases drainage with clean crocks should be given at the base; over these a layer of moss or fibre, and then fill up about two-thirds with the prepared compost. The roots are spaced out on this an inch or more apart, and covered with an inch of soil, which should be moist but not sodden. The pots are then placed in a temperature of 60° by night, the soil being kept just moist until growths appear. Water is then given in increased quantities according to the rapidity of growth, and plenty of light must be allowed to get to the plants to keep them sturdy.

According to the season, however, shade must be given during the hottest part of the day. The syringe should also be used freely early in the morning and late in the afternoons, especially during the summer season, to keep the foliage fresh and clean and free from attacks of red spider and mealy bug. The plants usually grow from 12 to 18 ins. high, and as the soft juicy stems are unable to stand up well by themselves, a few thin sticks should be placed to give them support. When grown in hanging baskets lined with moss, the shoots may be tied down horizontally to sticks, and in this way they look very effective.

Achimenes are easily increased by splitting up the scaly rhizomes when



FIG. 34.—Achimenes, leaf-cutting.

repotting; by cuttings of the young shoots with two or three joints inserted in light sandy peat and kept moist and shaded till rooted; by ripened leaves, the stalks of which are inserted up to the blade; and from seeds sown on a finely prepared surface in spring, in a temperature of 65° to 75° F., in the same way as Gloxinias.

There are innumerable varieties

of *Achimenes* to many of which names were at one time given. The flowers exhibit numerous shades of colour such as white, crimson, purple, mauve, scarlet, rose, carmine, yellow, blue, violet, and intermediate shades, many being self-coloured, while others again are beautifully blotched and speckled.

Apart from the garden varieties, the following are a few of the best natural species:—

A. grandiflora.— $1\frac{1}{2}$ ft. Leaves oval, slightly toothed. Flowers violet-purple, large. Mexico. (*Bot. Mag.* t. 4012.)

A. hirsuta.— $2\frac{1}{2}$ ft. Leaves heart-shaped, toothed. Flowers rose with a yellow centre. Guatemala. (*Bot. Mag.* t. 4144.)

A. longiflora.—1 to $1\frac{1}{2}$ ft. Leaves in circles of three or four, oval-oblong, coarsely toothed. Flowers violet. (*Bot. Mag.* t. 3980.)

A. multiflora.—12 to 18 ins. Leaves opposite or whorled, oval, deeply toothed. Flowers pale lilac. Brazil. (*Bot. Mag.* t. 3993.)

A. tubiflora.— $1\frac{1}{2}$ ft. Leaves oblong, pointed, obscurely toothed. Flowers pure white, with a tube about 4 ins. long. Buenos Ayres. Once known as *Gloxinia tubiflora*. (*Bot. Mag.* t. 3971.)

ACIDANTHERA (*akis*, a point; *anthera*, an anther or pollen sac; referring to the shape). Nat. Ord. Iridaeæ.—A genus containing a dozen species or more of S. African plants having smooth or fibrous-coated corms, usually erect, simple stems, bearing a few flat, linear, veined leaves. The plants are closely related to the *Babianas*, and may be grown in the same way in a cool greenhouse in pots of sandy loam and leaf-soil. They require a fair amount of water during growth, but the soil should

be kept practically quite dry during the resting season. Increased by off-sets.

A. æquinoctialis.—A remarkable species from the mountains of Sierra Leone. It has stems about 4 ft. high, and sword-like leaves 20 ins. long. The flowers are white, with a triangular crimson blotch at the base of each segment, and are about 3 ins. across, with a tube 6 ins. long. (*Bot. Mag.* t. 7393; *Gard. Chron.* 1893, xiv. 682.)

A. bicolor.—A native of the Abyssinian Mountains and the Zambesi, having corms about an inch thick,



FIG. 35.—*Acidanthera bicolor*.

and flower-stems 1 to $1\frac{1}{2}$ ft. high, bearing white starry flowers, having a triangular purple blotch at the base. (Fig. 35.)

A. candida.—A fine species from the woodless grassy steppes of the Altai Plains in Eastern Tropical Africa. It has roundish corms and slender stems 1 to $1\frac{1}{2}$ ft. high, furnished with narrow, pointed, stiffish, green leaves with a prominent midrib on both

sides. The sweet-scented flowers are pure white, and have three large fimbriated stigmatic arms spreading from the mouth of the long cylindrical tube. (*Bot. Mag.* t. 7879.)

A. Gunnisi.—A native of Somaliland, having white flowers faintly tinged with rose-purple, the perianth-tube being 4 to 5 ins. long.

ACONITUM (from *Acona* in Bithynia, where it is said to be



FIG. 36.—*Aconitum Napellus*,
tuberous root-stock

plentiful). Nat. Ord. Ranunculaceæ.—The popular names for this genus are Aconite, Monkshood, and Wolf's Bane. There are many species and varieties, some having tuberous roots, others fibrous. The latter are not considered in this work. They are easily recognised by their leaves, being more or less deeply divided into five large lobes, these again being irregularly cut into coarse teeth or smaller lobes, and by the hooded

flowers being borne in terminal racemes. The sepals form the most conspicuous part of the blossoms. The upper one is usually shaped like a helmet or cowl (hence the name of Monkshood), inside which two petals with long stalks and small hooded heads are enclosed. (See Fig. 37.)

The species mentioned below are all quite hardy, and when grown in bold clumps are ornamental in the flower-border. It must be remembered, however, that the roots, stems, leaves, etc., possess poisonous properties, and notwithstanding their beauty, it may be safer to keep them out of gardens to which young children have free access. *A. heterophyllum*, from the Himalayas, however, is said to be non-poisonous, and is even used as a tonic called "Atees." (*Bot. Mag.* t. 6092.)

Aconites flourish in any ordinary garden soil, in sunny or partially shaded places; and also by the sides of lakes, ponds, or streams, where they can have plenty of sunshine. When necessary to increase the stock, the roots may be divided in spring; or seeds saved in late summer or autumn may be sown at the same period in prepared seed-beds in sheltered and somewhat shady spots in the open. Of the tuberous-rooted species the common Monkshood—*A. Napellus*—is the best known, and the most ornamental for gardens. It is a virulently poisonous plant, 3 to 4 ft. high, with blackish, spindle-shaped roots, and leaves deeply divided into five or seven main lobes. The erect racemes of blue, hooded flowers, appear in June and July, and often in autumn again if the first crop has been cut early. There are several varieties, of which *album*, white, *bicolor*, blue and white, and *grandiflorum*, deep blue, are amongst the

best. The variety *eminens*, from Rhenish Prussia, reaches a height of 9 ft. or more, and has more open flowers than the type. (*Bot. Mag.* t. 8152.)



FIG. 37.—*Aconitum Napellus*. ($\frac{1}{2}$.)

A. Wilsoni is a tall, erect-growing species, 5 to 6 ft. high, with large flowers of a pale blue or violet colour. It commences to bloom the beginning of September, and after the terminal raceme is over, others are produced from the branches lower down on the stem, by which means the season of flowering is extended to the end of October. (*Bot. Mag.* t. 7130, as *A. Fischeri*; *Flora and Sylva*, Sept. 1903.)

There are many other tuberous-rooted Aconites, natives of Central and Southern Europe, but they are of no great garden value.

ACORUS (*a*, privative; *kore*, pupil of the eye; in allusion to the medi-

cinal properties). Nat. Ord. Aroideæ.—The only species of importance is the Sweet Flag, *A. Calamus*, an evergreen British marsh or water plant with thickish cylindrical sweet-



FIG. 38.—*Acorus Calamus*. ($\frac{1}{3}$.)

scented rhizomes, from the terminal buds of which arise sword-shaped leaves 3 to 6 ft. long. The small flowers are borne on a pointed club-like spadix 3 to 6 ins. long, in June and July. There is a variety, having yellowish-striped leaves, rather attractive. A more slender species, *A. gramineus*, from China, has grassy leaves, 4 to 6 ins. long; there is also a white-striped form. All the plants flourish in shallow water, or in marshy or muddy places such as the edges of ponds, lakes, ditches, etc. Propagation is effected by dividing the creeping root-stocks in spring.

AGAPANTHIUS (*agape*, love; *anthos*, a flower). Nat. Ord.

Liliaceæ.—A small genus of half-hardy plants from S. Africa, having shortish rhizomes with thick fleshy roots, strap-shaped leaves, and umbels of funnel-shaped flowers on top of a stoutish scape. Each flower has almost equal segments, and six stamens attached to the base of the tube. Seed-pods are usually produced in our climate, but seeds are rarely ripened.

A. umbellatus.—This fine plant, popularly known as the African Lily, is an evergreen with fine masses of leathery strap-shaped leaves $1\frac{1}{2}$ to 2 ft. long, and erect stout scapes 2 to 3 ft. high, on top of which are borne numerous bright blue flowers during the summer and autumn months, in umbels 6 to 12 ins. in diameter (*Bot. Mag.* t. 500). There are several varieties, the best being:—*albidus* with white flowers, smaller than the type; *Leichtlini*, deep hyacinth-blue; *maximus*, large, bright blue; *aureus*, with yellow-striped leaves, and *flore pleno*, a double-flowered form, and *argenteus*, with silvery-striped leaves, are rarely seen. Other varieties are *minor* and *Mooreanus*, both with smaller flowers than the type, but decidedly compact and handsome in growth, and with deep blue colour. A plant called *intermedius* seems to be one of the larger forms, with flower-stems about 5 ft. high, having large heads of bright blue flowers. A variety with blue and white flowers, called *bicolor*, is also attractive. *St Pauli* has pure white flowers, and *Weillighi* has lavender flowers, the petals of which are centred and edged with indigo. *Globosus* is a deciduous form with globular heads of flower.

The plant known as *A. insignis* is no doubt a variety of *A. umbellatus*, but is distinguished by the creamy tint at the base of the leaves in the

centre, by the longer flower-stems, and the more numerous but paler flowers, each with longer pedicels than in the type (*Gard.* 1903, lxiii. 67, f.).

A. caulescens is closely related to *A. umbellatus*, but has dark violet-blue flowers (*Gartenfl.* t. 1487).

A. umbellatus and its varieties are easily grown plants, and are very useful for the decoration of the cool greenhouse or conservatory either as pot plants or when planted in borders. They are not quite hardy, but in the most favoured parts of the Kingdom often pass an ordinary winter in the open unscathed. In such places they are easily protected in severe winters by covering the crowns with straw, litter, etc., and if grown by the margins of lakes, streams, ponds, etc., in such localities, make very attractive masses of colour during the summer months. They flourish in any garden soil, but naturally do best in a light one, having plenty of well-decayed manure. When grown in pots or tubs, as is often the case, they like a compost of sandy loam and leaf-soil made firm round the fleshy roots. During growth an abundance of water may be given, and when danger from frost is over the plants may be grown in the open air till the approach of winter. They may then be taken into a cool greenhouse, or failing this even into a cellar free from frost until the following spring. The easiest way to propagate the plants is by dividing the clumps in spring when repotting. It takes five or six years to raise good flowering plants from seed.

ALBUCA (*albicans* or *albus*, white). Nat. Ord. Liliaceæ.—A genus closely related to the Galtonias and Hyacinths, with about thirty species

natives of Tropical and South Africa. They have tunicated bulbs, linear leaves, and flowers borne in loose, erect racemes. The three outer segments of the perianth are more or less spreading, the three inner and somewhat shorter segments being connivent, and enclosing the six stamens.

A. Nelsoni is the best-known species. It is a native of Natal, and may be easily grown in a cool greenhouse from which frost is excluded in winter. The soft green leaves are 4 to 5 ft. long, and about 2 ins. broad in the widest part. The flowers appear during the early summer months, and are pure white, sweet-scented, tinted with red on the outside down the centre of each segment. The bulbs should be potted in a mixture of sandy loam and a little peat, and during growth require fair supplies of water. In warm, sheltered parts of the Kingdom the plants may be grown in the open air, but care must be taken to protect them during the winter months. Fresh plants are secured by detaching offsets from the older bulbs, and growing them on. (*Bot Mag.* t. 6649.)

A. Wakefieldi (or **A. Elwesi**) is a native of East Tropical Africa, about 12 ins. high, with loose racemes of pale green flowers. It requires to be grown in a warm greenhouse or stove. (*Bot. Mag.* t. 6429.)

Closely related to this is **A. Buchananii**, from Nyassaland, having small ovoid bulbs, linear leaves, and long thin scapes bearing racemes of yellow flowers (*Gard. Chron.* 1892, xii. 488).

ALISMA (Celtic *alis*, water). Nat. Ord. Alismaceæ.—A small genus of water or marsh plants having parallel-veined leaves, and whorls or umbels of flowers having three petals and six stamens.

A. Plantago.—This is the common British Water Plantain found in ditches and on the edges of streams in various parts of the Kingdom. It is an ornamental plant with stems swollen and fleshy at the base, and bearing stalked, broadly lance-shaped leaves 6 to 8 ins. long, the young ones being submerged or floating. The pink or rosy flowers are borne from June to August on scapes 1 to 3 ft. high. The variety *lanceolatum* is distinguished by its narrower lance-shaped leaves.

This plant being indigenous is easily grown on the edges of ponds, lakes, or streams, and looks ornamental in bold clumps. It is increased by division, or may be allowed to reproduce itself naturally from seeds.

ALLIUM (Celtic *all*, hot or burning; in reference to the qualities of the Onions). Nat. Ord. Liliaceæ.—A large genus of plants with tunicated bulbs, flattish or roundish leaves, and dense umbels of flowers on top of a stoutish scape. The perianth consists of six segments, free or slightly united at the base, more or less spreading or bell-shaped, each with a stamen attached at the base. There are about 250 species altogether distributed over Europe, N. Africa, and Abyssinia, subtropical Asia, N. America, and Mexico. Such well-known esculents as the Onion, Leek, Garlic, Chive, and Shallot belong to this genus. Alliums are easily grown in ordinary garden soil, and although somewhat pungent in odour as a rule, they keep this peculiarity to themselves if not bruised or handled too much. When planting in the open, the bulbs should be covered with two or three times their own diameter of soil, and from 12 to 18 ins. apart. They are excellent for

borders, shrubberies, rock-gardens, or for naturalising in grassland that is not to be cut or mown in summer. Propagation of any particular species is effected by offsets from the older bulbs; or by seeds sown in rich gritty soil in spring.



FIG. 39.—Allium, seedling.

The following are amongst the most ornamental kinds for the hardy flower-border, viz.:—

A. acuminatum.—12 to 18 ins. high, with deep rose flowers in flattish heads 3 to 4 ins. across, in July and August. There are several forms, chiefly differing in the deeper tint of the blossoms. N. America.

A. albo-pilosum.—A fine new species from the East, with violet flower-heads about 8 ins. across, the individual blossoms being about 2 ins. in diameter. The leaves, about 18 ins. long and 1 to 2 ins. broad, have white hairs scattered on the margins

and under-surface. Considered to be one of the finest species. (*Gard. Chron.* 1903, xxxiv. 34, f.)

A. cabulicum.—This species from Kabul has whitish flowers with red-brown keels, borne in dense roundish many-flowered umbels (*Bot. Mag.* t. 7294; *Gard. Chron.* 1893, xiii. 546.)

A. Ellisi.—A Persian species related to *A. karataviense*, having leaves, about 1 ft. long and 2 ins. broad, and large umbels of rosy flowers on stems about 1 ft. high (*Bot. Mag.* t. 7875).

A. Erdell.—A fine species from Palestine, with whitish flowers having a rich crimson centre (*Bot. Mag.* t. 6426.)

A. karataviense, 9 to 12 ins. high, has broad blue-green leaves, and large round heads of whitish or lilac flowers. Turkestan. (*Bot. Mag.* t. 6451.)

A. Moly.—A well-known species, native of S. Europe, having compact umbels of bright yellow starry flowers in May, June, and July. An excellent species about 12 to 15 ins. high for naturalising in woodland places, and also for forcing into early blossom in spring in the greenhouse.

A. neapolitanum.—Another well-known species from S. Europe. It grows about 18 ins. high, and in summer has loose umbels of white flowers, the green stamens of which are conspicuous. Useful for early forcing.

A. nigrum grows 2 to 3 ft. high, having broadly lance-shaped leaves, toothed on the margins, and large heads of deep violet flowers in summer. S. Europe.

A. ursinum (Fig. 40), popularly known as "Ramsons," is a native of the woods and hedgebanks of the British Islands, but when cultivated its masses of white starry flowers make a fine display. Useful for naturalising in the grass.

Other species of *Allium* worth growing are *A. cœruleum* (or *azureum*) 12 ins. high, sky-blue; *A. flavum*, 1 ft., yellow; *A. Macnabianum*, deep magenta; *A. narcissiflorum* (or *pedemontanum*), with sweet-scented rosy-purple bell-shaped flowers, in drooping umbels; *A. Ostrowskyanum*, rose or licac-purple; *A. Schuberti*, with large spikes of lilac or rose-coloured flowers; *A. violaceum*, violet; *A. Suworowi*, purple; *A. orientale*, 2 ft., creamy-white; *A. stipitatum*, 2 ft., violet-purple, etc.



FIG. 40.—*Allium ursinum*.

ALOCASIA (*a*, privative; and *colocasia*, a closely allied genus). Nat Ord. Aroideæ.—A genus of ornamental leaved plants chiefly natives of Tropical Asia and the Malayan Archipelago. There are about twenty natural species, and several garden hybrids, recognised by thickish root-stocks, from which arise large sagittate-cordate leaves on long stalks

sheathing at the base. The flowers are of no particular beauty from a garden point of view, and both males and females are borne together on a shortly stalked spadix.

All the Alocasias require to be grown in the stove house, that is in a warm and humid atmosphere, throughout the year. Their elegant foliage, often beautifully veined and marked, and their bold habit render them attractive subjects. They are by no means difficult to grow, provided they can be given a winter-night temperature of not less than 65° F., running up to 70° to 75° by day. During the summer months the temperature will naturally be from 5 to 10 degrees higher than this.

The compost most generally suitable for Alocasias seems to be a mixture of sandy loam and fibrous peat in about equal proportions, with a little chopped sphagnum moss, and pieces of charcoal added. The pots or pans in which they are to be grown should be well drained, because although the plants require an abundance of water, they dislike anything in the way of stagnant liquid round the roots. It is generally better to repot annually early in the year to keep the plants increasing in size and beauty, and pots of various sizes will be used in accordance with the bulk of the plants. The old soil should be removed with a pointed stick, or the root-stocks may be washed clean in tepid water to free them from sour material. The compost should be worked in firmly and finished off with a dressing of short sphagnum. The plants are then watered from time to time, and the syringe is kept going freely in the mornings and afternoons. When growth is well established, syringing indeed is not only a necessity to maintain the requisite moisture in

the atmosphere, but also to keep such insect foes as red spider, thrips, aphides, and mealy bug from spoiling the leaves and young growths, and thus destroying the appearance of the plants. In addition to intelligent watering and syringing, a little weak liquid manure may be given about twice a week to any specimens in which particular interest may be taken.

Ventilation must be regulated according to the season, and the climatic conditions prevailing outside; and although the plants require plenty of light to develop their colour, care must be taken not to allow the sun to scorch the foliage through the glass. On very hot days, therefore, the blinds must be let down for some time, if the glass has not been shaded permanently for the summer season.

Alocasias are propagated by means of detaching suckers from the root-stocks, and also by carefully dividing the latter when necessary. This work is best done in February or March when the old plants are being reotted. Each detached portion should be placed in a pot by itself in the compost used, and is encouraged into growth by judicious watering, syringing, and shading.

The following are amongst the best species and varieties:—

A. æquiloba.—A native of New Guinea, with pale green sagittate, lobed leaves, 2 ft. long, and small green spathes.

A. argyrea.—This species has very large, dark green, hastate, lance-shaped leaves with a silvery sheen, and a prominent midrib.

A. Augustiana.—A Papuan species 1 to 2 ft. high, with bright green wavy leaves, the stout stalks of which are coloured rose, and hieroglyphically marbled with brown or purple (*Ill. Hort.* 1886, 593).

A. Chantrieri.—A beautiful hybrid between *A. cuprea* and *A. Sanderiana*. The large, wavy, arrow-shaped leaves are broadly toothed, olive green above, with a narrow silvery edging to the main veins. The under-surface is deep wine-red in colour, while the leaf-stalks are faintly striped with greenish brown. (*Rev. Hort.* 1887, 465; *Ill. Hort.* 1888, t. 64.)

A. Chelsoni.—A nice hybrid between *A. cuprea* and *A. longiloba*. The large leaves are shining metallic green above, and purple beneath.

A. coriacea has dark green leathery leaves with clear green ribs, the petioles being rose-coloured when young, afterwards rosy white marbled with green (*Gard. Chron.* 1893, xiii. 475).

A. cuprea (*A. metallica*; *Xanthosoma plumbea*).—A fine Bornean species, 6 to 7 ft. high, with large, oval heart-shaped leaves, metallic or coppery green above, and bronzy purple beneath (*Bot. Mag.* t. 5190; *Ill. Hort.* 1861, 283).

A. Curtisi.—A native of Penang, about 2 ft. high, the leaf-blades being 18 ins. long, 12 ins. broad, with long basal lobes, light and dark green above, purple beneath. The spathes are about 6 ins. long.

A. Desmetiana.—Leaves elongated, heart-shaped, deeply sinuate, with spotted petioles.

A. Dussi.—This has large olive green leaves with brownish-red nerves and petioles (*Gartenfl.* 1892, 412).

A. eminens.—A native of the East Indies, with ovate-sagittate leaves, deep green above, purple beneath, the medium and main veins being paler in colour.

A. grandis.—A fine species from the Indian Archipelago. Leaves ovate-sagittate, pale green above, deep green beneath, and with blackish stalks.

A. guttata.—A Bornean species with elliptic-sagittate leaves, deep green above, purple beneath, and regularly spotted leaf-stalks. The variety *imperialis* is a finer plant. (*Ill. Hort.* 1884, 541.)

A. hybrida.—A hybrid between *A. cuprea* and *A. Lowi*. Leaves elliptic, pointed, olive green above, edged with ivory white, dull purple beneath. The young leaves are of a bronzy tint when unfolding.

A. illustris.—Leaves ovate-sagittate, rich green, spotted with dark green. East Indies.

A. Jenningsi.—An East Indian species of small growth, with ovate, heart-shaped leaves blotched with dark brown between the main veins; leaf-stalks spotted.

A. Lindeni.—Leaves ovate heart-shaped, pointed, triangular at the base, green above with yellowish-white veins; stalks whitish. Papua. (*Ill. Hort.* 1886, 603.)

A. longiloba (*A. amabilis*; *A. gigantea*).—Leaves large, sagittate, green with white veins; grows 4 to 5 ft. high. Java.

A. Lowi.—Leaves heart-shaped, olive green with white veins, purple beneath. Borneo. (*Bot. Mag.* t. 5376.)

A. Luciani.—A fine hybrid between *A. Thibautiana* and *A. Putzeyssi*. Leaves ovate, pointed, deep green above with white leaves, purple beneath, the pale green stalks being spotted with brown (*Ill. Hort.* ser. v. 27).

A. macrorhiza.—A noble species from Polynesia, 3 to 5 ft. high, with large heart-shaped leaves of a pale green. The variety *variegata*, which has the leaves marbled and blotched with creamy white over nearly half the surface, is a far more ornamental plant. It comes from Ceylon.

A. Margaritæ has large obcordate leaves, more or less wrinkled and

waved on the margins, with brownish-purple stalks (*Ill. Hort.* 1886, 64).

A. marginata.—A Brazilian species with broadly ovate, heart-shaped leaves about 18 ins. long, slightly sinuate on the margins, and with irregular, zigzag, blackish-brown markings on the stalks.

A. Marshalli.—An Indian species somewhat resembling *A. Jenningsi*, with broadly heart-shaped green leaves, darkly blotched between the side veins, and with a broad silvery band down the centre, the stalks being more or less marbled.

A. odora (*Arum* and *Caladium odorum*; *Colocasia odorata*).—A stemless Peruvian species, with heart-shaped, roundish leaves about 3 ft. long, with rounded lobes (*Bot. Reg.* viii. t. 641).

A. plumbea.—This species has large dark green crinkled leaves, with purplish petioles.

A. princeps, from the Malayan Archipelago, has sagittate leaves with narrow, divergent lobes at the base, forming a triangular opening; the margins are deeply indented, and the upper surface has a metallic, olive green tint. The under-surface is grey-green, veined, and edged with dark chocolate brown, the leaf-stalks being also marbled with the same colour.

A. Pucciani.—A garden hybrid with ovate-sagittate leaves about 18 ins. long, green above with pure white veins in the middle of a silvery band. The under-surface is bright purple, while the stalks are irregularly blotched with dark rosy-carmine on a pale purple ground.

A. Putzeyssi.—A native of Sumatra, with leaves like those of *A. longiloba*, deep green in colour except for the white bands along the veins and margins, the under-surface being deep purple (*Ill. Hort.* 445).

A. Reginae.—An elegant species from Borneo, with ovate, heart-shaped leaves, wavy on the margins, the under-surface being of a sombre brownish-purple, while the stalks are spotted with chestnut-purple (*Ill. Hort.* 1885, 544).

A. reversa, from the Philippine Islands, has ovate-sagittate leaves of a grey-green colour, relieved by deep green bands along the main veins. A pretty plant about a foot high. (*Bot. Mag.* t. 7498.)

A. Sanderiana.—A very ornamental species from the Malayan Archipelago, having drooping sagittate leaves, with three lobes on each side. The ground colour is soft green with a bluish metallic sheen, while the main veins and margins are conspicuously banded with ivory white. The stalks are brownish-green, streaked and mottled with purple. (*Rev. Hort. Belg.* 1884, 181.) The variety *gandavensis* has purplish young leaves with vermilion veins. This colouring remains constant on the under-surface, but gradually changes to green on the upper. (*Ill. Hort.* 1896, t. 65.)

A. scabriuseula.—A noble-looking Bornean plant, 4 to 5 ft. high, with spreading sagittate leaves of a deep shining green above, pale green beneath, and often as much as 2 ft. to 2½ ft. in length.

A. Sedeni.—A hybrid between *A. cuprea* and *A. Lowi*, and somewhat resembling the latter. Leaves oval, heart-shaped, deflexed, bronzy green above, with distinct ivory-white veins, the under-surface being purple.

A. sinuata.—A species from the Philippine Islands with sagittate leaves having sinuate margins, and of a deep green colour above, and whitish or grey-green beneath.

A. spectabilis.—This is similar to *A. Putzeyssi*, having large metallic

green leaves veined and laced with grey, the under-surface being dark purple.

A. Thibautiana.—A magnificent Bornean plant, with ovate, acute, deeply heart-shaped leaves, greyish olive green above, with whitish midrib and grey veinings, the under-surface being purple in colour (*Rev. Hort. Belg.* 1884, 37).

A. Villeneuvei.—A Bornean species closely related to *A. longiloba*, with irregularly shaped leaves, the stalks of which are heavily spotted with brown (*Ill. Hort.* 1887, t. 21).

A. Watsoniana.—A fine Sumatran species with cordately lobed leaves, wavy on the margins, and coloured olive green and dark purple on the upper surface, dark purple beneath (*Gard. Chron.* 1893, xiii. 442, 569, f. 83).

A. Wavriniana.—An ornamental species 3 to 4 ft. high, the stem being mottled with light and dark green and suffused with bronze. The lance-shaped, sinuate leaves are deep green, beautifully feathered with raised veins, which are still more prominent beneath on a purple ground.

A. zebrina.—A strong-growing species 4 to 5 ft. high, from the Philippine Islands, having erect, broadly sagittate leaves of a rich dark green, and pale green stalks marbled with zigzag bands of dark green (*Fl. d. Ser.* xv. 1541-1542).

ALPINIA (after *Prosper Alpini*, an Italian botanist). Nat. Ord. Scitamineæ.—A genus containing about forty-five species of graceful perennials, natives of Tropical and subtropical Asia, Australia, and the islands of the Pacific Ocean. They have horizontal or creeping rootstocks like the Ginger plant, erect ornamental leaves, and flowers

arranged in raceme-like clusters at the end of the leafy stems. The corolla has a short tube, the outer limb being divided into equal lobes, the inner one forming a large flat lip, while the lateral segments are reduced to small teeth or are absent altogether.

Alpinias flourish in a rich compost of fibrous loam, peat, and leaf-mould, or old cow-manure, in about equal proportions, with the addition of a little sharp silver sand to secure sufficient porosity. The minimum temperature during the winter season should not sink below 65° or 60° F., even if the plants are at rest and quite leafless. During the spring and summer months, when growth is active, an abundance of water must be given, and the syringe should be freely used in the mornings and afternoons to keep the foliage clean and healthy, and free from attacks of red spider or mealy bug. After the flowers have passed their best they should be cut off, to save the plants further exhaustion. Once the leaves begin to assume a yellowish tint, water should be given in smaller quantities, until eventually it is withheld almost entirely when the leaves drop. Propagation is effected in spring by carefully cutting the rhizomes with a strong sharp knife when the young shoots have fairly started into growth.

The following are the only species of garden value:—

A. albo-lineata.—A native of New Guinea, 3 to 4 ft. high, with elliptic, lance-shaped, soft green leaves obliquely banded with white.

A. borneensis.—A distinct Bornean species 4 to 6 ft. high, with leaves 2 ft. long, and purple-lipped flowers in panicles a foot long.

A. fimbriata.—A Bornean plant 3 to 5 ft. high, with lance-shaped leaves

1½ ft. long, and fine spikes of purple flowers.

A. longipetiola.—A strong-growing species from West Tropical Africa, about 6 ft. high, with elliptic leaves, the upper ones becoming narrower, the petioles being long, roundish, and winged at the top. The white or rose flowers spotted with purple are borne in terminal panicles.

A. mutica.—A handsome Bornean plant about 6 ft. high, with narrow, lance-shaped, almost stalkless leaves, and white and yellow flowers veined with crimson, borne in pairs on a spike-like raceme about August (*Belg. Hort.* vii. 21; *Bot. Mag.* t. 6908).

A. nutans (*Globba nutans*).—A fine Indian species, as much as 13 ft. high, with smooth, lance-shaped leaves, 12 to 18 ins. long, covered with reddish hairs. The pinkish, sweetly scented flowers appear about May in drooping racemes, the large orange-pink lip being striped with red. Owing to its size this species requires plenty of space, and may be grown in bold masses in corners of the hothouse, where it may be seen to the best advantage, either in pots, tubs, or planted out in beds of rich soil. (*Bot. Mag.* t. 1903.)

A. pumila.—A native of Eastern China, with tufts of elliptic, lance-shaped, pointed leaves, having white stripes on the green upper surface. The pink and rosy flowers are borne in short spikes about April, on short stalks springing up from the roots. (*Bot. Mag.* t. 6832.)

A. Sanderæ.—A species from New Guinea, with erect stems, shortly stalked shining green leaves about 5 ins. long, regularly and closely striped with broad white bands (*Gard. Chron.* 1903, xxxiii. 245).

A. tricolor.—A native of the Solomon Islands, with oblong pointed leaves about 10 ins. long, green, with

creamy yellow or white stripes (*Gard. Chron.* 1903, xxxiii, 245).

A vittata.—A graceful species from the South Sea Islands, with elliptic, lance-shaped, tapering leaves 6 to 8 ins. long, having broad, oblique bands of white on a dark green ground.

A zingiberina.—A Siamese plant, 4 to 6 ft. high, having smooth, oblong, oblanceolate leaves 10 to 12 ins. long, and ending abruptly in a sharp point. The pale green flowers with a white, pink-veined lip appear about July in an almost erect panicle 10 to 12 ins. long. (*Bot. Mag.* t. 6944.)

Other species not so well known are—*A. Allughas*, 3 ft., red; *A. auriculata*, 10 to 12 ft., reddish-yellow; *A. calcarata*, 3 to 5 ft., white; *A. cœrulea*, 6 ft., reddish-purple; and *A. malaccensis*, 6 to 8 ft., white.

ALSTRÆMERIA (in honour of *Baron Alstrœmer*, a Swedish botanist). Nat. Ord. Amaryllidææ.—A genus having forty or fiftyspecies, natives of tropical and subtropical S. America, characterised by having masses of thickish or tuberous roots from which arise leafy stems bearing clusters or umbels of richly coloured and often spotted flowers. The funnel-shaped perianth is more or less irregular, with six narrow segments in two circles. The lower segment of the inner circle is usually quite distinct from the others.

The Peruvian Lilies—as the Alstrœmerias are popularly called—are practically hardy south of the Thames, and in the more favoured parts of the United Kingdom. It is well, however, to afford the roots protection in severe winters with a covering of straw or litter. They are becoming more popular every year now that their culture is better understood than formerly, and when planted in bold groups or masses they are very ornamental plants in the flower-

border. The soil in which they are to be grown should have a southern aspect, and should be trenched to a depth of about 3 ft., so as to secure perfect drainage. Sandy loam and leaf-soil with some well-rotted cow-manure added makes a good compost, in which they flourish. The best time for planting is in March or April, when the weather is favourable. The clumps of roots should be buried from 6 to 9 ins. beneath the surface, and should be about a foot apart. A mulching of well-rotted manure or leaf-mould on the surface will keep the soil moist even during the hottest summer, and when it can be conveniently given it is better than watering too often. At the same time, it would be fatal to neglect giving sufficient moisture during the period of active growth, and this point must be attended to in hot, dry seasons. When the blossoms are beginning to appear, watering with weak liquid manure two or three times a week will be highly beneficial, and help the flower-stems to carry their blossoms more erect. Faded flowers should always be picked off, not only because of their unsightliness, but because the ripening of seeds helps to exhaust the reserve materials in the plants. Once the plants are established and doing well, it is best to leave them undisturbed for a few years until they become too crowded and show a falling-off in their growth. Each season, however, when grown in this way, they will be benefited by a good mulching of well-decayed manure over the surface about September. It will supply fresh food and also protect from frost, at the same time preventing the heat absorbed during the summer months from being radiated too rapidly.

Alstrœmerias are easily increased by carefully separating the fleshy roots

into as many clumps as there are crowns showing. This is best done as a rule in spring-time, when growth recommences after the winter rest. Ripened seeds may also be sown either in autumn or in spring, in pots or pans of rich gritty soil, and kept in a cold frame or greenhouse. The seedlings when large enough to handle easily should be pricked out into a compost of sandy loam, with a little peat and leaf-soil, in pots or pans. They may be grown on in this way for about a year, attention being given to watering, etc. They will then be large enough to transplant, without much danger to the brittle roots, to the open air where they are to bloom. Instead of sowing the seeds in the way described, they may be sown when thoroughly ripe in patches where it is intended the plants are to remain eventually. By covering the seeds with 2 or 3 ins. of rich gritty mould, they pass the winter safely and germinate freely the following spring. When this method is adopted one must not forget to mark the spot where the seeds have been sown.

The following are amongst the most useful garden kinds :—

A. aurantiaca (*A. aurea*).—A splendid strong-growing species 2 to 4 ft. high, native of Chili, having thin, lance-shaped leaves, and masses of large orange flowers, the two upper inner petals being brightly streaked with red or carmine. One of the best kinds for the open border. (*Bot. Mag.* t. 3350.)

A. brasiliensis.—A Brazilian species 3 to 4 ft. high, with oblong, lance-shaped leaves about 2 ins. long, and reddish-yellow flowers, the inner segments being spotted with deep brown. This species is too tender for outdoor cultivation.

A. caryophyllea. — A Brazilian

species about 8 or 9 ins. high, with narrow, lance-shaped leaves, and sweet-scented scarlet flowers produced in February. This species was erroneously figured as *A. Ligtu* in the *Bot. Mag.* t. 125. It is not a hardy plant, and can only be brought to



FIG. 41.—*Alstroemeria aurantiaca*. (3.)

perfection in a stove or warm greenhouse. During the winter season the roots are at rest, and consequently require no water during that period.

A. chilensis.—A beautiful Chilean species 2 to 3 ft. high, with more or less obovate, spoon-shaped, rather glaucous, twisted leaves minutely fringed at the edges. The blood-red or pink flowers appear during the summer and autumn months, and have the two upper inner segments lined with yellow. There are many seedling forms of this plant in gardens, having a great variety of colour from bluish-white to deep orange or red.

A. densiflora.—A Peruvian species with somewhat climbing stems, oval-pointed leaves, and dense umbels of scarlet flowers spotted with black at the base of the segments (*Bot. Mag.* t. 5531).

Being a tender species, this plant should be grown in a greenhouse.

A. hæmantha.—This is a plant figured in the *Bot. Mag.* t. 2354 as *A. pulchella*, and as *A. Simsii* in *Sw. Brit. Fl. Gard.* t. 267. It is a native of Chili and grows 2 to 3 ft. high, and has crowded, thin, lance-shaped leaves 3 to 4 ins. long, glaucous beneath, the upper ones being linear. Numerous flowers are borne during the summer in compound umbels, and have the outer segments of a bright red tipped with green, the narrower inner ones having red-purple spots on an orange ground. The variety *albida* has whitish flowers, while one called *Barclayana* has crimson ones.

A. Ligtu.—This is according to Mr Baker's Monograph of the Amaryllidæ the correct name for the plant more popularly known as *A. pulchra*. It grows 1½ to 2 ft. high, and has narrow leaves 2 to 3 ins. long. The flowers are whitish or pale lilac, or red, obliquely streaked with purple. The variety *pulchra* proper, as figured in the *Bot. Mag.* t. 2421, has longer and narrower leaves, and flowers of various colours. There seems to have been much confusion of names in connection with this plant, the following having been described formerly as being distinct: *A. angustifolia*, *A. Presliana*, *A. pallida* (*Bot. Mag.* t. 3040), *A. Hookeriana* (*A. rosea*, *A. Hookeri*), *A. bicolor* (*Lodd. Bot. Cab.* t. 1497), and *Flos-martini* (*Bot. Reg.* t. 731).

All these forms are natives of Chili, and are somewhat tender. When grown in the open air, there-

fore, they should be planted in the warmest spots, and protected with litter or other material in winter.

A. pelegrina or **peregrina** (*Lily of the Incas*).—A beautiful Chilean species about 1 ft. high, cultivated at Hammersmith as long ago as 1774, in Messrs Lee's nursery. The leaves are thin, lance-shaped, and about 2 ins. long, and the outer segments of the lilac flowers are 1 in. broad, while the inner ones are heavily spotted with reddish-purple. The variety *alba* is a beautiful form with white unspotted flowers. It is, however, rather tender, and requires the protection of a cold frame or cool greenhouse, where it makes a fine subject in pots. (*Bot. Mag.* t. 139.)

A. pulchella (*A. Banksiana*; *A. psittacina*).—A Brazilian species 2 to 3 ft. high, with scattered more or less lance-shaped leaves and clusters of dark red flowers tipped with green, all the segments, which are very unequal, being spotted inside with brown. The variety *Erebouldti* has white flowers spotted with crimson. Rather tender. (*Bot. Mag.* t. 3033; *Bot. Reg.* t. 1540.)

A. revoluta.—A Chilean species, 1 to 1½ ft. high, with wavy, twisted lance-shaped leaves and bright orange flowers tipped with purple, the upper segments being striped with crimson.

A. versicolor (*A. peruviana*).—A pretty plant about 1 ft. high, from Chili and Peru, with obliquely linear leaves, and yellow flowers spotted and striped with purple or maroon. This is a strong-growing species with several beautiful garden forms.

AMARYLLIS (after Virgil's *Amaryllis*), *Belladonna Lily*. Nat. Ord. Amaryllidæ.—This genus is restricted to the one species described below, although the name *Amaryllis* is generally used in gardens for the

species and varieties of *Hippeastrum*—which see.

A. Belladonna (*A. pudica*; *A. rosea*; *Coburgia Belladonna*).—This is a native of Cape Colony, and not of the West Indies as stated in some works, and was introduced to cultivation as long ago as the year 1712. In spring the ovoid bulbs, which are 3 to 4 ins. through, produce seven to nine strap-shaped, distichous, dull green



FIG. 42.—*Amaryllis Belladonna*. (4.)

leaves 12 to 18 ins. long and about 1 in. broad. From six to twelve funnel-shaped flowers, consisting of six nearly equal, oblong acute, connivent segments, are borne on the top of a solid scape 12 to 18 ins. high, about August and September. They are of a beautiful soft rose colour and sweetly fragrant. (*Bot. Mag.* t. 733; *Red. Lil.* t. 180.)

There are several forms of the

Belladonna Lily, including *blanda* (*Coburgia blanda*) (*Bot. Mag.* t. 1450), which has longer and broader leaves, 2 to 3 ft. long, and larger and paler coloured flowers; and *pallida*, which differs from the type only in having paler coloured flowers. Other forms have been called *rosea perfecta*, *speciosa purpurea*, and *spectabilis bicolor* or *mutabilis* in gardens. The “Kew” variety, however, is far superior to them all. It originated in the Royal Gardens, Kew, and is much more vigorous and free flowering than the type, from which it differs chiefly in having a stouter scape twice as long, and bearing about four times as many flowers of a rich rosy-crimson colour. It is said to be the result of crossing *A. Belladonna* with *Brunsvigia Josephine*.

The Belladonna Lily and its varieties flourish in warm sunny spots sheltered from bleak cold winds. The bulbs should be planted about 9 ins. deep in a rich compost of sandy loam and leaf-mould. Good drainage is essential, and may be secured by placing a thickish layer of brickbats, clinkers, etc., about 3 ft. below the surface of the border. If the bulbs are planted in autumn, it will be wise to cover them with a layer or heap of leaves, litter, etc., in bleak localities, as a protection against frost and also to throw off heavy rains. Once planted in a suitable position, the bulbs need not be disturbed for four or five years. Transplanting is best done after the withering of the foliage. When fresh plants are required the bulbs are lifted and all offsets separated and replanted, allowing a distance of about 1 ft. between each one. During the hot summer months copious waterings should be given, and an annual mulching of well-rotted manure will also be beneficial.

AMICIA (after *J. B. Amici*, a celebrated French physician). Nat. Ord. Leguminosæ.—There are only a few species in this genus, the best known being—

A. Zygomeris.—A Mexican shrubby plant 4 to 6 ft. high, having thick, fleshy root-stocks, and fleshy, downy stems furnished with paripinnate leaves divided into two pairs of wedge-shaped obovate or truncate leaflets. The pea-like flowers, which appear in September, are yellow, streaked with purple on the keel, and are enclosed before expansion in conspicuous and ornamental leafy stipules of a purplish colour. (*Bot. Mag.* t. 4008.)

This species is perfectly hardy in the milder parts of the United Kingdom, and will grow well in any good and well-drained garden soil in warm, sunny positions. It may be increased by seeds or cuttings of the young shoots under glass early in the season.

AMMOCHARIS (*ammos*, sand; *charis*, loving; in reference to wild conditions). Nat. Ord. Amaryllidææ.—This genus contains only the following species—

A. falcata.—A native of Cape Colony and Natal, where it is found at an elevation of 5000 feet. It has ovoid bulbs, 6 to 9 ins. in diameter, covered with numerous brown tunics. The narrow, strap-shaped leaves appear before the flowers in summer or autumn, and attain a length of 1 to 2 feet. During the winter months the sweet-scented bright red flowers are borne twenty to forty in an umbel on stout two-edged scapes 6 to 12 ins long, springing up from the side of the bulbs. This species was formerly known under the generic names of *Crinum*, *Amaryllis*, and *Hæmanthus*. (*Bot. Mag.* t. 1443.)

This species is not quite hardy

except in very favoured spots, and is therefore best grown in a cool greenhouse in a well-drained compost of sandy loam and peat in about equal proportions. It is increased by offsets from the older bulbs.

AMOMUM (*a*, not; *momos*, impurity; referring to the quality of counteracting poison). Nat. Ord. Scitamineæ.—A genus of deciduous herbaceous perennials closely related to the Gingers (*Zingiber*), the *Alpinias*, *Cureumas*, and *Hedychiums*, having thickish or creeping rhizomes, entire lance-shaped leaves distichously arranged, and spikes or clusters of bracteate flowers springing up close to the ground from the rhizomes. Calyx tubular or spreading at the mouth, three-lobed. Corolla-tube sometimes as long as the calyx, sometimes very slender and much longer, with three equal spreading lobes, or with the posterior one broader and more erect.

There are about fifty species known, natives of Tropical Asia and Africa, some species being also found in Tropical Australia and the Pacific Islands. Owing to their aromatic flavouring they were formerly used in embalming, and the word "mummy" is said to be derived from the generic name. All the kinds in cultivation may be grown in the same way as the *Alpinias* in a stove house with plenty of atmospheric moisture during the growing season. They flourish in rich sandy loam, with a little leaf-soil or old manure added. Propagation is effected by dividing the rhizomes in the spring, when repotting may be necessary.

Amongst the species met with are:—

A. angustifolium, 8 ft. high, with narrow, lance-shaped leaves, and

chrome-yellow flowers, sometimes crimson and yellow, and sometimes all crimson, produced in June, July, and August. Madagascar.

A. Cardamomum.—8 ft. high. Flowers brownish. August. East Indies. This species yields the round Cardamoms of commerce, the true Cardamoms being obtained from *Elettaria Cardamomum*—which see.

A. Granum-paradisi.—Popularly known as "Grains of Paradise" or "Guinea Pepper," is a native of W. Africa. It grows about 3 ft. high; has elliptic, lance-shaped leaves, red stems, and white flowers tinged with yellow and rose, in March or April. (*Bot. Mag.* t. 4603.)

Otherspecies are—*A. Danielli*, 2½ ft., red; *A. hemisphericum*, 12 ft. high, with leaves 1½ ft. long, green above, claret-red beneath; flowers red and yellow, surrounded by large dull red bracts (*Bot. Mag.* t. 7592); *A. Melegueta*, 1 to 2 ft., pale pink; *A. platyandrum*, 6 to 8 ft., dark red with a yellow lip; *A. trilobum*, 2 to 3 ft., deep red and yellow; and *A. sceptrum*, 5 to 6 ft., bright rose-purple—all from W. Africa.

AMORPHOPHALLUS (*amorphos*, deformed; *phallos*, a mace; referring to the misshapen barren appendix of the spadix). Nat Ord. Aroideæ. —Extraordinary looking herbaceous plants, sometimes of great size, with large, roundish, flattened tubers, from 2 to 5 ft. in circumference in some species, and natives of Tropical Asia, Tropical Africa, the Malayan Archipelago, and the Pacific Islands. From each tuber a solitary leaf with a stalk from 2 to 10 ft. high usually arises, and in some species this is large enough to cover an area 45 ft. in circumference, or roughly 15 ft. across. The leaves are divided into three main lobes, the latter being

again divided and subdivided into smaller segments. The inflorescence consists of an aggregation of minute flowers borne on a thickish, irregular, club-like spadix, which sticks up boldly to a height of 6 ft. in some species (e.g., *A. Titanum*), in the centre of a large surrounding cup-shaped envelope called a spathe. The latter varies from 8 or 9 ins. in diameter to as much as 3 ft.

From the dimensions of some of the species, it is obvious they can only be grown in establishments having plenty of accommodation under glass. On the whole they are scarcely plants for the ordinary stove or warm greenhouse, and can only be regarded as remarkable vegetable curiosities, quite appropriate in such places as the National Garden at Kew, where even the putrid odour that arises from the inflorescence of many can be tolerated during the period the plants condescend to bloom.

To grow the plants successfully, a stove or warm greenhouse temperature (60° to 65° F. minimum in winter), is necessary, accompanied with plenty of moisture during active growth in spring and summer. The tubers should be potted in rich turfy loam, leaf-soil, and a fair sprinkling of coarse silver sand. In addition to liberal supplies of water when growing, the syringe should be freely used in the mornings and late in the afternoons. As the leaves die down the supply of water should be gradually lessened, and when the tubers are dormant, they may be left in the soil without further moisture until growth recommences. Propagation is practically out of the question with many, if not most, species; and the plants can only be secured by importing the tubers or seeds direct from their native habitats.

The following species may be briefly noted:—

A. Afzeli (*Corynophallus Afzeli*).—A dwarf species, 1 to 2 ft. high, from Tropical Africa, having finely divided leaf-lobes, and tubular spathes marbled and striped with purple. The variety *elegans* has the leaves cut into finer segments; *latifolia* has broader lobes; and *spectabilis* has pale-coloured stalks with darker blotches. (*Gard. Chron.* 1872, 1619.)

A. campanulatus (*Tacca phallifera*; *Arum campanulatum*).—A native of the East Indies, about 2 ft. high, with large tubers, and leaves about a yard wide divided into three large lobes, each again cut into smaller divisions. The spathe appears before the leaf, and is about a foot long, bell-shaped, greenish-yellow, outside spotted with brown; the inner surface being purplish or violet, while the large, swollen, irregular spadix sticks up in the centre. (*Bot. Mag.* t. 2812; *Gard. Chron.* 1889, i. 755, 804.)



FIG. 43.—*Amorphophallus campanulatus*. (L.)

A. Eichleri.—A native of W. Tropical Africa, with solitary, green, much-divided leaves, and small purple and white spathes about 4 ins. across,

having a brown, club-shaped spadix about 6 ins. long in the centre (*Bot. Mag.* t. 7091).



FIG. 44.—*Amorphophallus Eichleri*. (L.)

A. Elliotti.—A species from Sierra Leone, having fleshy tubers, and leaf-stalks about 1 ft. high with a three-lobed pinnatifid blade. The scapes are about 1 ft. high, bearing a short, broad-hooded spathe, coloured pink and green with blotches and zones of brown purple. (*Bot. Mag.* t. 7349.)

A. glabra, from Queensland, resembles *A. variabilis*, but has shorter spathes, and the flowers emit a fragrance like pineapples (*Gard. Chron.* 1895, xvii. 484).

A. grandis.—A Javan species about a yard high, with a purple spadix in the centre of a spathe which is green outside and white within.

A. Leopoldiana (*Hydrosme Leopoldiana*).—A native of the Congo, 2 to 3 ft. high, with palmate leaves cut into fine segments. The reddish-violet spathes are ovate, lance-shaped, and pointed, enclosing a cylindrical

spadix 2 to 2½ ft. long. (*Ill. Hort.* ser. v. 23.)

A. oncophyllus.—A native of the Andaman Islands, with a tuberous root-stock about 10 ins. in diameter, and a leaf-stalk 3 ft. high, blotched with pale green. The leaf-blade is about 3½ ft. across, divided into numerous lance-shaped segments. The bell-shaped spathe is nearly a foot long, coloured inside deep brown-purple with yellow blotches. The erect spadix is creamy yellow, and the whole inflorescence emits a very disagreeable odour. (*Bot. Mag.* t. 7327.)

A. Rivieri (*Proteinophallus Rivieri*).—This is probably the best-known species of the genus. It is a native of Cochin-China, and has finely divided leaves a yard or more across, and borne on stalks about 3 ft. high, marbled and blotched. The dark brown cylindrical spadix is much longer than the irregularly bell-shaped rosy-green spathe, and is generally produced from March to May, before the leaves appear.

A. Teutzi (*Hydrosme Teutzi*).—A native of W. Tropical Africa, with solitary three-partite leaves cut into branching finely cut segments. The trifid spathe is green outside, purple-brown inside, enclosing a shorter spadix with a greenish cylindrical appendix. (*Gartenfl.* t. 1142.)

A. Titanum (*Conophallus Titanum*).—A gigantic species from Sumatra, having huge tubers (said to be edible), and enormous leaves which cover an area of 45 ft. in circumference when fully developed. The blackish-purple or green marbled spadix attains a height of 5 ft., standing up in the centre of a bell-shaped spathe nearly 3 ft. across. This is pale green near the base within, but otherwise bright blackish-purple; the outer surface being pale green, smooth

below, but irregularly corrugated above.

This extraordinary plant flowered for the first time in Europe in the Royal Gardens, Kew, in June 1889, ten years after it had been received as a small seedling from the Botanic Gardens at Florence, whither seeds were sent by Dr Beccari. The Kew



FIG. 45.—*Amorphophallus Titanum*. (3/8.)

plant had a spadix 3 ft. 3 ins. high, and 6 ins. in diameter; the leaf-stalk 8 ft. high, and 9 ins. in diameter at the base; the spread of the leaf was 12 ft.; and the tuber weighed in March 1889, 57 lbs., and was 18 ins. in diameter and 12 ins. deep. To show the short duration of the inflorescence, it may be mentioned that the spathe began to unfold at 5 P.M., was fully open by 6.30 P.M., began to shut at 8 P.M., and by 11 P.M. had closed entirely. The stench was overpowering, and was said to resemble that of

rotten fish and burnt sugar. (*Bot. Mag.* tt. 7153-4-5.)

A. variabilis (*Brachyspatha variabilis*).—An East Indian fetid-smelling species about 3 ft. high, with solitary, much-divided leaves about 18 ins. across, borne on spotted stalks. The greenish-purple spathe encloses a whitish spadix. (*Gard. Chron.* 1876, 120.)

A. virosus.—A Siamese species resembling *A. campanulatus*, but smaller. The spathes are pale green spotted with white and edged outside with purple. The inner surface is purple and corrugated at the base, creamy white in the centre, and purple again towards the top, the whole being about 8 ins. long, and 6 ins. across. The brownish or purple spadix is about 7 ins. high, with a roundish corrugated top or appendix. (*Bot. Mag.* t. 6978.)

A. zeylanicus.—This has a whitish spathe spotted with green, and a yellow spadix; is also known as *Arum sylvaticum*, and *Synantherias sylvatica*, the latter being now the accepted name. (*Bot. Mag.* t. 7190.)

AMPELOPSIS (*Ampelos*, a vine; *opsis*, resemblance; in reference to the vine-like appearance). Nat. Ord. Ampelideæ.—There are only a couple of species of garden note with tuberous roots belonging to this genus, namely, *A. napiformis*, with roundish corrugated roots, and five-lobed leaves, and *A. serjaniæfolia* (or *A. tuberosa*), having dahlia-like roots, and palmately lobed leaves. Both are climbers, the first-named being a native of China, the other from Japan. They are both hardy, and ornamental in foliage, like their relatives the Virginian creeper (*A. quinquefolia*) and the well-known *A. Veitchi*. They flourish in ordinary soil, and may be increased by division of the roots, or by cut-

tings of the ripened wood in autumn. They are generally referred to the genus *Vitis*.

ANCHOMANES (derivation unknown). Nat. Ord. Aroideæ.—A small genus of hothouse tuberous perennials closely related to *Amorphophallus*, and requiring the same cultural treatment. Outside botanical collections the plants are practically unknown.

A. dubius.—A fine species, having thick, fleshy tubers, from which a much-divided elegant leaf is thrown up. The spathe is very large and recurved, about 12 in. long, the outer surface being a pale olive purple, the interior glossy, cream-coloured. The spadix is over 6 in. long, and $\frac{3}{4}$ in. thick, the upper five-sixths being densely packed with creamy male flowers, while the basal portion having the female flowers is a dull purple colour (*Gard. Chron.*, May 1885, 668, f.).

A. Hookeri (*Caladium petiolatum*).—A remarkable plant from the Island of Fernando Po, having poisonous potato-like tubers marked with rings and scars. The leaf-stalk is 3 ft. high rounded, green blotched with purple, especially below, where it is mucicated. The blade is divided into three spreading branches, each being again divided into smaller segments. The flower-stem is about a foot high, and bears a boat-shaped tapering spathe, 6 to 8 in. long, deep velvety purple within, but greenish-purple outside at the base. (*Bot. Mag.* t. 3728.)

The variety *pallida* is larger, with prickly leaf and flower-stems, and a wider and paler purple and green spathe enclosing a white spadix, having a deep purple base (*Bot. Mag.* t. 5394).

ANDROCYMBIUM (*aner* or *andros*, a man; *cymbos*, a cavity; in reference

to the stamens or male organs being enclosed in a hollow formed by the folding of the petals). Nat. Ord. Liliaceæ.—A genus containing about thirteen species of greenhouse bulbs or corms, more curious perhaps than ornamental, chiefly natives of South Africa and the Mediterranean region. They like sandy soil, plenty of sunshine, and a dry atmosphere, and when at rest no water. The tufts of leaves spread out on the soil, and the flowers, more or less stalkless, appear in the centre. The species sometimes met with in botanical collections are—*A. melanthium eucomoides*, green (*Bot. Mag.* t. 641); *A. leucanthum*, white (figured in *Sw. Brit. Fl. Gard.* as *A. eucomoides*); *A. melanthoides*, white; *A. punctatum*, whitish; and *A. volutare*, white—all natives of South Africa.

ANDROSTEPHIUM (*aner*, anther; *stephanos*, a crown; in reference to the dilated filaments forming a corona). Nat. Ord. Liliaceæ.—A small genus having only two or three species of bulbous plants intermediate between Brodiaea and Bessera, and distinguished by having six-lobed funnel-shaped flowers in clusters or terminal umbels.

A. violaceum.—A native of Texas, grows 6 to 9 ins. high, has few narrow leaves, and about April or May produces its umbels of bluish-violet flowers.

It is a fairly hardy species in the milder parts of the Kingdom, and flourishes in a rich sandy loam. In severe winters, and especially in bleak spots, it is necessary to protect the bulbs from frost by covering with litter or ashes, or by taking them up in autumn and storing until spring. Propagated by offsets or seeds.

ANEMONE (*Windflower*; *anemos*, the wind). Nat. Ord. Ranunculaceæ.—There are about seventy species of Windflower, all hardy herbaceous perennials, with radical leaves more or less divided and lobed, some with fibrous roots, others with tuberous ones. The latter are the only ones considered in this work, but the reader will find ample information regarding the others in the author's *Practical Guide to Garden Plants*.

The tuberous-rooted Anemones flourish in the open border in rich sandy loam that has been deeply dug to secure perfect drainage. Indeed they succeed in ordinary good garden soil that has a good depth and is enriched with well-decayed manure every year or two. They soon establish themselves, and are not only valuable for the ordinary flower-border, but also for grassy slopes and banks, rock-gardens, terraces, etc.

A. apennina (*Apennine Windflower*).—A tuberous blackish-rooted species from S. Europe, growing about 6 ins. high. The stem leaves are in whorls of three, with long blunt lobes, all somewhat pubescent. Flowers about 2 ins. across, bright sky blue, appear on single stalks in March. There is a white (*alba*) and also a rose-coloured (*rosea*) variety.

This species prefers sandy loam or peat, and thrives under the partial shade of trees. It makes a beautiful carpet of blue, and should be grown for this purpose in large patches, beneath deciduous trees and shrubs, or mixed with Tulips, Daffodils, etc. Easily increased by division.

A. baldensis.—A rare tuberous-rooted Swiss species about 6 ins. high. The leaves are twice ternate, with many-parted narrow segments. The solitary flowers appear in May, and have eight to ten oblong oval white

sepals, hairy outside, and reddish tinged with blue. Grows best in shady parts of the rockery.

A. blanda (*Blue Winter Wind-flower*).—A lovely tuberous-rooted species from the mountains of Greece. It grows about 6 ins. high, and closely resembles *A. apennina*. Leaves three-partite or cut with stalked or sessile three-partite, cut segments; those of the involucre deeply cut and stalked. The deep blue flowers, each nearly 2 ins. across, appear in winter or early spring, having nine to fourteen oblong linear sepals. The variety *scythinica*

sheltered place in rockeries, sunny banks, or warm grassy slopes. Increased by seed or division.

A. coronaria (*Poppy Anemone*).—This important species from S. Europe has given rise to the many single and double florists' varieties, which appear in such abundance in the early spring and summer. It grows about 6 to 9 ins. high, and has ternate deeply cut leaves, with numerous narrow-pointed segments. The flowers have six to eight oval rounded sepals varying from red to white, purple, and pink. (*Bot. Mag.* t. 841.)



FIG. 46.—*Anemone blanda scythinica*.

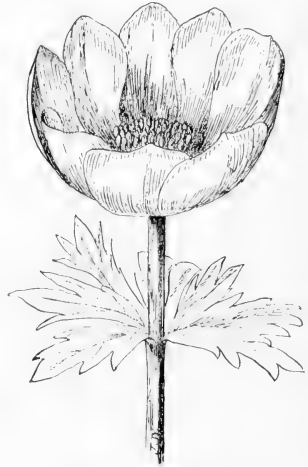


FIG. 47.—*Anemone coronaria*.

from N. Kurdistan has pale blue and white flowers; and the one known as *Cypriana* is charming. The buds are bright blue outside, but when they open in the sunlight, they show a pure white interior.

This species likes a rich, light, and well-drained loam, and a warm

Several distinct varieties or groups of varieties having single and double flowers have arisen from this species, having a great range of colour, between pure white and deep purple, passing through salmon-pink, scarlet, etc. The single-flowered and double-flowered varieties known as the Caen Anemones, with which may be

mentioned the Double Nice, and the Cardinal's Hat varieties, are particularly fine, having large flowers in many exquisite shades. The strain known as "St Brigid" Anemones have mostly semi-double blossoms, and are great improvements on the ordinary single forms, owing to their greater vigour and freedom of flower. The colours may be white, crimson, cobalt-blue, rose, pink, salmon, scarlet, lavender, heliotrope, etc. One single-flowered variety, called the "King of Scarlets," has brilliant scarlet flowers and forms a fiery picture in the spring border or rockery. The double-flowered "Chrysanthemum" Anemones are a fine race, with flowers resembling those of small incurved Chrysanthemums, or China Asters, displaying such colours as violet, crimson, rose, carmine, lilac, etc.

Tubers of both single and double varieties may now be obtained from nurserymen at a very reasonable rate, either in separate colours or mixed. It is generally better, however, to keep the varieties distinct from each other. Planting may be done either in spring from January to March in cold soils, or early in the autumn from September to October in warm light soils. The soil if possible should be a rich, deep, and sandy loam, so that the tubers if left in the ground during the winter shall not be so likely to rot with the combination of cold and moisture. Instead of planting tubers, seeds of the best varieties may be obtained, and from these it is possible to raise a large number of plants in the course of a year. The seeds should be sown in June, or when fully ripe in a warm sheltered bed in the open. The soil, of course, should be broken up first of all, and the surface should then be trodden down firmly, and properly levelled with the rake. Having

sown the seeds thinly and evenly over the surface, cover them with about a $\frac{1}{4}$ in. of rich sandy compost, and tread in with the feet, or beat down with the back of the spade or piece of board, afterwards finishing off with the back of the rake, and giving a gentle watering from a fine-rosed can, especially if the soil is inclined to dryness. Until the seeds germinate, which is generally about three weeks after sowing, the seed-bed should be kept shaded with a piece of canvas or mat, and always kept in a moist but not sodden condition. When the young plants appear, they must have plenty of sunshine, and should never be allowed to get too dry; otherwise their growth is likely to be checked. If necessary the young plants may be left to flower in the seed-bed, or they may be lifted in September and transplanted. In cold bleak localities, however, transplanting is best done in spring rather than in autumn.

Enormous quantities of Poppy Anemones find their way into the English markets from the Riviera every spring.

A. fulgens (*A. hortensis*; *A. pavonina*; *A. stellata*), *Scarlet Windflower*.—This is a native of S. Europe, about 1 ft. high, with bright green three-lobed cut and toothed leaves. The large, solitary flowers appear in May, 2 ins. or more across, of a brilliant scarlet-crimson colour, sometimes with a paler zone at the base around the jet-black bunch of stamens in the centre. *A. fulgens major* is a fine form, and *A. pavonina* (the Peacock Anemone) is a double form. If cut early in the morning or in the evening, the blossoms last well in water for room decoration.

The Scarlet Windflower likes a rich, deeply dug, loamy soil with a dash of lime in it, and is suitable for the

partially shaded spots in the rockery or flower-border. Stagnant moisture at the roots is fatal to it, hence the necessity for good drainage. The roots may be planted almost at any time, but during early autumn is the best time, say in August or early September. For the decoration of the greenhouse early in the year the

1 to 2 ins. across, having six oval, veined sepals, appear in April and May. The variety *Robinsoniana*, which seems to be identical with one called *cœrulea*, has lovely sky-blue flowers; the variety *Alleni* is similar, but larger in every way; the variety *flore pleno* has double white flowers; *rosea*, rose-coloured; and *cornubiensis*, blue,



FIG. 48.—*Anemone fulgens*, var. (A)

Scarlet Windflower is very useful. The tubers may be potted up in autumn and kept in a cold frame, or under ashes, until after Christmas, when they may be brought in from time to time to keep up a succession. They must not, however, be placed in too high a temperature. Increased by dividing the roots, or from seeds in the same way as the Poppy Anemone.

A. nemorosa (*Wood Anemone*).—A charming British plant found in woods and copses all over the Kingdom, as well as in Europe and N. America. It grows from 4 to 8 ins. high, and has silky-haired leaves twice or thrice divided into narrow segments. The white, or sometimes purple, flowers,



FIG. 49.—*Anemone nemorosa*.

are other forms. They are all charming when grown in bold masses in the rock-garden or flower-border in somewhat shaded positions. Increased by division of the root-stocks in autumn, or by seeds.

A. palmata.—A distinct tuberous-rooted plant about 6 to 8 ins. high, from the Mediterranean region. The roundish, heart-shaped leathery leaves are bluntly three to five-lobed, slightly toothed and hairy. The large, glossy, golden-yellow flowers with ten to twelve oblong, obtuse sepals appear in May and June, and open in the sunshine only. The double variety, *flore pleno*, and the white one, *albida*, are both pretty but very scarce. (*Bot. Mag.* t. 2079.)

A. palmata grows best in dampish

places in deep, turfy peat, or loam and leaf-soil, into which it roots deeply and forms strong clumps. It is increased by dividing the root-stocks or from seeds.

A. ranunculoides (*Yellow Wood Anemone*).—A S. European plant, growing 4 to 6 ins. high, with three- to five-parted leaves having deeply toothed trifid segments. The clear, golden-yellow flowers, with five or six elliptic sepals, appear in March either singly or in pairs. There is a Pyrenean variety with purple flowers, and one named *pallida* with sulphur-coloured ones.

This charming little plant is occasionally found naturalised in English woods, and likes a rich, sandy soil with a little chalk or lime. Increased by division or seed.

ANIGOZANTHOS (*anoigo*, to open; *anthos*, flower; in reference to the branching expansion of the flower-stalks). Nat. Ord. Hæmodoraceæ.—A genus having eight species of herbaceous plants, natives of S.W. Australia, with thickish, horizontal rhizomes, radical leaves usually narrow and sword-shaped, but sometimes terete or distichous. Flowers large, borne on simple or branched dichotomous stalks, with an elongated, woolly perianth.

These plants are not particularly well known, and are never likely to become popular, except in botanical collections. They require to be grown in a cool greenhouse with a winter temperature about 45° to 50° F. They may be potted in a compost of three parts peat and one part sandy loam. During growth water is given when required, but during the dormant winter season practically no water need be given. The plants are easily increased by dividing the root-stocks in spring when growth

begins. The following species may be noted:—

A. bicolor.—3 ft. Scarlet and green. May.

A. coccineus.—5 ft. high. Flowers crimson in June.

A. flavidus.—3 ft. Yellowish green. May. (*Bot. Mag.* t. 1151; *Red. Lil.* t. 176.) This species has been confused with *coccinea*, *grandiflora*, and *Manglesi*.

A. Manglesi.—3 ft. Green. May. (*Bot. Mag.* t. 3875.) Green and red in the variety *angustifolia*, figured in the *Bot. Reg.* t. 2012.

A. pulcherrimus.—3 ft. Yellow. May. (*Bot. Mag.* t. 4180.)

A. tyrianthinus.—3 ft. Purple and white. May. (*Bot. Mag.* t. 4507.)

All the species mentioned above are natives of the Swan River region.

ANOIGANTHUS (*anoigo*, to open; *anthos*, a flower). Nat. Ord. Amaryllideæ.—There is only one species in this genus, namely:—

A. breviflorus (*Cyrtanthus brevi-*

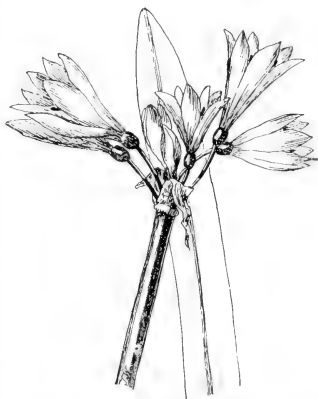


FIG. 50.—*Anigoanthus breviflorus*. ($\frac{1}{2}$)

florus).—A native of the mountains of Natal, the Transvaal, and Cape

Colony, with short-necked, ovoid bulbs about 1 in. in diameter, and three or four strap-shaped leaves 1 ft. or more long. The bright, yellow flowers appear from October to February in a wild state, but during the spring (April and May) in British gardens. From two to ten are borne in an umbel on top of the fleshy peduncle 6 to 12 ins. high. The variety *minor* is a dwarfer plant, with narrow perianth segments. (*Bot. Mag.* t. 7072; *Gard. Chron.* 1889, i. 557; *Gard.* 1891, t. 814.)

This species flourishes in a mixture of sandy loam and leaf-mould, and may be grown in a cool greenhouse; or even in the open air with protection in winter in the warmest parts of the Kingdom. It may be increased by offsets from the older bulbs.

ANOMATHECA (*anomos*, singular; *thea*, a capsule; in reference to the



FIG. 51.—*Anomatheca cruenta*. (Z.)

seed-pod). Nat. Ord. Iridæ.—This genus is now referred to *Lapeyrousia*

by botanists, but is still better known as *Anomatheca*.

A. cruenta.—An attractive South African species 6 to 12 ins. high, with rather large, roundish corms or bulbs, and sword-shaped, linear leaves. The flowers, which are of a beautiful deep crimson with a deeper coloured blotch on the base of each of the three larger and lower segments, appear in summer and autumn in loose clusters at the ends of the slender stems, and are very effective when the plants are grown in bold masses. This species is only hardy on warm soils in the mildest parts of the Kingdom. It should as a rule be treated in the same way as the *Ixias* (see p. 319), to which it is closely related.

ANTHERICUM (*anthos*, flower; *kerkos*, a hedge; in reference to the tall flower-stems). Nat. Ord. Liliacæ.—

A genus containing about fifty species of tufted, herbaceous perennials having short root-stocks, more or less fleshy roots, and radical, linear leaves. The slenderly stalked flowers are borne on tall, leafless, simple, or branched scapes furnished with linear, scarious bracts. The perianth, which is sometimes slightly twisted, has distinct rotate-spreading, almost equal three to five-nerved segments, and six stamens hypogynous or slightly adnate to the base of the segments. Most of the *Anthericums* are natives of S. Africa, but few of them are appreciated as garden plants. Those mentioned below are hardy and make effective border plants, especially *A. Liliago*. They like a compost of rich sandy loam and a little leaf-soil, with good drainage. To secure the best effects, bold groups should be planted instead of isolated specimens, and once established, need not be disturbed for four or five years. The soil, however, in such cases should be given a good

top-dressing of well-rotted manure in the autumn to keep sufficient nourishment near the roots. The plants are easily increased by dividing the root-stocks in autumn, or in spring. Plants may also be raised from seeds sown when fully ripe in a frame, but it is scarcely worth while.

A. Bicheti.—An elegant species from W. Tropical Africa, having flexible leaves variegated with white. This species is too tender for the open air, and should be grown in a warm greenhouse.

A. echeandioides.—A somewhat tender species, supposed to be a native of Mexico, having lance-shaped leaves about 1 ft. long, and orange-yellow flowers borne in pairs about November (*Bot. Mag.* t. 6809). This species is scarcely known, and is probably not hardy. It should therefore be grown in a greenhouse.

A. Hoffmanni.—An East African free-flowering species, with shining green leaves about a foot long and nearly 2 ins. broad. The longer flower-stems bear dense panicles of delicate white star-shaped flowers. Tender.

A. Hookeri (*Bulbinella* and *Chryso-bactron Hookeri*).—A beautiful New Zealand plant 1 to 3 ft. high, with linear sheathing leaves 9 to 12 ins. long, and bright yellow flowers about $\frac{1}{2}$ in. across, freely produced in erect racemes in early summer. This species likes a rich, deep, moist soil. *A. Rossi*, probably not in cultivation, is a much finer plant and remarkable for having yellow unisexual flowers.

A. Liliago (*Phalangium* and *Watsonia Liliago*), *St Bernard's Lily*.—A very free-flowering species from S. Europe cultivated for more than three hundred years. It has tufts of narrow channelled leaves 12 to 18 ins. long, gracefully recurving, and erect loose spikes of pure white flowers 1 to 1 $\frac{1}{2}$

ins. across, borne well above the foliage from May to August. The variety *major* is a more robust form with larger flowers. *A. Liliastrum*, known as *St Bruno's Lily*, is now referred to the genus *Paradisea* (which see).



FIG. 52.—*Anthericum Liliago*, root-stock. (1.)

A. ramosum (*A. graminifolium*).—A S. European plant of rapid growth, with flat, narrow grass-like leaves, and trusses of white starry flowers borne from June to August on stout erect stems about 2 ft. high (*Bot. Mag.* t. 1055, as *Phalangium ramosum*).

A. yedoënsis, now called *Alectorurus yedoënsis*, is an interesting species from Japan, 1 to 2 ft. high, with branching, pyramidal panicles of pale rose-purple flowers with protruding stamens. The flowers are remarkable for being dioecious.

ANTHOLYZA (*anthos*, flower; *lyssa*, rage; in reference to the opening flower resembling the mouth of an enraged animal). Nat. Ord. Iridææ.—A genus of S. African plants with *Gladiolus*-like corms and leaves, and spikes of bright-coloured flowers overtopping the foliage. Perianth tubular, with six

unequal segments, the upper arching ones being much longer than the others.

Antholyzas are rarely met with except in botanical collections. They flourish in warm sunny spots out of doors in stiffish, well-drained loamy soil with a little peat and leaf-mould. They may be treated the same as *Gladiolus*, and increased in the same way by offsets from the older corms, or by seeds.

In cold localities it is better to grow the plants in a cool greenhouse. The best kinds for gardens are:—

A. æthiopica (*A. floribunda*; *A. præalta*), which grows about 3 ft. high, and produces spikes of scarlet and green flowers in June. The variety *ringens* (*A. vittigeræ*) has orange-red flowers, smaller than those of the type, borne on plum-purple stems with a "bloom" (*Bot. Mag.* t. 561, 1172).

A. caffra (*Anisanthus splendens*).—A showy species about 2 ft. high, with spikes of rich scarlet flowers appearing in June.

A. carolina, bright orange; *A. fulgens*, rich coppery rose; and *A. paniculata*, with panicles of red, brown, and yellow flowers, and its variety *major*, are other members of the genus.

A. Cunonia (*A. bicolor*; *Anisanthus Cunonia*), with scarlet and black flowers (*Bot. Mag.* t. 343; *Red. Lil.* t. 12).

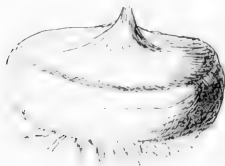


FIG. 53.—*Antholyza Schweinfurthi*, corm. (7.)

A. Schweinfurthi, from Abyssinia, has bright red and yellow flowers

borne on loose simple spikes (*Bot. Mag.* t. 7709).

ANTIGONON (*anti*, against, opposite; *gonia*, an angle). Nat. Ord. Polygonaceæ.—A genus containing a few species of decorative hothouse climbing plants bearing their flowers in clusters at the ends of the young shoots or in the axils of the upper leaves. The flowers have five segments, of which the three outer are broadly heart-shaped and most conspicuous, the two inner ones being oblong. They remind one forcibly of the *Bougainvilleas*.

The species mentioned below have a reputation for being very difficult to flower. One, however, sees one or other of them occasionally in the finest perfection. They require to be planted out in a well-drained border in a warm house, the compost being rich sandy loam and leaf-soil. The shoots should be trained up wire trellises near the glass, but not too close, so that the leaves may obtain as much light as possible. Plenty of water should be given during active growth, but the roots should be kept almost dry during the resting period in winter. The best way to increase the stock is by cuttings of the shoots in spring in a hotbed or in a close frame in the greenhouse.

A. amabile.—A Mexican plant with tuberous roots, angular climbing stems, bearing oval heart-shaped leaves, and clusters of bright pink flowers from August to October.

A. insigne, from Colombia, has broadly oval oblong leaves with cordate rounded lobes, and bright rosy pink flowers (*Gard. Chron.* 1877, vii. 789).

A. leptopus.—This is the best-known and perhaps the most ornamental species. It is a native of Mexico, and has stalked, heart-shaped

leaves, and about August and September produces its bright rose-purple blossoms in great abundance. (*Bot. Mag.* t. 5816.) There is a white-flowered variety called *albiflora*.



FIG. 54.—*Antigonon leptopus*. ($\frac{1}{2}$.)

APHYLLANTHES (*aphyllos*, leafless; *anthos*, a flower). Nat. Ord. Liliaceæ.—This genus contains only the following species:—

A. monspeliensis.—A beautiful hardy herbaceous perennial with short rush-like branches springing up from a short thickish root-stock. It is remarkable for having no leaves, as indicated by the generic name. The small heads of deep blue funnel-shaped flowers appear in June and July, and are borne on slender leaf-like scapes having membranous sheaths at the base. (*Bot. Mag.* t. 1132.)

This plant comes from the south of France. It flourishes in rich sandy

peat in warm, sunny parts of the rock-garden, and is hardy in the mildest parts of the Kingdom. It requires protection of a hand-light or a heap of litter in cold localities, and may be increased by division of the root-stocks in spring. Seeds may also be sown when fully ripe, the young plants being grown in pots in cold frames for the first year to establish them.

APIOS (*apion*, a pea; in reference to the shape of the roots), GROUND NUT. Nat. Ord. Leguminosæ.—A small genus of climbing perennials, having pinnate three- to seven-foliolate leaves, and pea-shaped flowers in panicles or clusters at the ends of the shoots. Standard petal reflexed, ovate, or roundish, longer than the obliquely ovate wings; keel elongated, much incurved, involute, or spirally twisted. Stamens ten, upper one free. Pod linear, more or less sickle-shaped, flattish.

A. tuberosa (*Glycine Apios*).—An elegant light and graceful twining perennial, native of Pennsylvania, with eatable floury tubers, and pinnate leaves composed of five oblong lance-shaped leaflets. Flowers from July to September, deep orange, dull brownish-purple or pink, sweet-scented, in dense axillary racemes (*Bot. Mag.* t. 1198).

An effective twiner for warm, sheltered spots. It likes rich sandy soil, and may be increased by dividing the tuberous roots in spring; but this must be done with great care, otherwise the roots may die after separation. To avoid this, seeds may be sown when fully ripe in rich sandy soil in cold frames, the seedlings afterwards being planted out the following spring if large enough. The tuberous roots are eaten by the N. American Indians. It was once thought they

would make a good substitute for the potato in Europe.

APONOGETON (Celtic *apon*, water ; *geiton*, neighbour; in reference to place of growth). Nat. Ord. Naiadaceæ.—A genus containing about twenty species, of which the best known are :—

A. Bernieriana is closely related to *A. fenestræ*. It has pinkish flowers, but narrower and longer leaves, with closer netted veins.

A. capensis (or **A. angustifolium**) is like a small *A. distachyon*, having small long-stalked leaves and small white flowers (*Gard. Chron.* 1906, xxxix. 306 ; xl. 341).

A. distachyon, the Cape Pondweed or Winter Hawthorn.—A very ornamental S. African water plant, having flattish brown tuberous root-stocks,

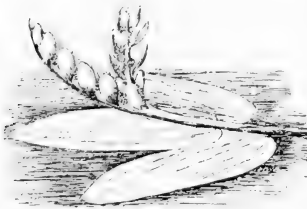


FIG. 55.—*Aponogeton distachyon*. (1.)

from which arise masses of stalked oblong lance-shaped distinctly veined leaves, which float on the surface of the water. The forked spikes appear from September to Christmas, each blossom having six stamens with conspicuous brown anthers, and many carpels. (*Bot. Mag.* t. 1293.)

The "Winter Hawthorn" is quite hardy in the milder parts of the Kingdom, and may be grown in ponds, lakes, or streams of fresh water. The plants are best placed

in pots or pans, and these are sunk about a foot below the surface of the water. In this way they will be safely secured from frost. To increase the plants, the root-stocks should be carefully divided in spring, after the leaves and flowers have withered. Seeds may also be sown when ripe in sandy soil in pots that can be submerged in water. This plant can also be grown easily in large bell-glasses or water-tanks in cool rooms, or in cold greenhouses.

A. fenestræ.—This is the wonderful Lace-leaf or Lattice-leaf plant of Madagascar, for years well known as Ouvirandra. It is a singular aquatic plant with tuberous rhizomes, and broadly elliptic lance-shaped leaves 6 to 18 ins. long, floating horizontally beneath the water surface, and being remarkable for having no soft tissue between the nerves or veins, the latter forming a beautiful netted lacework. The flowers are greenish-white, borne on forked spikes. (*Bot. Mag.* t. 4894.)

A. fenestræ and its relatives require to be grown in hothouses, in water-tanks or tubs, the temperature most suitable being about 75° to 80° F. The rhizomes should be planted in a compost of turfy loam, and well-matured cow-manure and leaf-mould in about equal proportions, and should not be deeper than 6 to 9 ins. from the surface of the water. The plants may be grown in an ordinary washing-tub beneath the stages, in a stove house, or tropical fernery. Propagation is effected chiefly by dividing the root-stocks, but new plants may also be obtained from seeds.

A. Henkelianum differs from *A. fenestræ* in having a larger rhizome, erect instead of creeping, and the leaves are a paler green (*Gard. Chron.* 1906, xl. 270, ff. 108, 109).

ARISÆMA (*aron*, Arum; *sana*, type; in reference to resembling the Arums). Nat. Ord. Aroideæ.—A genus containing about fifty species of tuberous-rooted Arum-like herbaceous plants, chiefly natives of temperate and subtropical Asia, a few being natives of N. America, and one in Abyssinia. The leaves are usually cut into three main lobes, but in some cases more. The oblong or inflated spathe, often beautifully striped and marked, is rolled round the lower portion of the spadix. The latter usually bears either male or female flowers, and is often produced a great length beyond the spathe, and in some species furnished with long hairs.

Arisæmas are not difficult plants to grow. They require greenhouse treatment; that is to say, if the temperature does not sink below 45° to 50° at night during the winter months, the plants will then require only proper treatment as to soil, water, and cleanliness. A mixture of loam and a little peat or leaf-soil, with good drainage, suits them perfectly. During active growth attention must be given to watering, increasing or decreasing the supply according to circumstances. When dormant in winter the tubers may be left in the old soil till growth recommences in spring. Then they should be repotted, and if necessary to increase the stock, the offsets may be detached and potted up separately. The following species are worth growing in large collections of plants. Most of them flower between May, June, and July:—

A. concinnum.—A native of the Sikkim Himalayas, about 2 ft. high, with solitary leaves composed of ten to twelve lance-shaped entire pale green leaflets radiating from the top of the stalk. Spathe of the female plant longitudinally striped with green and

white, and white and purple in the male. (*Bot. Mag.* t. 5914.)

A. curvatum (*A. helleborifolium*).—A Himalayan plant 2 to 4 ft. high, with pedately divided leaves, and large basal bracts beautifully marbled with dark olive green, light green, and red. Spathe green, with a cylindrical tube obscurely striped with white, the elliptic blade arching forward being green on the inner surface and brownish-red on the outer. The spadix is about 1 ft. long, produced into a purplish tail. (*Bot. Mag.* t. 5931.)

A. Dracontium (*Arum Dracontium*), *Dragon Root*.—A hardy N. American species about 2 ft. high, with leaves pedately divided into nine to fourteen oblong lance-shaped segments. Spathes green, oblong, erect, with a much longer awl-shaped spadix. (*Bot. Reg.* t. 668.)

A. fimbriatum.—A native of the Philippine Islands, about 18 ins. high, having two leaves each deeply divided into three smooth oval-pointed segments, and having stalks of a pale purple rose spotted with purple. The spathe is tubular at the base, spreading into a broad ovate-pointed limb, beautifully striped and veined with white on a brownish-purple ground colour. The long slender cylindrical spadix is furnished with numerous purple hairs. (*Bot. Mag.* t. 7150; *Gard. Chron.* 1884, xxii. 680; *Gartenfl.* 1886, t. 357.) Fig. 56.

A. flavum.—A dwarf Arabian species, having the leaves divided into five to seven leaflets. The spathe is yellow-hooded, and encloses a short club-like spadix. (*Gartenfl.* 1891, 578, f. 103, as *A. enneaphyllum*; *Bot. Mag.* t. 7700.)

A. galeatum.—A native of the Sikkim Himalayas, about 1 ft. high, with solitary trilobed leaves, green and purple-tinted spathes longitudinally

striped with white outside, and purple within.

A. Griffithi (*A. Hookerianum*).—A handsome species from Sikkim, 1 to 1½ ft. high, with leaves divided into large roundish leaflets. Spathe large, hooded, brownish-violet, veined with green. The spadix is also brownish-violet, with a disc-like projection at the base, the free end being produced into a long thread-like appendage. This species is probably quite hardy in the mildest parts of the United Kingdom.



FIG. 56.—*Arisæma fimbriatum*. (1.)

A. japonicum.—A dioecious species from China and Japan, having a roundish tuber, and two-leaved stems 1 to 2 ft. high. The leaves are long stalked and deeply lobed. The spathe is green, striped with white. (*Bot. Mag.* t. 7910.)

A. Lackneri.—A Burmese species

related to *A. speciosum*, but differing in having long-tailed spathes.

A. nepenthoides.—A Himalayan species, 2 ft. high, with leaves pedately divided into five more or less lance-shaped leaflets. Spathe ochre-brown and green, with two auricles above the tubular portion; spadix yellow. (*Bot. Mag.* t. 6446.)

A. Murrayi.—A native of Bombay, about 1½ ft. high (*Bot. Mag.* t. 4388).

A. ringens (*A. præcox*; *A. Sieboldi*).—A remarkable hardy Japanese species about 6 ins. high, with leaves divided into three ovate-oblong long-pointed segments. Spathe striped with green and white, cylindrical below, suddenly arching over, and then contracting into a rather small deep purple orifice with broad reflexed margins. (*Bot. Mag.* t. 5267.)

A. speciosum.—A native of the moist forests of the temperate Hima-



FIG. 57.—*Arisæma speciosum*. (3.)

layas, about 2 ft. high, with solitary leaves divided into three dark green

leaflets, conspicuously edged with red, and having stalks mottled with white. Spadix deep glossy purple, greenish and white, with a flexuose appendage or tail about 20 ins. long. The spathe is deep purple, broadly striped with creamy yellow. (*Gard Chron.* 1879, xii. 585; *Gard.* 1890, 758.)

A. triphyllum (*Arum triphyllum*; *A. zebrinum*).—A North American species 9 to 12 ins. high, with leaves cut into three equal, oblong, lance-shaped pointed segments. Spathe 4 to 6 ins. long, striped with broad lines of purple brown, with about 1 in. of green in the middle. Spadix 3 ins. long, spotted brown. (*Bot. Mag.* t. 950.)

A. utile.—A Sikkim species 12 to 18 ins. high, with pairs of three-foliolate leaves. The flowers appear in May and June, having brownish-red spathes veined with green, and a purple spadix. (*Bot. Mag.* t. 6474.)

A. Wrayi.—A native of Perak,



FIG. 53.—*Arisæma Wrayi*. (½.)

about 18 ins. high, with green leaf-stalks marbled with reddish-brown.

The spathes are white and green, and somewhat resemble those of *A. nepenthoides* in shape. (*Bot. Mag.* t. 7105.)

This species should be grown in the stove or a warm greenhouse.

ARISARUM (*aris*, and *aron*, Greek names for Arum). Nat. Ord. Aroidæ.—A small genus of curious, hardy, herbaceous perennials with tuberous root-stocks and long-stalked rounded hastate or sagittate leaves. The only species of any note are *A. proboscideum* (*Bot. Mag.* t. 6634), which is a native of S. Italy, and has greenish spathes; and *A. vulgare* (*Arum Arisarum*) from S. Europe, with livid-purple spathes (*Bot. Mag.* t. 6023). They both grow in well-drained peaty soil, and may be increased by division or seeds. Only fit for botanical collections.

ARISTOLOCHIA (*aristos*, best; *locheia*, parturition; in reference to its supposed medicinal characters) BIRTHWORT. Nat. Ord. Aristolochiaceæ.—This genus consists of several species, some of which have tuberous root-stocks. The flowers are remarkable for their peculiar, more or less triangular cup-shaped forms and strange colourings—some blossoms being a foot and more across, and 18 to 24 ins. long, while others like those in the Dutchman's Pipe (*A. Siphon*) are comparatively very small. Some species like the British *A. Clematitis*, and the N. American *A. Siphon*, and *A. tomentosa* are quite hardy; but most of them require the protection of a warm greenhouse or stove. The stems are climbing, and in some kinds attain great lengths. The leaves are usually heart-shaped or lobed. Most of them flourish in a compost of sandy loam and peat, and may be

increased by cuttings of the half-ripened shoots, or by layering the ripened stems. The species figured here, *A. Goldiciana*, is a remarkable native of old Calabar, West Africa. It has a swollen woody root-stock, from which the stems shoot up annually. The large leaves are heart-shaped, and the enormous flowers (over a foot across) are of brownish-red colour, mottled with yellow, while the distended throat is streaked with red and creamy white. (*Bot. Mag.* t. 5672.)

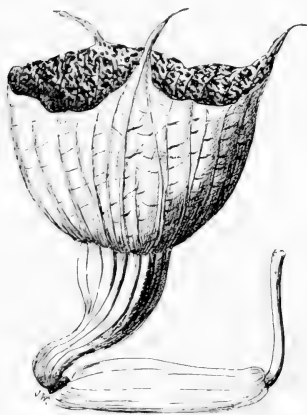


FIG. 59.—*Artstolochia Goldiciana*. (A.)

This plant rarely flowers, but when it does it excites attention. It must be kept dry when in a dormant condition, but water must be given freely as growth commences and increases. The atmosphere also should be humid, and the night temperature should not fall below 65° to 70° F.

ARODENDRON (*aron*, arum; *dendron*, a tree). Nat. Ord. Aroideæ.

A. Engleri.—This is a handsome plant about 6 ft. high, native of Zanzibar. It grows partly submerged, and has stems about 2 in. thick at the base. The leaf-stalks are about 2 ft. long, with sheaths copiously striped with black. The leaf-blade is 1½ ft. long and about 7½ in. broad, while the spathe is 2 ft. long and 6 in. broad. The fruit-bearing spadix becomes as large as a child's head. (*Rev. Hort.* 1904, 350.)

ARTHROPODIUM (*arthron*, a joint; *pous*, a foot; the flower-stems being jointed). Nat. Ord. Liliacæ.—A genus containing about a dozen species of plants with thickened rhizomes or bulbous root-stocks, and resembling the *Anthericum*s in appearance. They are easily grown in a cool greenhouse in a compost of sandy loam and peat or leaf-soil, and may be increased by division, offsets, and seeds.

In the following species the leaves are all radical, narrow or linear, and the flowers, mostly white, are borne in loose spikes during the summer months. They are nearly all natives of Australia or New Zealand, viz.:—*A. cirrhatum* (*Bot. Mag.* t. 2350); *A. fimbriatum*; *A. neo-caledonicum*; *A. paniculatum* (*Bot. Mag.* t. 1421); and *A. pendulum* (*Red. Lil.* t. 360).

ARUM (*aron*, the Greek name for the common species). Nat. Ord. Aroideæ.—A genus of herbaceous perennials with thick or tuberous root-stocks, and pedate or hastate leaves. Flowers monœcious, female ones below, and separated from the males by barren or rudimentary ones on the more or less club-shaped spadix. Berries fleshy.

The Arums are a curious race of plants, often with unpleasant odours when in blossom, but nevertheless or-

namental in appearance, and worthy of a place in gardens. The hardy species flourish in moist, shady, or sunny spots, and may be grown in rougher parts of the garden. The common British Arum—*A. maculatum*—grows under these conditions, and is by no means a plant to be despised

Colocasia, Richardia, etc. The following kinds are worth growing:—



FIG. 60.—*Arum maculatum*, tuberous root-stock. (J.)

when planted in bold groups. The more tender species flourish in sandy loam, with a little peat or leaf-soil, but few of them are grown outside botanical collections. In all cases the plants are propagated by detaching the offsets or suckers from the older tubers, or from seeds sown in light sandy soil, after they have been freed from the sticky pulp in which they are enclosed. As the name Arum has been loosely employed for many plants, the reader will find it mixed up with such genera as *Arisæma*,

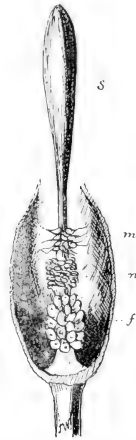


FIG. 61.—Arum, showing spadix (s), with male flowers (m), neutral flowers (n), and female flowers (f).

A. crinitum (*Helicodiceros crinitus*).—A highly curious plant from



FIG. 62.—*Arum crinitum*. (J.)

Corsica, commonly called the "Dragon's Mouth," owing to the

large open ovate brownish spathe heavily blotched with purple, and covered with hairs. The drooping dark purple spadix is also covered with long blackish hairs. The plant grows 12 to 18 ins. high, has lobed leaves, and when in blossom emits a strong stench. It requires to be grown in sheltered sunny spots in rich sandy soil. (*Bot. Reg.* t. 831.)

A. Dracunculus (*Dracunculus vulgaris*), *Dragon Plant*.—A native of S. Europe, 2 to 3 ft. high, with



FIG. 63.—*Arum Dracunculus*. (3)

large blackish tubers, pedately lobed leaves, and fleshy stalks and stems, mottled with black. The flowers appear in June and July on an erect brownish-red tapering spadix, issuing from a large ovate lance-shaped spathe contracted at the base, and of a rich deep purple or claret colour on the inner surface.

This plant also has a very disagreeable odour when in bloom.

A. Eggeri.—This is closely related to *A. spectabile*, and is probably only a form of it.

A. italicum.—A native of the Channel Islands, S. England, and S. Europe. It grows 9 to 24 ins. high, with triangular-hastate leaves appearing before winter. The flowers appear in spring on a creamy white or yellowish spadix, enclosed in a hooded greenish-yellow or whitish spathe. In autumn when the leaves have withered, the clusters of scarlet berries on the stems are very beautiful and attractive. This species may be naturalised in grassy places or shrubberies, and increased by seeds or offsets. The variety *marmoratum* has the leaves blotched or marbled with yellow. (*Bot. Mag.* t. 2432.)

A. maculatum.—This is our common "Lords and Ladies" or "Cuckoo Pint" found in woods, hedges, and dry ditches in most parts of the country. It has hastate-cordate leaves often spotted with black, and yellowish-green spathes, edged and often spotted with purple, enclosing a dull purple or rarely yellow club-shaped spathe. In autumn the bright scarlet berries look very handsome. Useful for naturalising in waste places.

A. Magdalenæ.—This is closely related to *A. palæstinum*, but has a yellow spathe marbled and spotted with purple.

A. palæstinum (*A. sanctum*).—A very attractive species, native of Palestine, resembling the well-known Arum Lily in foliage and appearance. The large bright shining green leaves are hastate in shape, and the flower-stems are thrown well above the foliage in early summer. The spathe is 6 to 8 ins. long, greenish-yellow washed with red outside, but deep

almost blackish velvety purple on the inner surface. From the centre springs a blackish spadix about 6 to 8 ins. long. There is a form with variegated leaves.

A. pictum (*A. corsicum*).—A native of the Balearic Isles. It grows about 2 ft. high, and has long-stalked heart-shaped lobed leaves, and deep dull purple spathes.



FIG. 64.—*Arum maculatum*, var. (1)

A. spectabile.—A native of Asia Minor, about 1 ft. high, having broadly hastate sagittate leaves, and deep purple oval oblong spathes.

A. spirale.—A somewhat tender species from China, about 1 ft. high, having linear lance-shaped leaves and brown spathes in May and June.

ASARUM (*asaron*, the Greek name). Nat. Ord. Aristolochiaceæ.—A genus containing over a dozen species of peculiar-looking plants, having creep-

ing, more or less knotty rhizomes, solitary hermaphrodite, bell-shaped, or urn-shaped flowers with three lobes; stamens twelve, of which six are longer than the others. The style has six stigmatic lobes.

A. canadense (*A. carolinianum*; *A. latifolium*).—A curious looking N. American plant known as the Canadian Asarabacca or Wild

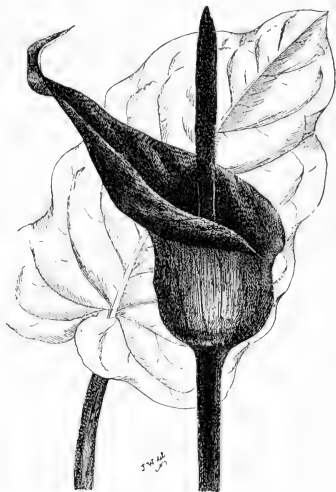


FIG. 65.—*Arum palastinum*. (2)

Ginger, and also Snake Root. It has roundish, more or less fleshy, creeping root-stocks, from which spring roundish heart-shaped, hairy-stalked leaves. The purple, three-lobed, tubular flowers with stalks a little over 1 in. long appear in April and May. (*Bot. Mag.* t. 2769.) This peculiar little plant is perfectly hardy.

A. caudigerum.—A pretty little species from S. China, having heart-shaped hairy leaves and brownish-red speckled flowers, the three triangular

lobes of which are produced into tails (*Bot. Mag.* t. 7126).

A. europæum (*Asarabacca*).—This is a British and European plant with a stoutish root-stock, evergreen kidney-shaped leaves 2 to 3 ins. long, and greenish-purple flowers in May.

A. geophilum.—A native of S. China, having red-brown creeping and branching rhizomes about as thick as a lead pencil; softly hairy, roundish, heart-shaped leaves 3 to 4 ins. long, and purple three-lobed flowers margined with yellow and dotted with white, which appear in November (*Bot. Mag.* t. 7168). This species should be grown in a cool greenhouse.

A. japonicum (*Heterotropa asaroides*).—A smooth Japanese species with knotty rhizomes, oval, heart-shaped spotted leaves, and dark greenish-purple flowers (*Bot. Mag.* t. 4933).

A. macranthum.—A remarkable species from the Island of Formosa, having long-stalked deltoid ovate, acute leaves, 4 to 5 ins. long and broad, and numerous short-stemmed flowers having three wavy, triangular, purple and speckled lobes spreading from a deep purple cup-like centre rimmed with white (*Bot. Mag.* t. 7022). Requires a warm greenhouse.

A. maximum.—A Chinese plant with creeping rhizomes, heart-shaped leaves about 18 ins. high, 8 ins. broad, dark green, mottled with grey as in *Cyclamen*. The fleshy three-lobed flowers are borne on short stalks, and are of a maroon-purple colour with a conspicuous white eye-like blotch. (*Bot. Mag.* t. 7456.)

A. parviflorum.—This Japanese species grows 3 to 4 ins. high, and has heart-shaped white spotted leaves, with deep basal lobes, and green and purple flowers about April (*Bot. Mag.* t. 5380).

A. virginicum.—A native of

Virginia, about 9 ins. high, having bluntly, heart-shaped, leathery leaves mottled with white above. The dark purple-brown flowers appear in April and May. (*Bot. Mag.* t. 3746.)

These curious plants being natives of moist and somewhat shady places will flourish in such spots in the garden or rockery if hardy, or may be grown in pots in a cold frame or greenhouse when tender. They are interesting perhaps more from a botanical than a garden standpoint. They flourish in a moist, sandy, and peaty soil, and may be increased by dividing the roots early in autumn or in spring.

ASCLEPIAS (Greek name of *Æsculapius*, the god of medicine). Nat. Ord. *Asclepiadææ*.—A genus containing about sixty species of perennial herbs few of which are of garden value. The only one worth noting with tuberous roots is **A. tuberosa**, known as the "Butterfly Weed," or "Pleurisy Root." It is a handsome N. American plant, 1 to 2 ft. high, having purplish hairy stems, and oval or oblong lance-shaped leaves 2 to 3 ins. long, narrowed at each end, and arranged oppositely, alternately, or in whorls of three. The bright orange showy flowers appear from July to September, and are borne in dense umbels at the tips of the shoots and in the axils of the leaves

It flourishes in rich sandy soil, to which peat or leaf-mould should be added, and may be grown in borders or shrubberies, where they may be left for a few years without disturbance. Increased by division of the tuberous roots, or may be raised from seeds when they ripen.

ASPARAGUS(*a*, intensive; *sparasso*, to tear; in reference to the strong

prickles of some species). Nat. Ord. Liliaceæ.—A genus containing over 100 species of plants, some of which have tuberous root-stocks. The stems are climbing or decumbent, and furnished with narrow leaf-like bodies called “cladodes.” The flowers are small, and are succeeded by berry-like fruits.

All kinds of *Asparagus*, including *A. officinalis* of the kitchen garden, are ornamental foliage plants, and are much used in floral decorations. Although the roots are in most cases fleshy or fibrous, few have anything of a tuberous nature except those mentioned here.

A. Balansæ.—A native of Palestine, with stiffish, more or less erect leaves, and white flowers borne on naked stems (*Gard. Chron.* 1898, xxiii. 111, f. 43).

A. isthmocarpa.—This species, from Palestine, is closely related to *A. Balansæ*, but has larger flowers. It grows about 5 ft. high.

A. medeoloides (*Myrsiphyllum asparagoides*).—This is the well-known “Smilax” of florists. It is a

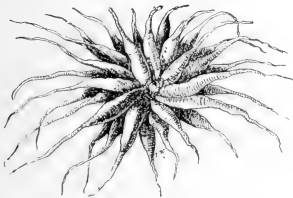


FIG. 66.—*Asparagus medeoloides*, root-stock. (1.)

S. African plant, with tufts of narrow, spindle-shaped, tuberous roots radiating from a common centre. The slender, thread-like stalks attain a length of 10 to 15 ft., and are furnished with glossy green, ovate, pointed leaves (“cladodes”). The small

white flowers appear in summer. (*Bot. Mag.* t. 5584.) The variety *myrtifolius* is recognised by its smaller myrtle-like “leaves.” (*Gard. Chron.* 1904, xxxvi. 323, f. 146.)

This species is also grown in thousands in market nurseries in a warm greenhouse. The plants are generally grown in pots, and strong but slender twine is stretched upwards to wires to enable the shoots to climb, and to prevent them from becoming entangled. When long enough the shoots and twine together are cut, and in this way are sent to market to be sold for decorative purposes, and several cuttings may be made from one plant. The compost most frequently used is a mixture of sandy loam and leaf-soil, or a little peat, and pots of various sizes from 5 ins. to 8 ins. are used, according to the object in view. During growth, plenty of water is essential, and frequent syringing also, to keep the foliage bright and glossy. From time to time the slender stems must be placed round the vertical strings, to give them a start in twining round them upwards.

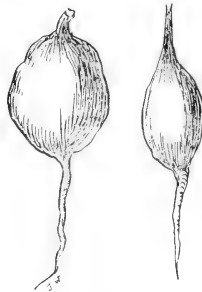


FIG. 67.—*Asparagus Sprengeri*, tuberous roots.

A. Sprengeri.—An ornamental species from Natal, having ovoid or

spindle-shaped tuberous and fibrous roots as shown in the sketch. The stems are more or less decumbent, 3 to 4 ft. long, and furnished with clusters of narrow sickle-shaped bright glossy green leaves or "cladodes."

This species is now extensively grown in hanging pots or baskets, for its ornamental appearance. It is scarcely hardy even in the mildest parts of the Kingdom, and yet will stand much rough usage. To secure nice plants the temperature of a greenhouse is necessary, and a compost of sandy loam and leaf-soil will give good results. The stems are cut in large quantities for floral decorations. Propagation is effected by dividing the root-stocks, or by raising the plants from seeds.

ASPHODELINE (from *Asphodelus*). Nat. Ord. Liliaceæ.—A genus closely related to *Asphodelus*, with fourteen species of herbaceous plants, having short rhizomes or clusters of fleshy roots.

A. lutea (*Asphodelus luteus*) is the best-known and most ornamental species. It is a native of S. Europe, and grows 3 to 4 ft. high, its erect stems being covered with deep green, awl-shaped, three-sided, furrowed leaves, with distinct paler veins. The beautiful, sweet-scented, yellow flowers are borne in summer in a long, dense, straight raceme, each blossom springing from the axils of a buff-coloured bract. The double-flowered variety (*flore pleno*) is a pretty plant, like the type in habit, but having double flowers. (*Bot. Mag.* t. 773; *Red. Lil.* t. 223; *Bot. Reg.* t. 1507.) It flourishes in ordinary good garden soil, and is easily increased by dividing the root-stocks in spring.

ASPHODELUS (*a*, not; *sphello*, to supplant; in allusion to the

beauty of the flowers), **ASPHODEL**. Nat. Ord. Liliaceæ.—A small genus of herbaceous plants, natives of the Mediterranean region, E. Indies, and Mascarene Islands. They have small rhizomes or clusters of thick, fleshy, subtuberous roots, and narrow, strap-shaped leaves, more or less three-sided, or roundish-hollow.

The species mentioned below flourish in sandy soil that has been deeply dug and well manured. Grown in bold clumps they are fairly effective as border plants, and may be increased by division of the roots in spring. It is scarcely worth while trying to raise plants from seeds, as it takes a few years to do so.

A. ramosus.—This seems to be the best of the *Asphodels*. It is a native of S. Europe, and grows from 4 to 5 ft. high, having stiffish sword-shaped leaves, channelled above and strongly keeled beneath. The large white flowers, with a reddish-brown line down the centre of each petal, appear during the summer on long, dense racemes. The variety *albus* is pure white. Closely related to it is *A. comosus*, a Himalayan species, 1 to 2½ ft. high, the white flowers of which have greenish keels to the petals. *A. fistulosus* is another white-flowered species from S. Europe, recognised by its hollow, awl-shaped leaves; and *A. creticus*, from Crete, has yellow blossoms on stalks about 2 ft. high.

ASPIDISTRA (*aspidiseon*, a little round shield; in allusion probably to the stigma), **PARLOUR PALM**. Nat. Ord. Liliaceæ.—A genus with three species of herbaceous plants, natives of India, China, and Japan; having short, thickish, creeping rhizomes, large ornamental leaves, and dull purple or greenish-yellow, bell-shaped flowers springing up from the root-stocks just above the surface of the

ground. The perianth has eight spreading lobes, and eight stamens—rather unusual characters in the Liliaceæ.

The best-known species is undoubtedly *A. lurida* (*Bot. Mag.* t. 2499) and its variety *variegata*. The first-named has beautiful, glossy green, perfectly smooth leaves, 1 to 2 ft. long, broadly oblong lance-shaped, with long stalks. The variety is similar in every way, except that broad streaks of silver run from base to apex of the leaves, and render them effective in appearance.

Notwithstanding their Eastern origin, Aspidistras are so easily grown that a specimen or two is often to be found in the most humble cottage, very often in the best of health. Indeed, there is no plant to equal the Aspidistra for room decoration, and this has probably given rise to the popular name of Parlour Palm—although the plants are in no way related to the Palms proper. They appear to thrive in darkish places, and amidst dry and dusty surroundings—provided they are kept judiciously moist at the root, and are not placed too near the fire, or gas. Indeed, during all but the coldest weather, Aspidistras may be grown in the open air; and so long as the temperature does not sink much below 35° F. in winter, the plants will live and increase in bulk for many years.

To secure handsome specimens, the thickened root-stocks and fleshy roots should be arranged first of all so as to bring the leaves springing from them into a regular position—and not too widely or irregularly separated from each other. They should then be placed into well-drained pots. These should not be too large, as the plants appear to thrive best when the roots are fairly well confined. The most suitable compost is a

mixture of sandy loam, to which a little leaf-mould, peat, or old manure should be added. This should be worked in well between the rhizomes and roots with the fingers, using a flat potting-stick to get the compost down at the sides of the pot, and to make it sufficiently firm. A good soaking should then be given, and the plants stood in the shade for a few days until thoroughly recovered from the disturbance. As a rule the best time to pot Aspidistras is in the spring, when the new leaves are spearing up from the roots. In the case of old or well-established plants that have become too large, and show signs of deterioration owing to an impoverished soil, they should be taken out of the pots, and these have to be broken sometimes to avoid injury to the roots. The old soil should then be pricked out with a pointed stick, and the root-stocks should be thoroughly rinsed in tepid water until every particle of the old soil has been washed away. This will prevent injury to the root-stocks. If it is desired to increase the plants, the rhizomes may then be cut with a sharp, strong-bladed knife into suitable portions containing a few leaves and new growths. One or more portions may then be put into a pot of convenient size in the way described above, and in due course the portions will become established into fine specimens.

Amateurs frequently fail with Aspidistras. The leaves turn yellow and shrivel at the tips and gradually waste away, and a few weak growths try to develop. This state of affairs is generally the result of keeping the plants in a room too hot and too dry, and very often too dusty, and also through over-watering—especially in winter. The natural remedy is: alter these conditions, taking care to

give water only when the soil is getting dry. This should be particularly noted in the winter season, when the plants absorb water very slowly. At this period of the year also, only tepid or lukewarm water should be given, and not ice-cold water from the tap. Should the leaves become infested with scale, thrips, or red spider, they should be sponged with soapy water or some well-known insecticide, taking care first of all to scrape the scale insects off with a piece of pointed stick.

When grown in cool greenhouses in shade, *Aspidistras* naturally grow much more quickly than in ordinary dwelling-rooms; and gardeners who make a speciality of them can produce some magnificent specimens in a year or two. During active growth, weak liquid manure is given once or twice a week, and copious supplies of water are given according to the state of the weather and the rapidity of growth. A nice syringing early in the morning, and late in the afternoon, is highly beneficial to the plants, especially during the warmer months of the year. To secure the finest long-leaved specimens, *Aspidistras* are grown in a high temperature, in deep shade, and in a very humid atmosphere. They are afterwards hardened off in cooler and less humid houses for sale.

Besides *A. lurida*, the other species are *A. punctata* (or *A. elatior*), from Japan, 2 to 3 ft. high (*Bot. Mag. t. 5386*), and its variegated forms, with white or yellow bands or blotches.

BABIANA (*babianer*, the Dutch for *baboon*; in reference to the bulbs being eaten by baboons). Nat. Ord. Iridacæ.—A genus of herbaceous plants with fibrous-coated corms or bulbs, stiffish, plaited, narrow, hairy leaves, and

funnel-shaped flowers in dense spikes.

With one exception, viz., *B. socotrana*, all the species are natives of S. Africa. They are all similar in appearance so far as height and foliage are concerned, and they rarely exceed a foot in height. They are usually grown in pots in a compost of sandy loam and leaf-soil, for the decoration of the cool greenhouse during the summer months, from May to September. During this period of growth and development, water must be given freely when needed; but in winter, when the bulbs are at rest, they may be kept almost quite dry in the old soil.

Where a warm or even hot sunny border is available, *Babianas* may be grown out of doors fairly well, especially in the most favoured parts of the Kingdom. The soil should be deeply dug, well manured, and should consist of loam with plenty of coarse sand or grit in it. The bulbs should be planted in spring when starting into growth, and after growth in the autumn should be protected from cold rains with a sloping roof of litter. Indeed, they may be treated exactly like their relatives the *Ixias* (which see). They are propagated by offsets from the older bulbs in spring.

The following are some of the best kinds, remarkable for their colours, and often for their fragrance:—

B. disticha.—6 ins. Blue. June (*Bot. Mag. t. 626*.)

B. plicata.—6 ins. Purple. May. (*Bot. Mag. t. 576*.)

B. ringens.—3 to 6 ins. Scarlet. May. (*Bot. Mag. t. 6667*.)

B. sambucina.—6 ins. Purple. April. (*Bot. Mag. t. 1019*.)

B. socotrana.—4 to 6 ins. Violet, blue. Sept. (*Bot. Mag. t. 6585*.)

B. spathacea.—6 ins. Light blue. June. (*Bot. Mag. t. 638*.)

B. stricta.—12 ins. Blue, white. May. (*Bot. Mag.* tt. 621, 638.) The variety *angustifolia* has bright blue flowers tinged with pink at the base; *rubro-cyanea* (*Bot. Mag.* t. 410) has blossoms 2 ins. or more across, brilliant blue with a deep crimson zone at the base; *sulphurea* (*Bot. Mag.* t. 1053), creamy or pale yellow; and *villosa* (*Bot. Mag.* t. 583), brilliant crimson.

B. tenuiflora.—6 ins. Purple. May.

B. Thunbergi.—12 ins. White and red.

B. tubiflora.—6 ins. Deep red. (*Bot. Mag.* tt. 847, 1019.)

BEGONIA (after *M. Begon*, a French patron of botany). Nat. Ord. Begoniaceæ.—A genus containing upwards of 350 species of juicy herbs or undershrubs, many having perennial, tuberous root-stocks. Leaves more or less unequal-sided, entire, lobed or parted, irregularly toothed. Flowers often showy, monœcious. Male flowers consisting of two large outer (sepaloid), and two small inner (petaloid), segments. Stamens numerous, free, or united in one bundle. Perianth of the female flowers has two to ten segments, of which the two outer ones are larger and sepaloid. Ovary inferior, often three-, rarely two-, or four- to five-celled. Styles two to four, free, or united at the base, with branched, twisted stigmas. Fruit a capsule, usually three-angled and unequally three-winged. Seeds numerous, minute.

The fibrous-rooted Begonias, which constitute an important group by themselves, are not considered in this volume dealing with bulbous and tuberous plants.

The tuberous Begonia may now be looked upon as one of the most popular of garden flowers, both for the decoration of the conservatory or

greenhouse and for the flower-border during the summer months. Indeed, many prefer them for bedding-out purposes to the Zonal Pelargoniums, considering them more ornamental in foliage, more durable in blossom, more pleasing in colour, and more easily preserved during the winter months. With the exception perhaps of the Cactus Dahlia, the tuberous Begonia has responded more readily than any other plant in cultivation to the art of the hybridist. Thirty years ago the plants were just beginning to attract popular attention, as a certain number of hybrid forms had been put into commerce; and since that time marvellous strides have been made in the evolution and development of varieties with blossoms of great size and substance, and as double as the finest hollyhock or rose.

These results have not been achieved from one species only, but from about half a dozen. The first natural species concerned in the parentage of the florists' Begonia was introduced from Bolivia in 1857, and was named *B. boliviensis* (*Bot. Mag.* t. 5657). It had scarlet flowers. Eight years later, in 1865, a yellow-flowered species (*B. Pearcei*) came from the same country, and was followed in 1867 with the introduction of *B. roseiflora* (*Bot. Mag.* t. 5680), with bright rose-coloured flowers, from the Andes of Peru. The fourth parent, *B. Clarkei* (*Bot. Mag.* t. 5675), also with rose blossoms, came from the Bolivian Andes in 1867. In the same year *B. Veitchi* (*Bot. Mag.* t. 5663), with scarlet or orange flowers, arrived from the Peruvian highlands; while the sixth and last parent, *B. Davisi* (*Bot. Mag.* t. 6252), with crimson-scarlet blossoms, was not introduced to cultivation till 1876, nearly twenty years after the first parent, *B. boliviensis*. In their native habitats the species mentioned

grow at an altitude of 11,000 to 13,000 feet, so that they may be regarded almost as hardy plants, well adapted for cultivation in our temperate and fickle climate. It will be noticed that with the exception of the yellow-flowered *B. Pearcei*, the other species have red, scarlet, or crimson flowers; and yet the result of hybridising, crossing, or intermarrying one species with another has been the production of progeny showing many other shades of colour such as pure white, crimson, scarlet, pink, rose, yellow, orange, and innumerable intermediate shades. The one colour lacking is blue, and it is doubtful if ever such a colour will be seen on a tuberous Begonia until some purple- or blue-flowered parent is discovered. Of the species mentioned, *B. boliviensis* (scarlet), *B. Pearcei* (yellow), and *B. Veitchi* (orange - scarlet) have been more frequently used as parents than the others, and it is obvious that the beautiful yellow-flowered varieties now in cultivation all show the influence of the *B. Pearcei* blood in their veins. When one compares the small, drooping, four-petalled flowers of the original parents with the huge blossoms (both single and double) now so well known, it seems scarcely credible that such magnificent results could have been achieved by the gardener in a little over thirty years.

CULTURE.—Tuberous Begonias are plants that almost anyone can grow to perfection, either in the open air or under glass. Indeed, for the decoration of the outdoor garden the tuberous Begonia is in many places ousting the ever-popular Zonal Pelargonium from the flower-beds, and it is now to be found during the summer months in many cottage gardens. It is not particular as to soil so long as this has been deeply dug and liberally

dressed with well-rotted manure. For pot plants a compost of well-matured loam, leaf-soil, and a little silver sand will be found to give excellent results — especially if a little basic slag or some of the proprietary manures have been mixed with it.

STARTING THE TUBERS.—Any time during February or March these may be taken from their winter quarters and placed in shallow boxes on the surface of either coco-nut fibre, leaf-soil, or indeed any good garden compost, in a temperature of 60° to 65° F. The tubers should not be placed too closely together, otherwise when the fibrous roots develop they are likely to become matted together. It is then difficult to separate one tuber from the other without great injury to the delicate roots. There is no necessity to cover up the tubers when starting them into growth, but care should be taken to keep the rounded surface underneath, as it is from the hollow surface that the new shoots sprout. Each day the tubers and compost in which they are placed should be sprinkled with tepid water, to encourage growth; and on no account should they be allowed to dry up or shrivel.

POTTING.—As soon as the new shoots are about 2 ins. long, the plants are ready to be potted. The size of the pots will depend upon the size of the tubers. A safe general rule to follow is to allow about 1½ ins. all round between the outside of the tuber and the inside of the pot. It may therefore happen that pots 5, 6, or 8 ins. in diameter may be used. If they should become full of roots in a short time, owing to vigorous growth, it may be necessary to pot a second time, using slightly larger pots. The compost may consist of well-matured loam, leaf-mould, and silver

sand, as stated above, with a sprinkling of fine bone-meal or basic slag.

SHADING.—This is only necessary for a short time after the plants have been disturbed, merely to check evaporation from the fleshy leaves, and to enable the injured roots to heal, and throw out new fibres. When well established again, plenty of light and air should be given, taking care in the early part of the season not to allow the temperature in the greenhouse to fall below 60° F. by means of cold draughts from the ventilators or open doors.

WATERING.—This should always be done early in the morning or late in the afternoon, so as to avoid wetting the foliage in the middle of the day when the sun-heat is likely to be powerful, and cause brown blotches where drops of water have rested. If the soil contains a fair amount of humus in the form of leaf-soil—say about one-third of the whole compost—the soil will keep moist and cool for a much longer period than if only a small quantity be present. At each time of watering any plants that are actually dry, or nearly dry, should have a thorough soaking. If, however, the soil is sufficiently moist to go from one period to another, it is better to wait, rather than to give water to a soil already fairly wet. The amount of water supplied will vary according to the weather and the growth of the plants. Thus, during warm weather, when the plants are growing freely, more water will be required than later on in the season, when growth is ceasing, the flowers withering, and the stems and leaves begin to turn yellow and drop off one by one.

PINCHING AND DISBUDDING.—To make fine bushy plants, any early flower-buds that appear after the plants have been finally potted

should be pinched out, so that the plants may first of all develop greater strength. The leading shoots may also have just the points nipped out, to encourage side shoots from lower down the stems. In this way, strong, sturdy, bushy plants may be formed that will throw large quantities of blossom during the summer season.

MANURING.—Once the plants are really well-established, and more than ordinary results are required, it will be found necessary to give weak liquid-manure water two or three times a week. This may be made by placing a little guano, soot, and well-rotted cow-manure into a bag, and dropping it into a tank or tub of water. The liquid should be stirred up well with a stout stick before use. About half a pint to a pint of liquid manure—according to its strength—will be sufficient to dilute a gallon of clear water. Whenever rain-water is available it is always to be preferred to tap-water.

PLANTING OUT.—Tuberous Begonias are not grown in the open air nearly so much as they ought to be. The single-flowered varieties are particularly useful, and need staking but little to keep the blossoms off the ground. The beds in which Begonias are to be planted out for summer decoration should be deeply dug, and as the plants are gross and rapid feeders, plenty of well-decayed manure should be incorporated with the soil, as well as some leaf-mould and grit, if the land is inclined to be at all heavy. The plants may be started in a greenhouse, as advised above, but excellent results may be obtained without the aid of any heat whatever. Tubers may be started in coco-nut fibre in a cold frame in March, and by the first week in June will have growths 2 or 3 ins. high. They may be then planted

out, and although naturally more backward than plants raised in heat, they last much better during the season. Indeed, they continue to bloom well into October until they are cut down by the frost.

LIFTING AND STORING.—Once the plants begin to turn yellow, or are cut down by the early frosts, the tubers should be taken up, cleaned after the growths are decayed, and stored in dry soil or sand in an airy, frost-proof cellar with a temperature of 45° to 50° F. until the following spring. They may then be started into growth again in the way described.

PROPAGATION.—Tuberous Begonias are easily raised from seeds, division of large tubers, or from cuttings of the side shoots. Unless one has the convenience for propagating, it will be found much more satisfactory to purchase tubers from a reliable source. When plants are to be raised from seeds, the latter should be sown in January or February on the prepared surface of a rich gritty soil. Pots or shallow pans may be used, and should be well drained for about half their depth with clean "corks." A layer of rough fibre or moss should be placed over these, and then the rougher particles of soil. The surface may be flat or slightly domed, but should be pressed fairly firm with a piece of flat board, so as to prevent the tiny brown seeds from dropping down too far. It is safer to dip the pots or pans in water rather than use the water-pot. In this way the soil will be moistened without running any risk of washing the seeds into patches, as is likely to be done with the water-pot. The temperature at which seeds should be sown should be about 70° to 75° F., and the tender seedlings should be protected from cold draughts and chills.

PRICKING OUT.—When the young plants are about $\frac{1}{2}$ -in. high, each one may be lifted up with a pointed stick cleft at the apex, and transferred to other pots or pans in a rich gritty compost, about an inch or two apart. In due course, after shading and sprinkling, the young plants begin to grow vigorously, and may be transferred singly to small pots and grown on. Young plants raised in this way will flower freely during the summer months, either in the greenhouse or in partially shaded places in the open air. Where large numbers of plants are required, seeds may also be sown about July or August, and will produce plants that will continue to grow during the winter season and blossom the following spring and summer.

CUTTINGS.—If there is a desire to retain and increase the stock of any specially fine variety, this may be done by taking cuttings of the shoots about 2 to 3 ins. long during the summer months, and inserting them in a compost of sandy loam and leaf-soil, or in leaf-soil or even coco-nut fibre alone, in a temperature of 60° to 65° F. The cuttings should be kept close and shaded for some days, and should also be sprinkled overhead two or three times a day to keep the surrounding atmosphere and compost sufficiently humid. Cuttings soon root in this way, and may be then potted up and grown on.

Another method of increasing the stock of any desired variety is to cut large tubers into two or more parts, each with a sprouting bud, in the spring, dipping the cut surface in charcoal, soot, or slaked lime to heal it over quickly.

PESTS.—Tuberous Begonias are almost immune from insect pests. Thrips, however, occasionally infest them when grown in an atmosphere

too hot and arid. They are easily kept at bay by syringing the plants freely when not in blossom, and afterwards keeping the stages sufficiently damped with water each day.

It is needless to give a list of names, as these are only of fleeting interest, and the very finest forms may be obtained from a packet of good seeds saved from choice strains. The main groups into which tuberous Begonias may be divided are (1) single-flowered and (2) double-flowered. In both sections the petals are broad, of good shape and substance, and in many varieties the edges are beautifully denticulate; in others they are beautifully frilled and serrated. What are called "Butterfly" Begonias have the flowers with a lighter shade in the centre, the petals being splashed and marbled with a deeper colour. The "crested" Begonias have excrescences or crested outgrowths raised on the centre of the petals, which present a peculiarly distinct appearance in consequence.

WINTER-FLOWERING BEGONIAS.

There are now many charming varieties of florists' Begonias that flower during the winter months—from October till the end of January. These have been raised by crossing some of the best tuberous varieties with *Begonia socotrana*. This is a fibrous-rooted species from the Island of Socotra, having roundish peltate leaves and bright pink flowers in winter. (*Bot. Mag.* t. 6555.) In using this fibrous-rooted species with the tuberous-rooted varieties, the object aimed at was to secure a sturdy winter-flowering race. A good deal has been accomplished in this respect by Mr John Heal, and varieties with single, semi-double, and double flowers have been produced. The plants have mostly sterile flowers, and

consequently have to be raised by means of cuttings, and they are semi-tuberous in character. They must be grown in warm greenhouses to be brought to perfection. Some of the best forms at present are: *Ideala*, *Adonis*, *John Heal*, *Mrs Heal*, *Ensign*, *Winter Cheer*, *Julius*, *Venus*, and *Winter Perfection*. The flowers vary in colour from bright pink to deep purple pink, rose, and cerise. Besides the parents of the modern tuberous Begonia there are several other tuberous-rooted species, but they are chiefly of botanical interest at present.

BELEMCANDA or BELAMCANDA.

(The Malabar name of the plant.) Nat. Ord. Irideæ.—The only species of the genus is—

B. chinensis, formerly known as *Ixia* and *Pardanthus chinensis*, introduced from China and Japan in 1759. It has a short stolon-bearing rhizome, and loose tufts of sword-like leaves, 1 to 1½ ft. long and an inch broad. From three to twelve shortly tubular flowers are borne in a loose cluster, the fleeting segments being red and spotted with purple brown. (*Red. Lil.* t. 121; *Bot. Mag.* t. 171; *Fl. d. Serr.* t. 1632.)

This species being only half hardy, requires to be grown like the *Ixias* in sheltered spots, or in frames or greenhouses. It likes a rich sandy soil, and may be increased by division of the root-stocks, or by means of its black pea-like seeds.

BESCHORNERIA (after *H. Beschornier*, a German botanist). Nat. Ord. Amaryllidæ.—A small genus of evergreen Yucca-like plants, all natives of Mexico, having short, thickened rhizomes or tuberous root-stocks, tufts of fleshy, lance-shaped leaves, and clusters of drooping, funnel-shaped flowers deeply cut into narrow seg-

ments, and borne in simple or paniced racemes on stalks 2 to 8 ft. high, springing out of the centre of the plants.

The *Beschornérias* are not well-known outside botanic gardens. They require to be grown in a warm greenhouse, and flourish in a compost of rich sandy loam and leaf-soil or a little peat, and may be grown in pots or tubs, or planted in beds or borders, where the evergreen appearance of the ornamental foliage would be more likely appreciated. The best-known species are:—

B. bracteata, with leaves $1\frac{1}{2}$ to 2 ft. long. Flowers reddish, on stalks 4 to 5 ft. high. (*Bot. Mag.* t. 6641.)

B. Decosteriana has leaves 2 to $2\frac{1}{2}$ ft. long, and green flowers tinged with red, on stems 7 to 8 ft. high (*Bot. Mag.* t. 6768.)

B. Toneliana.—Leaves $1\frac{1}{2}$ to 2 ft. long. Flowers greenish, on stems about 4 ft. high. (*Bot. Mag.* t. 6091.)

B. tubiflora.—Leaves about 1 ft. long, and $\frac{1}{2}$ to 1 in. broad. Flowers reddish-green, on stems 2 to 3 ft. high. (*Bot. Mag.* t. 4642.)

B. Wrighti.—This species has masses of spreading recurved sword-like leaves 4 to 5 ft. long and about 2 in. wide in the middle. The green, downy flowers are borne on pyramidal panicles about 8 ft. high. (*Bot. Mag.* t. 7779.)

B. yuccoides.—Leaves $1\frac{1}{2}$ to 2 ft. long. Flowers entirely green, on reddish stems 4 to 6 ft. high, with rosy red bracts.

This species flourishes in the open air in warm sheltered spots, but must be protected in winter. (*Bot. Mag.* t. 5203.)

BESSERA (after *Dr Besser*, professor of botany). Nat. Ord. Liliaceæ.—The only representative of this genus is—

B. elegans, a charming little Mexican plant about 2 ft. high, having tunicated corms, narrow, channelled leaves, and umbels of beautiful drooping bell-shaped blossoms from

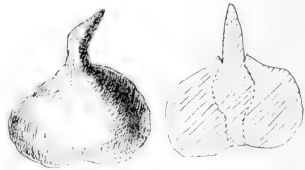


FIG. 68.—*Bessera elegans*, corm and section.

July to September. These are scarlet in the type, but there is so much variation in the colour that



FIG. 69.—*Bessera elegans*. ($\frac{1}{2}$.)

specific names have been given to forms, such as *fistulosa*, purple; *Herberti*, purple and white; and *miniata*, scarlet and white. (*Bot. Reg.* tt. 34, 1546; *Fl. d. Serr.* t. 424.)

The bulbs are best planted in a compost of sandy peat and loam in about equal proportions, and may be grown in a greenhouse in the coldest parts of the Kingdom, or in the warmest places in sunny spots against a south wall. During the growing season—that is, during the spring and summer months—the soil should be kept fairly moist when grown in pots, afterwards withholding water as the plants show signs of going to rest. Propagation is effected by means of offsets from the older bulbs in spring.

BIARUM (*bis*, twice; *Arum*, Arum). Nat. Ord. Aroideæ.—A small genus of tuberous-rooted herbaceous plants closely related to the Arums, and having linear oblong, or lance-shaped leaves with long slender stalks, all natives of Palestine and the Mediterranean region. The flower-stalks are short or almost absent; the spathes soon wither. The plants are all hardy, but like warm, sunny spots in any good and well-drained garden soil. They are more curious than beautiful, and consequently more appropriate in botanical collections than in the ordinary flower-border. They are increased by separation of the offsets from the older tubers in spring. The best-known species is *B. tenuifolium* (also known as *B. gramineum*, *B. constrictum*, and *Arum tenuifolium*), with dark brownish-purple spathes (*Bot. Reg. t.* 512). Other kinds, all with blackish-purple spathes, are *B. angustatum*, *B. carduchorum*, *B. crispulum*, *B. Kotschyi*, and *B. Pyrami*.

B. eximium, is a native of W. Cilicia, with broad, simple leaves, and spathes dark purple on the upper side, and green spotted with red on the under side (*Gard. Chron.* 1898, xxiii. 126, f. 49, as *Ischarum*).

BIDENS (*bis*, twice; *dens*, a tooth; in allusion to the seeds). Nat. Ord. Compositæ.—This is a large genus, having over one hundred species of more or less weedy plants with opposite leaves, once, twice, or thrice pinnately cut, and solitary flower-heads.

B. dahlioides is a native of Mexico, where it is found at an elevation of over 8000 ft. It is a perennial about 2 ft. high, with Dahlia-like, tuberous roots, pinnate leaves having three to seven leaflets, and solitary flower-heads about 3 ins. across, the ray florets varying in colour from white to pink, purple, and rose.

This little-known plant flourishes in milder parts of the Kingdom in ordinary good garden soil, and may be easily propagated by division of the tuberous roots and by means of seeds, which are freely ripened in favourable parts. In cold or bleak places the plants may be treated exactly like Dahlias, the tubers being lifted and stored in frost-proof places in winter.

BIGNONIA (after the *Abbé Bignon*, librarian of Louis XIV.). Nat. Ord. Bignoniaceæ.—This genus contains about 120 species of shrubby plants with more or less climbing stems. The one mentioned here is remarkable for its long, irregularly shaped, tuberous roots, viz. :—

B. æquinoctialis (*B. Unguis*).—A native of Guiana, with climbing stems, smooth, opposite leaves in pairs, and during the summer months bearing clusters of irregularly bell-shaped yellow flowers on the ends of the young shoots.

This species requires stove or warm greenhouse treatment, and flourishes in rich, light soil, and plenty of moisture during active growth. Its shoots may be trained up pillars or

trellises. It may be increased by cuttings of the young shoots in spring in sandy soil under a bell-glass, but care must be taken not to keep the cuttings too wet.

BLANDFORDIA (after *George, Marquis of Blandford*), CHRISTMAS BELLS. Nat. Ord. Liliaceæ. — A genus of Australian plants closely related botanically to the Day Lilies (*Hemerocallis*), *Funkias*, and *Kniphofias*. They have very short, thickened root-stocks, not bulbs, with masses of thickish, fleshy roots, and tufts of long, narrow, stiffish, and prominently veined leaves sheathing at the base. The beautiful tubular or bell-shaped flowers droop from an erect stem.

Blandfordias are charming plants for the greenhouse, which they render brilliant from May to July with their showy flowers. In Australia they are known as "Christmas Bells," the flowers appearing in the depth of the Antipodean winter. The plants flourish in a compost of turfy loam, peat, and coarse silver sand in about equal proportions. The pots should be well drained, and not too large for the plants. During the winter season a temperature of 45° to 50° F. will be sufficient for the plants, and during the summer months it will be unnecessary to place them in artificial heat. The easiest way to increase a stock is by means of suckers. These are produced fairly freely by strong plants. Each sucker should be detached carefully and placed in a small pot by itself in spring, when the older plants are to be repotted. The young sucker plants should be kept close and moist for a few weeks until well established. Afterwards plenty of air and light may be given, combined with judicious watering. Care must

be taken to shade during very strong sunshine, otherwise the leaves begin to turn yellowish.

Blandfordias may also be raised from seeds. These should be sown when fully ripe in well-drained pots or pans on a compost of loam, peat, and sand, the upper surface of which has been made fine for the reception of the seeds. Germination is often slow and irregular, but there will be a good many young plants by the following spring. These should be pricked out about 2 ins. apart in a similar compost, and placed in a warm corner of the greenhouse where they can be kept moist, and shaded from strong sunshine. The following spring the young plants will require more space, and may be moved into 3-in. or 4-in. pots according to their size. They are grown on thus for another season, and the following spring will be large enough for 5-in. or 6-in. pots, using the compost already mentioned, and making it firm round the roots.

Plants once established need not be repotted every year, unless the soil has become sour or exhausted. In addition to the ordinary waterings, a little weak liquid manure should be given once or twice a week when the flower-stems begin to show.

Insects are not very troublesome, greenfly perhaps being the most common pest. This is easily checked by syringing with quassia and tobacco solutions, or by vaporising the greenhouse. The following are the species and varieties known:—

B. flammea.—A fine species 2 to 3 ft. high, with grass-like leaves and flowers about 1½ ins. long, broad at the throat, narrower towards the base. The colour is rich brownish-red at the base, shading upwards into orange and yellow. There are several varieties, which have been considered

as species by some, the best being *splendens*, with larger and brighter coloured flowers than the type; *elegans*, with large crimson flowers edged with yellow; and *aurea*, a pure golden-yellow flowered form. Figures to be found in *Bot. Mag.* t. 5809; *Bot. Reg.* t. 924; *Fl. d. Serr.* 6585; *Gard.* 1883, t. 411.

B. grandiflora (*B. Cunninghamsi*).—Another fine plant 2 to 3 ft. high, with sheathing, distichous leaves about a foot long and a $\frac{1}{4}$ in. broad, and ending in a needle-like point. The flower-stem is topped with a cluster of about half a dozen drooping flowers, each about 2 ins. long, and of a glowing red and yellow colour. (*Bot. Mag.* t. 5734; *Bot. Reg.* t. 924.)

B. marginata.—This is a Tasmanian species about 2 ft. high, with rough-edged leaves, and rich dark red flowers about $1\frac{1}{2}$ ins. long, margined with yellow, and borne on a deep

2 ft. high, with grassy leaves, and drooping clusters of orange or brownish-red and yellow flowers, each about $1\frac{1}{2}$ ins. long (*Bot. Mag.* t. 2003).

B. princeps.—This is a fine species, or, as it has been called, a variety of *flammea*. It has longer and larger flowers, $2\frac{1}{2}$ to 3 ins. long, of a beautiful orange-red passing into soft golden-yellow, and borne on stalks about a foot high. (*Bot. Mag.* t. 6209.)

The Blandfordias, or "Australian Christmas Bells" as they might be called popularly, deserve greater attention than they receive at present. They are easy to grow, and are unique as ornamental flowering plants during the summer. There is no necessity to grow them in pots. They would do well planted out in a peaty border in a cool greenhouse. All the species mentioned above, except *B. marginata*, are natives of New South Wales.



FIG. 70.—*Blandfordia princeps*. (1/3)

purple-coloured stalk. The variety *intermedia* has yellow flowers.

B. nobilis.—A noble species about

BLOOMERIA (after *H. G. Bloomer*, Curator of the Academy of Nat. Science, California, 1863). Nat. Ord. Liliaceæ. — A small genus closely related to *Brodiaea*, *Bessera*, and *Nothoscordum*, having fibrous-coated corms, long linear radical leaves, and simple scapes ending in an umbel of many rotate flowers, with six distinct spreading segments. Stamens six, hypogynous, or very slightly adhering to the base of the segments.

B. aurea (*Allium croceum*; *Nothoscordum aureum*).—A handsome Californian plant, with dense umbels of bright yellow flowers on stems about 1 ft. high. **B. Clevelandi** is another yellow-flowered species, but smaller. Both kinds flourish in rich sandy loam, and should be placed in warm, sunny corners in the rock-garden or border. Increased by offsets.

BOBARTIA (after *Jacob Bobart*, a professor of botany at Oxford in

the seventeenth century). Nat. Ord. Irideæ.—This genus contains about a dozen species, all natives of South Africa, and of little garden value. They have a short rhizome, which becomes thickened into a corm in *B. filiformis*. The flowers are borne in clusters, and are usually yellow in colour. The species have been confused a good deal with members of such genera as *IXIA*, *MARICA*, *MORÆA*, and *SISYRINCHIUM*, to all of which they are closely related, and require the same cultural treatments. The plants grow from 1 to 3 ft. high, and have stiff, roundish, or narrow sword-shaped leaves. *B. anceps*, *B. aphylla*, *B. Burchelli*, *B. filiformis*, *B. gladiata*, *B. macrospatha*, *B. robusta*, and *B. spathacea* are the species known. *B. aurantiaca* is now known as *HOMERIA*.

BOCCONIA (after *Paolo Bocconi*, a Sicilian botanist). Nat. Ord. Papaveraceæ.—A genus containing three species of bold and ornamental plants with thickish, creeping root-stocks, large, deeply lobed leaves, and erect panicles of numerous small flowers.

They are all easily grown in any good garden soil, and flourish in shade or sunshine, but make much finer plants in the latter. They seed freely, and each year hundreds of young self-sown plants may be found around the old ones. They are also easily increased by division of the thickish yellow rhizomes. Indeed, once they are in a garden, the chief difficulty will consist in preventing them from crowding out other plants of less vigorous growth.

B. cordata (*B. japonica*; *Macleaya yedoënsis*).—A stately Chinese perennial, 6 to 10 ft. or more high, with large, deeply lobed, fig-like leaves, soft green above, whitish beneath.

Flowers small, creamy buff, produced in large feathery or plume-like panicles during the summer months. (*Bot. Mag.* t. 1905.)

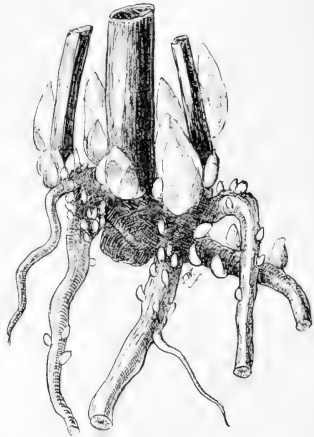


FIG. 71.—*Bocconia cordata*, root-stock and buds. (3.)

B. frutescens.—A Mexican species 3 to 6 ft. high, with large sea-green lobed leaves and feathery panicles of greenish flowers. This is not quite hardy, and therefore not often seen.

B. microcarpa.—This species from N. China is very similar in appearance to *B. cordata*, but does not grow so tall. Its leaves are also somewhat smaller and more deeply lobed and ornamental, and the flowers are of a more bronzy brown tint.

BOMAREA (after *Valmont de Bomare*). Nat. Ord. Amaryllidæ.—This genus contains about eighty species of plants with slender roots, often thickened towards the tip into large tubers; more or less climbing or creeping stems; leaves sometimes linear, but usually oblong, pointed,

and tubular or funnel-shaped flowers in drooping umbels.

Notwithstanding their habit, the Bomareas are closely related to the *Alstroemerias*, and may be grown quite as easily, but not in the open air. They require the protection of a cool or slightly warm greenhouse, and flourish in a well-drained compost of sandy loam, to which a little peat or leaf-mould may be added, and also a few nodules of charcoal. Young plants are best grown in pots until they are well established. They may then be planted out in the greenhouse in a nice border, whence the stems can be trained up the rafters near the glass or at the ends of the house, where they will have still more light, and at the same time the requisite warmth. During growth, from spring till autumn a certain amount of moisture is needed at the roots, and on warm genial days, especially during vigorous growth, the plants will benefit by occasional syringings in the morning and afternoon; but these should cease when the plants are bearing their large clusters of beautiful flowers. The winter temperature for Bomareas should not be lower than 50° F. at night, with a rise of 5° during the daytime.

To increase the stock, the roots may be separated in spring as growth is commencing, each portion being placed in a small pot, according to size, and grown on in genial warmth and moisture. Seeds may also be sown when thoroughly ripe, in a mixture of fine sandy loam and peat or leaf-soil in equal proportions, and kept in a temperature of 60° to 65° F. When large enough to handle easily, the seedlings should be transferred singly to small pots in a similar compost, and kept in a warm, fairly close and moist atmosphere until they

become established. Then a place slightly cooler and more airy will suit them very well. Syringing and watering must be attended to with regularity; and as the plants increase in size, they will require moving into larger pots, when the same treatment will be required. When the new growths appear, a little soot or slaked lime should be sprinkled round them to protect them from slugs, if any.

The following are some of the best-known Bomareas in cultivation:—

B. acutifolia Ehrenbergiana.—A Mexican species with deep orange-yellow flowers, the inner segments being paler and spotted (*Bot. Mag.* t. 6444).

B. Calsasiana (*Alstroemeria Calsasi*).—This species grows at an elevation of 8000 to 11,000 ft., on the Andes of Ecuador and New Granada. The leaves are distinctly stalked, 3 to 6 ins. long, and from six to thirty reddish-brown and bright yellow flowers are borne in an umbel. (*Bot. Mag.* t. 5442.)

B. Carderi.—A fine species from the Andes of Colombia, with leaves 4 to 6 ins. long, and compound umbels of large pale pink flowers, spotted with claret-brown towards the tip, the inner segments being greenish-white and much spotted (*Fl. Mag.* n.s. t. 239; *Gard. Chron.* 1876, i. 795, f.). Fig. 72.

B. edulis (*A. Salsilla*).—This is a very variable species, and is found wild throughout Tropical America from Cuba and Mexico to Peru and S. Brazil. It has edible, tuberous roots. The leaves are 3 to 4 ins. long, and the flowers are pink, tipped with green, the inner segments being greenish and heavily spotted with claret-brown. (*Bot. Mag.* t. 1613.) The variety *Elwesi* has pink outer segments, the inner ones being

pencilled with red (*Gard. Chron.* 1905, xxxvii. 350).

There are several varieties, such as *chontalensis*, with pale yellowish-green inner segments (*Bot. Mag.* t. 5927); *ovata*, with broader leaves and larger flowers (*Bot. Mag.* t. 2846); and *cornuta*, which has the outer



FIG. 72.—*Bomarea Carderi*. (1.)

floral segments furnished with a distinct spur at the apex. There are many other forms which Mr Baker in his *Handbook of the Amaryllideæ* says he cannot distinguish specifically.

B. frondea.—This is closely related to *B. Caldasiana*, and is found at altitudes of 8000 to 10,000 ft. on the Andes of Colombia. The leaves are 4 to 5 ins. long, and the flowers, borne in dense umbels, are reddish-brown, with bright yellow, heavily spotted inner segments. (*Gard. Chron.* xvii. n.s. 699, f.)

B. Kalbreyeri.—This also comes from the Andes of Colombia (9000 to 10,000 ft.), and is close to *B. Caldasiana*. The flowers are reddish-brown outside, the inner segments

being bright yellow, spotted with claret-brown. (*Rev. Hort.* 1883, 516, f.)

B. oligantha.—A native of the Peruvian Andes, having flowers dull red outside, the inner segments bright yellow, spotted with claret-brown. (*Gard. Chron.* 1877, ii. 648).

B. patacocensis (*B. conferta*).—A native of the Andes of Ecuador and Colombia, with huge clusters of bright red flowers, the inner segments having a yellow keel and a few spots (*Bot. Mag.*, t. 6692; *Gard. Chron.* 1882, 186, f. 31).



FIG. 73.—*Bomarea patacocensis*. (1.)

B. Shuttleworthi.—A fine species from the Andes of Colombia, with oblong acute leaves 5 to 6 ins. long, and flowers red outside, yellow tinged with green within, and copiously spotted with red brown (*Gard. Chron.* 1882, i. 76, 77, 85).

B. vitellina.—A Colombian species with ovate oblong leaves 3 to 4 ins. long, and bright orange-yellow flowers.

BONGARDIA (after *Heinrich Gustav Bongard*, a German botanist). Nat. Ord. Berberideæ.—The only species,

B. Rauwolfii (or *Leontice altaica*, or *L. chrysozonum*, as it used to be called), is a pretty little tuberous-rooted perennial about 6 ins. high, having pinnately cut, glaucous leaves, with thickish segments again twice or thrice divided or toothed, and having a purple blotch at the base of each leaflet. The golden-yellow flowers appear in May on branched pyramidal panicles, each blossom being about 1 in. across, and drooping from a slender stalklet or pedicel. Sepals three to six, petaloid. Petals six, almost similar. Stamens six, free. It is a native of Syria and Persia, where it is used as a pot herb. (*Bot. Mag.* t. 6244.)

This plant flourishes in light sandy soil with a little peat or leaf-mould in warm, open positions in the rock-garden or border. In winter the plants should be protected from cold, heavy rains by a flower-pot, bell-glass, etc., otherwise the tuberous root-stocks are apt to perish. The plants may be increased by seeds sown in cold frames when ripe, or by offsets in spring, or in early autumn and wintered in a cold frame.

BOUSSINGAULTIA (after a celebrated French chemist, *Boussingault*). Nat. Ord. Chenopodiaceæ.—A small and little-known genus belonging to the Beetroot and Spinach family, containing about ten species of herbaceous plants having fleshy rhizomes emitting climbing stems furnished with smooth, thickish leaves, and having the small flowers in branching sprays. The best-known species is—

B. baselloides.—A native of S. America. It is a quick-growing plant with reddish twining stems, on which arise tubercles (Fig. 74). The wavy leaves are heart-shaped, fleshy, and shining green, and the small, white, sweet-scented flowers appear in

branched sprays about September and October.

This plant is not quite hardy, but might grow fairly well with winter protection in the warmest parts of the Kingdom. In other places it should be grown in a greenhouse, and as the stems often attain a length of



FIG. 74.—*Boussingaultia baselloides*, showing tubers on stem. (3.)

about 20 ft. in the course of a year, the plants should be either trained over walls, trellises, pillars, or rafters, or on wire balloons if grown in pots. They flourish in a compost of sandy peat and loam, and may be increased by seeds, division of the tuberous roots, and by the tubercles produced on the stems. (*Bot. Mag.* t. 3620.)

B. cordata, from Peru, is a nearly allied species.

BOWIEA (after *J. Bowie*, a Kew collector). Nat. Ord. Liliaceæ.—The only species is—

B. volubilis, a native of S. Africa. It has large, globular, greenish bulbs, and is remarkable for its slender climbing stems, which branch into slender, staghorn-like segments, and bear greenish, fleeting flowers with reflexed segments. The true leaves are grass-like, but they soon wither.

This plant is simply a vegetable curiosity. It grows freely in a cool greenhouse, and has been known to flourish in the open air in very warm, sheltered spots in ordinary light garden soil. (*Bot. Mag.* t. 5619.)

BRACHYSTELMA (*brachys*, short; *stelma*, a crown; referring to the coronal processes of the flowers). Nat. Ord. Asclepiadææ.—A small genus of tuberous-rooted perennials with climbing stems, opposite leaves; fleshy, bell-shaped or starry flowers.

The plants of this genus are very little known. They are all natives of S. Africa, and require to be grown in a greenhouse. A compost of sandy loam and leaf-soil suits them best, and they may be increased by basal cuttings in spring. The species best known are *B. Arnoti* (*Ref. Bot.* t. 9); *B. Barberæ* (*Bot. Mag.* t. 5607); *B. Caffrum* (*Gard. Chron.* 1894, xvi. 62); *B. ovatum* (*Ref. Bot.* t. 226); *B. spatulatum* (*Bot. Reg.* t. 1113); and *B. tuberosum* (*Bot. Mag.* t. 2343). The flowers of these are greenish, yellowish, or purple.

BRAVOA (after *Bravo*, a Mexican botanist). Nat. Ord. Amaryllidææ.—A small genus of Mexican plants having tuberous root-stocks, narrow leaves, and red or whitish flowers,

usually in distant pairs. The perianth has a long, subcylindrical tube, and short, ovate oblong, almost equal segments.

The Bravoas are pretty little plants, almost hardy in the mildest parts of the Kingdom, with protection in winter; otherwise best treated as greenhouse plants. They like a compost of rich sandy loam and leaf-soil, and several should be grown together in well-drained pots to make a display. They may be increased by offsets, or more slowly from seeds.

B. Bulliana has ovoid tubers about 1 in. through, the outer tunics split into fibres at the top. The bright leaves are about 6 ins. long, and 1 to 1½ ins. broad. From five to six pairs of whitish and almost stalkless flowers are borne on a flexuose stem 2 to 3 ft. long. This species and the next have produced a hybrid called *B. kewensis*. (*Gard. Chron.* 1899, xxvi. 112.)

B. geminiflora (*The Twin Flower*).—This is the best-known member of the genus, having been introduced from Mexico in 1838. The globose tubers are 1 to 1½ ins. through, with fibrous tunics. The leaves are 12 to 18 ins. long, ½ to ¾ in. broad, and the bright coral-red tubular blossoms, twenty to thirty in number, hang in pairs on a stalk 12 to 18 ins. high.

This species grows wild at an altitude of 7000 ft. on the mountains of Central Mexico, and is practically hardy in warm and sheltered spots facing south in the neighbourhood of London. (*Bot. Mag.* t. 4741; *Fl. d. Serr.* v. 520.)

B. sessiliflora.—This species grows at an altitude of 6000 to 8000 ft. in Mexico, and is probably as hardy as *B. geminiflora*. It has an oblong tuber, narrow, pointed leaves, and stalkless, whitish flowers in distant pairs, on stems 1½ to 2 ft. high.

B. singuliflora.—The tubers of this

species are about $1\frac{1}{2}$ ins. through, and the leaves are about a foot long, and not more than $\frac{1}{3}$ -in. broad. The greenish-white flowers are usually or nearly always solitary, instead of being in pairs, and have the tube tinged with purple.

BREVOORTIA (after *Brevoort*). Nat. Ord. Liliaceæ.—The only species is—

B. Ida-maia, much better known still under the name of *Brodiaea coccinea* in catalogues. Popularly it is called the "Crimson Satin Flower," and the "Californian Fire Cracker." It is a pretty Californian plant with tunicated corms, narrow leaves, and during June and July bears loose umbels of bright red or scarlet flowers tipped with green, and drooping from the top of a scape 2 to 3 ft. high.



FIG. 75.—*Brevoortia Ida-Maia*, corm and section. (3.)

It flourishes under identical conditions with the *Brodiaeas* in rich and well-drained, deeply-dug, sandy soil in the border or rock-garden. When it grows freely in warm, sheltered spots, it is decidedly handsome.

The genus *Brevoortia* differs from *Brodiaea* botanically in having three stamens only instead of six, and a slightly stalked instead of a sessile ovary.

BRODIAEA (after *J. J. Brodie*, a Scottish cryptogamist). Nat. Ord. Liliaceæ.—A genus closely related to *BREVOORTIA*, consisting of a pretty and interesting number of herbaceous plants, having tunicated corms or bulbs, narrow leaves, and flowers

borne in umbels on top of a simple scape. The perianth is funnel-shaped or bell-shaped, narrowed at the base, dilated above, and having six more or less equal lobes. Stamens six, perfect, or with three alternate ones reduced to staminodia.

The genera *TRITELEIA*, *HESPEROCORDUM*, and *CALLIPRORA* are now merged in this.

The *Brodiaeas* are nearly all natives of California, but a few exist in Brazil and Argentina. Consequently they require to be grown in warm, sunny borders in sheltered positions in British gardens. They are not difficult to cultivate, provided the soil is well drained by deep cultivation, and well enriched with decayed manure. A fair quantity of sand or grit should also be incorporated not only to keep the soil open, but to absorb the heat from the sun and thus keep the soil warm. The best time to plant the corms or bulbs is either early in September, or about February or March when the weather is mild and open. Once planted properly, the plants may be left to take care of themselves, and should not be disturbed for a few years, until they become so thick that separation and replanting become absolutely necessary. The surface should be kept free from weeds, and in the autumn a top-dressing of well-rotted manure will be beneficial. Increase is easily effected by separating the offsets from the older corms. Seeds may also be sown when ripe, but will not produce flowering bulbs for three or four years or more.

There are many species known, but the following is a selection of the best garden plants. They nearly all flower during the summer months, some being earlier than others, extending the flowering period from

March and April, and from May to July:—

B. Bridgesi (*Triteleia Bridgesi*).—A species closely related to *B. laxa*, but easily distinguished by its longer and broader blue flowers, with a decided red tinge, as many as ten to twenty blossoms being in an umbel.

B. californica (*B. Austina*).—A very fine species, 15 to 18 ins. high, bearing loose umbels of ten to twenty-five flowers of a beautiful rose-purple, each spreading funnel-shaped blossom being $1\frac{1}{2}$ to 2 ins. long, and the same in width. Perfect stamens three.

B. candida.—This is like *B. laxa*, but is finer, with large heads of white flowers tinted with pale blue, or in some cases pink, on stout stems.

B. capitata (*Milla capitata*).—A beautiful species, with narrow linear leaves and fragile stalks 1 to 2 ft. high, bearing umbels of numerous bright lilac or deep violet blooms about April. The variety *alba* has white flowers.

B. congesta.—A free-flowering species, with roundish slender leaves and deep violet flowers, six to twelve in an umbel, borne in summer on flexuous scapes 3 to 5 ft. long. There are three fertile stamens alternating with three purple cleft staminodia in the throat of the tube. There is a rare white-flowered form.

B. crocea.—A small species with very narrow leaves and umbels of yellow flowers borne on slender leafless stalks a foot high (*Gard. Chron.* 1901, 126, f. 39).

B. Douglasi (*Milla* and *Triteleia grandiflora*).—This fine species seems to be intermediate between *B. Howelli* and *B. laxa*. It has narrow leaves, and dense umbels of six to twenty beautiful bright blue flowers about 1 in. long on the top of a scape $1\frac{1}{2}$ to 2 ft. high. Perfect stamens six, three of

which are seated on the throat of the tube, the other three reaching nearly half-way up the segments. (*Bot. Mag.* t. 6907.)

B. gracilis (*Triteleia gracilis*).—A rare and pretty species, with slender leaves, and about a dozen bright yellow flowers, about $\frac{1}{2}$ in. long, in an umbel on the top of a scape less than 6 ins. high. The oblong segments are keeled with brown, and there are six perfect stamens.

B. grandiflora (*Hookera coronaria*).—This is the original species upon which the genus *Brodiaea* was founded by Smith in 1808. It has linear leaves and bright violet-blue flowers, three to ten in an umbel, on top of a scape about 18 ins. long. The perianth tube is over 1 in. long, with rather longer, oblong, spreading segments and three fertile stamens. *B. minor* comes near this species, but has fewer flowers and shorter scapes. The variety *Warei* has lilac-rose flowers about 3 ins. long on stems 2 to $2\frac{1}{2}$ ft. high. (*Bot. Reg.* t. 1183.)

B. Hendersoni.—This very rare species comes near *B. Bridgesi* and *B. laxa*. The flowers, however, are salmon-yellow striped with purple, and are $\frac{1}{2}$ to 1 in. long, with bluish anthers to the stamens in the centre.

B. Howelli (*Triteleia Howelli*).—This is closely related to *B. Douglasi*. It has, however, smaller flowers of a beautiful porcelain-white, delicately streaked with blue. The variety *lilacina* is a far superior plant, having twenty or more funnel-shaped flowers each 1 in. across in an umbel, and of a soft lavender-blue with white segments. (*Bot. Mag.* t. 6989.)

B. hyacinthina (*Hesperocordum hyacinthinum*; *H. Lewisii*).—A pretty species having linear leaves and ten to thirty purple flowers in an umbel on top of a scape 1 to 2 ft. long. The variety *lactea* (better known in

gardens as *Hesperocordum lacteum*), has umbels of white flowers striped with green behind. The form known as *lilacina* has larger white flowers than *lactea*, suffused with lilac.



FIG. 76.—*Brodiaea Howellii lilacina*. ($\frac{1}{2}$.)

B. ixioides (*Ornithogalum ixioides*; *Calliprora lutea*).—A beautiful and distinct species popularly called "Pretty Face," having narrow, linear, fleshy leaves, and scapes 1 to 2 ft. long, bearing umbels of ten to twenty bright yellow flowers. The variety *erecta* is a fine form with large clear yellow flowers of great substance. *Splendens* is another fine variety, rather earlier in blossoming.

B. laxa (*Milla* and *Triteleia laxa*).—A pretty and showy species with narrow linear leaves, and scapes 1 to 2 ft. long, having umbels of twenty to fifty or more pale or dark violet flowers about $1\frac{1}{2}$ ins. long, with segments shorter than the funnel-shaped tube. The variety *splendens* is an improvement on the type, with stouter scapes and larger heads of blossom of a soft

pale blue or pinkish-purple. Other forms have deep purple-blue flowers.

B. Leichtlini (*Milla Leichtlini*).—A pretty species from the Chilean Andes. It has narrow linear leaves, and in



FIG. 77.—*Brodiaea laxa*. ($\frac{1}{2}$.)

March produces its large, slightly scented, pure white flowers with a greenish band down the centre of the segments. Only a few large blossoms are borne on each umbel.

B. multiflora (*B. parviflora*).—A pretty species with six to twenty rather small pale blue flowers in umbels on long scapes. There are three perfect stamens and three staminodia. (*Bot. Mag.* t. 5989.)

B. Orcutti.—This distinct species has linear flattish leaves and stout scapes 1 ft. or more in length, and umbels of five to fifteen or more bright lilac flowers, each over 1 in. in diameter, with three fertile stamens and three staminodia (*Gard. Chron.* 1896, xx. 214, f. 40).

B. Palmeri.—A species not yet well known, with narrow lance-shaped leaves, and bright purple flowers on stems 1 to 2 ft. high (*Gartenfl.* 1889, f. 107).

B. peduncularis (*Milla* and *Triteleia peduncularis*).—This is similar to *B. laxa*, but has finer long-stalked flowers of a beautiful porcelain-white varying to rosy-purple, in large loose umbels. This is a very free and vigorous species, and makes a fine show when grown in large masses.

B. Purdyi.—This is a very distinct dwarf species, having beautiful rosy-purple or lilac flowers, with spreading and recurved segments, each of which has a central line of violet.

B. rosea.—A pretty dwarf species with roundish leaves and scapes 3 to 6 ins. long, carrying five to eight rosy-red or pinkish-purple flowers, less than 1 in. long, in an umbel. Fertile stamens three, with dilated filaments; staminodia three, white, strap-shaped.

B. Sellowiana.—A handsome species

grass-like, tapering leaves, very much recurving. The solitary sweet-scented flowers are about $1\frac{3}{4}$ ins. across, of a uniform bright golden yellow, with the exception of a more or less distinct green central keel on the outer surface of the ovate acute segments.

This species does not appear to have become very common, owing probably to being rather more tender in character. It grows well in an ordinary greenhouse, and flowers in January and February. (Fig. 78.)

B. stellaris.—A fine but rather rare species, having roundish leaves and reddish-purple flowers, varying to deep blue, in an umbel, borne on scapes 2 to 6 ins. high.

B. uniflora (*Spring Starflower*).—This plant is still much better known



FIG. 78.—*Brodiaea Sellowiana*. (3.)

about 6 ins. high, native of Uruguay. It has narrow, deeply channelled,



FIG. 79.—*Brodiaea uniflora*. (3.)

either as *Milla uniflora* or *Triteleia uniflora*. It is one of the most charming of spring or early summer flowers, the pale lilac-blue starry flowers, each about 2 ins. across, being borne on purple-tinted scapes about 6 ins. high in April and May,

and nestling amongst the narrow leaves. There is a beautiful white-flowered variety, *alba*, and another called *violacea*, with porcelain-blue flowers.

Although a native of Buenos Ayres, it is quite hardy in the British Islands, and is an excellent plant for massing boldly along the edges of grass walks or borders, in the grass itself, or for planting beneath trees and shrubs.

B. volubilis (*Stropholirion californicum*).—A remarkable species, with slender twining stems 6 to 12 ft. long, bearing umbels of beautiful rose-coloured blossoms (*Bot. Mag. t. 6123*).

BRUNSVIGIA (after the House of *Brunswick*). Nat. Ord. Amaryllidæ.—A genus containing about ten species of S. African plants, having large tunicated bulbs, strap-shaped leaves (produced after the flowers), and umbels of funnel-shaped flowers on stout scapes, and usually red or rose-red in colour. Botanically the *Brunsvigias* are closely related to *Amaryllis*, *Nerine*, *Lycoris*, *Crinum*, *Vallota*, and *Cyrtanthus*.

From a garden point of view these bulbous plants are not well known, at least not so well as some of them deserve to be. They cannot be called hardy, except perhaps in the most favoured and hottest parts of the Kingdom, and are therefore generally treated as half-hardy plants in a cool greenhouse. They flourish in a mixture of rich sandy loam and fibrous peat, and may be grown in well-drained pots, or planted in the greenhouse beds or borders. If grown in the open air, the warmest and sunniest spots should be chosen for them, and the large bulbs should be planted deeply so that the crowns may be 6 ins. or more beneath the

surface. In this way they will be secure from frost, and may be still further protected from cold winter rains by covering by heaps of litter, bracken, etc., or by placing a hand-light or bell-glass over them. It should be noted that the leaves and flowers do not appear together: the latter appear during the summer months, generally during July; and after withering, the leaves develop and carry on the work of assimilation till the winter. When they wither, water is withheld until growth starts again. The simplest method of increasing the stock is by means of offsets from the older bulbs. Seeds may take from ten to sixteen years before they produce a flowering bulb.

The species known include—

B. Cooperi.—Bulbs ovoid, 3 to 4 ins. through; leaves 3 to 4 ins. broad; flowers bright red, 2 to 2½ ins. long, twelve to sixteen in an umbel (*Ref. Bot. t. 330*).

B. gigantea (*B. multiflora*; *Amaryllis orientalis*).—Bulbs very large; leaves 3 to 5 ins. broad, about a foot long; flowers bright red, 2 to 2½ ins. long, twenty to thirty in an umbel on top of a red or green stalk 8 to 12 ins. long, and as thick as a man's finger (*Bot. Mag. t. 1619*).

B. grandiflora.—Bulbs large, ovoid; leaves strap-shaped; flowers pale red, 2 ins. long, about thirty in an umbel, on a compressed scape about 1½ ft. high (*Bot. Reg. t. 1335*).

B. Josephinæ (*Amaryllis Josephinæ*; *A. Griffiniana*).—This is the best known and perhaps finest species. It has bulbs 5 to 6 ins. in diameter; grey-green strap-shaped leaves 2 to 3 ft. long, and 1½ to 2 ins. broad. The bright red flowers, 2½ to 3 ins. long, are borne in large umbels of twenty to thirty, and sometimes as many as fifty to sixty, on top of a scape about 1 in. thick and 18 ins. high.

It was at one time thought that the Kew variety of *Amaryllis Belladonna* (see p. 71) was a hybrid between that species and *Brunsvigia Josephinae*, Mr C. G. van Tubergen, of Haarlem, however, is of another opinion. Writing in the *Gard. Chron.* in January 1909, p. 57, he says:—"Principally with a view of ascertaining the parentage of the Kew variety of *Amaryllis Belladonna* (see *Gard.*, November 19, 1898, and notes in the *Gard. Chron.*, February 9, 1901, etc.), in the autumn of 1892, I artificially impregnated *Brunsvigia Josephinae* with pollen of *Amaryllis Belladonna*. Seeds formed freely, as the two genera, *Brunsvigia* and *Amaryllis*, are very nearly related. As could be foreseen, with the slow-growing *B. Josephinae* as the female plant, a long time had to elapse before the seedling plants would be strong enough to reach flowering size. After sixteen years of patient waiting, two of the strongest bulbs produced flower-spikes in September of last year (1908). When the hybrid plants had been growing for a few seasons it became evident that they differed in habit from the Kew variety of *Amaryllis Belladonna*, which produces a leaf-stem about 4 ins. high, whereas my hybrids all bear the character of *Brunsvigia Josephinae* in the foliage, leaves being formed directly above the neck of the bulbs. The infusion of the *Belladonna* blood is clearly shown in the bulbs, as these resemble those of the *Belladonna* and produce offsets freely, whilst *Brunsvigia* never produces offsets. A comparison of the supplementary illustration in the *Gard. Chron.*, January 23, 1909, with that of *The Garden*, November 1898, leads to the conclusion that the Kew plant can no longer be regarded as a hybrid between these species, unless it was a cross effected in the reverse way,

taking *Amaryllis Belladonna* as the female parent. In that case the variety *blanda* must have been used, it being the only variety of *A. Belladonna* known which produces a leaf-stem. The colour of the flowers of my hybrid was a clear deep rose, suffused with carmine. A single spike produced twenty-two flowers." The parentage of the Kew variety of *A. Belladonna* is therefore still in doubt. It is a pity Mr van Tubergen did not make the reverse cross eighteen years ago, making *A. Belladonna* the seed parent.

B. minor (*B. humilis*).—Bulbs ovoid, 2 to 3 ins. through; leaves strap-shaped, 6 ins. long, 1 in. broad; flowers pale red, 1 to 1½ ins. long, twelve to forty in an umbel, on stout scapes 6 to 9 ins. high (*Bot. Reg. t.* 954).

B. Radula (*Amaryllis Radula*; *Coburgia Radula*).—Bulb globose, larger than a hazel-nut; leaves 2 to 3 ins. long, 1 to 1¼ ins. broad, covered all over with rough papillæ; flowers red, three to five in an umbel, on scapes 2 to 3 ins. high.

B. Slateriana (*Ammocharis Slateriana*; *Amaryllis Banksiana*).—Bulb globose, 4 to 5 ins. through; leaves grey-green; flowers bright rose-red, 1½ ins. long, fifteen to twenty in an umbel, on stout compressed stalks 6 ins. high.

BRYONIA (*bryo*, to sprout; in allusion to the annual shoots from the tubers). Nat. Ord. Cucurbitaceæ.—A genus of slender climbing herbs with three- to five-lobed leaves; small whitish or yellow-green flowers, the males and females of which are usually borne on separate plants.

B. dioica.—This is a native perennial plant having large, fleshy, tuberous roots, often 2 to 3 ft. long, five-lobed leaves, and clusters of greenish

flowers from May to September. The female blossoms are succeeded by red berries, about $\frac{1}{4}$ in. in diameter, in autumn.

This species flourishes in any garden soil, and may be used in rough places for covering trellises, arches, old hedges, etc., up which it climbs by means of slender stems and spiral tendrils. There is no need to propagate, especially as it looks after itself once in a garden. Indeed it may be desirable to get rid of it very often.

This plant must not be confused with the Black Bryony (*Tamus communis*), (which see).

BULBINE (*bolbos*, a bulb). Nat. Ord. Liliaceæ.—A genus containing about twenty-three species, mostly natives of S. Africa, with two in W. Australia. Notwithstanding the generic name indicating a bulbous nature, many of the species are really fibrous or fleshy rooted plants, and have been much confused with the Anthericums. The leaves are lance-shaped or linear, and often fleshy; and the small sweet-scented yellow, or rarely white, flowers are borne in dense racemes.

The plants are easily cultivated in any ordinary rich and sandy garden soil, but require warm and sheltered spots. All kinds are increased by offsets in autumn or in spring.

B. Mackenii.—A handsome plant from Natal, 9 to 12 ins. high, having fleshy, fibrous root-stocks, ovate-oblong, rather fleshy leaves, and erect spikes of golden-yellow starry flowers in summer (*Bot. Mag.* t. 5955). Other species are:—**B. australis** from New South Wales (*Bot. Mag.* t. 3017); **B. caulescens** (*Bot. Mag.* t.

816); and **B. semibarbata** from Tasmania (*Bot. Mag.* t. 3129), all formerly known as Anthericums.

BULBOCODIUM (*bolbos*, a bulb; *kodion*, wool; in reference to the woolly coatings of the bulbs). Nat. Ord. Liliaceæ.—This genus consists of one species, resembling a Crocus in habit and appearance, but differing in having a superior instead of inferior ovary, and six stamens instead of three. It is closely related to *Merendera* (which see).

B. vernum.—A pretty plant 4 to 6 ins. high, with a black corm, from the European Alps. The violet or rosy-

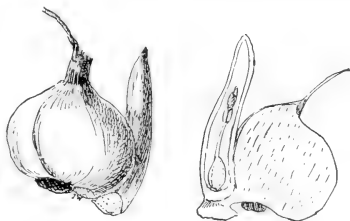


FIG. 80.—*Bulbocodium vernum*, corm; and section showing new shoot, with miniature flower-spike. (3.)

purple, funnel-shaped flowers, nearly 4 ins. long, are produced often as early as January in mild seasons, and before the broad, strap-shaped, channelled leaves appear. (*Bot. Mag.* t. 153; *Red. Lil.* iv. t. 197; *Fl. d. Serr.* xi. 1149.) There is a form with variegated leaves, and also one from the Caucasus called *versicolor* (*Bot. Reg.* t. 571).

This species is suitable for growing with Snowdrops, Leucojums, Winter Aconites, and some of the Colchicums, etc., in the rockery or warm parts of the flower-border. A light, rich, sandy loam suits it well, and the bulbs are best left alone for three or four years after planting. To increase the stock,

the bulbs may be lifted from July to September, and the offsets detached and replanted at once 4 to 6 ins. apart and 3 to 4 ins. deep.

BUPHANE (*bous*, an ox; *hone*, slaughter; the bulbs are said to be fatal to cattle). Nat. Ord. Amaryllideæ.—A small genus of no great garden value, closely related to *Hæmanthus*, having large tunicated bulbs, leathery leaves, and numerous red funnel-shaped flowers in umbels. There are only two species, both natives of Cape Colony. They are not quite hardy enough for open-air culture, but grow easily in a greenhouse in a compost of sandy loam and peat, in the same way as the *Brunsvigias*.

B. ciliaris (*Amaryllis ciliaris*; *Hæmanthus ciliaris*; *Brunsvigia ciliaris*; *Coburgia ciliaris*; *Crossyne ciliare*).—This species has roundish bulbs 3 to 4 ins. in diameter, stiff leathery leaves, 6 to 12 ins. long, thickly ciliated with brown or straw-coloured bristles. From fifty to one hundred dull purple flowers are borne in a dense umbel on a stout scape 4 to 6 ins. high. The variety *guttata* has narrower leaves and longer bristles. (*Bot. Reg.* t. 1153.)

B. disticha (*B. toxicaria*; *Hæmanthus toxicaria*; *Amaryllis disticha*; *Brunsvigia toxicaria*), *The Bushmen's Poison Plant*.—A species with huge roundish bulbs 6 to 9 ins. in diameter, with many hundreds of thin brown tunics. Leaves 1 to 1½ ft. long, distichous, not ciliated, but often wavy. The deep scarlet sweet-scented flowers are borne in dense umbels 6 to 12 ins. across, on stout compressed stalks 6 to 12 ins. high. (*Bot. Mag.* t. 1217; *Bot. Reg.* t. 567.)

From the bulbs of this species the Bushmen of S. Africa express a

poisonous juice, in which they dip their arrows when bent on killing-raids.

BURBIDGEA (after *P. W. Burbidge*, late curator of Trinity College Botanic Gardens, Dublin). Nat. Ord. Scitamineæ.—The only representative of this genus is—

B. nitida.—An ornamental-looking plant, closely related to *Alpinia*, 3 to 4 ft. high, with tufts of erect, roundish stems, furnished with elliptic, lance-shaped pointed leaves 4 to 6 in. long. The bright orange-scarlet flowers are borne in terminal racemes, sometimes as often as three times in one year. (*Bot. Mag.* t. 6403.)



FIG. 81.—*Burbidgea nitida*. (1.)

This plant is rarely seen outside botanic gardens. Being a native of N.W. Borneo, it naturally requires plenty of heat and moisture. It must therefore be grown in the stove, with a minimum winter temperature of 65° F., and may be treated as a pot plant or placed in a border. It flourishes in loamy soil enriched with a little old cow-manure, and during the

period of growth in the spring and summer months likes plenty of water and free syringings. Grown in bold masses, *B. nitida* is effective when in blossom. It requires a rest in winter, and may be increased by division of the creeping root-stocks in spring.

BUTOMUS (*bous*, an ox; *temno*, to cut; in reference to the acrid juice causing the mouth to bleed). Nat. Ord. Alismaceæ.—This genus is represented by—

B. umbellatus, the "Flowering Rush."—A beautiful marsh plant, having creeping root-stocks and three-sided leaves 3 to 4 ft. long, sheathing at the base. The umbels of rosy-lilac blossoms about 1 in. across appear in June and July, and consist of six oblong segments, nine stamens, and six beaked reddish carpels in the centre.

The Flowering Rush flourishes on the margins of lakes, streams, or rivers in muddy soil, but requires open, sunny places to come to perfection. It may be increased by division of the root-stocks in spring; or may be raised from seed.

CALADIUM (perhaps from *kala-dion*, a cup, in reference to the spathes; or *kalos*, beautiful, referring to the leaves). Nat. Ord. Aroideæ.—A genus of popular garden plants, all natives of Tropical America north of the Equator. Gustav Wallis, the great plant collector, has reported that the forests along the lower Amazon are covered for miles and miles with Caladiums during the rainy season. They have tuberous root-stocks, and long-stalked, peltate, oblong, or sagittate or arrow-shaped leaves of a more or less membranous texture,

and often beautifully coloured and veined. The flowers are borne on spadices within spathes, but are of no particular beauty.

Caladiums are still highly valued as decorative plants wherever an interest is taken in hothouse subjects. There is a general resemblance in the appearance and shape of the leaves of the numerous varieties in cultivation (said to be about two thousand), but there is great variation in size and colouring. The leaf-blades of some varieties are only a few inches long, but in others they

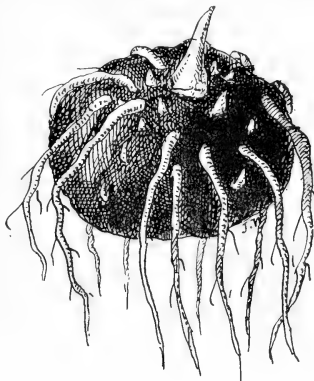


FIG. 82.—Caladium, root-stock and roots.

are as much as 18 ins. or more. The colouring also ranges from almost a pure white and pellucid tissue to deep crimson, purple, bronze, etc., while many forms are beautifully mottled, or blotched with colours quite distinct from the ground colour.

Provided plenty of heat and moisture are available, there is no great difficulty in growing Caladiums; and yet to produce really fine specimens is an act that can only be acquired by experience and intelligent

attention to cultural details. The plants are mostly grown in pots, the sizes of which vary according to the size of the tubers. The drainage must be perfect in all cases. An excellent compost is made by mixing turfy loam, leaf-mould or turfy peat, old cow-manure, and coarse silver sand in equal proportions, the whole being turned over three times to secure an equable distribution of the various ingredients.

The tubers are started into growth at intervals between January and March. They are shaken out of the old soil in which they have rested during the winter, and any dead or decaying portions are carefully scraped away. After potting up in the compost above mentioned, the tubers are placed in a temperature of not less than 65° to 70° F., the pots being often plunged in a coco-nut fibre bed with a moist bottom heat, to encourage more rapid growth. Gentle sprinklings are at first given to keep the surroundings moist, but as the growths push up with increasing vigour, so must the supply of water be increased accordingly. Once the leaves are fully expanded, and the pots have become full, a somewhat cooler atmosphere may be provided if it is intended to keep the plants a long time in leaf, or if they are required for exhibition. As a rule, however, the heat and moisture are kept up during active growth when plants are not required for other situations, and weak liquid manure is given three or four times a week, or even oftener, to bring out all the gorgeous beauty of the leaf coloration. The plants are kept clean by frequent syringings; and owing to the delicate tissues of the leaves, they must not be subjected to strong sunshine at any time.

Towards the autumn the leaves

begin to lose their beauty, and flop over the sides of the pots. This indicates the approach of the resting period; consequently water is given less frequently, until at length the withered leaves drop off and the tubers are once more allowed to rest in a dryish state until early spring in a temperature not below 60° F. during the winter.

Caladiums are easily increased by detaching the suckers which spring from the fleshy tubers in spring, or by carefully cutting tubers with several crowns into pieces. When the sucker-like shoots have grown 5 or 6 ins. long, they should be cut off at the base with as many fibrous roots attached as possible. They are then put into small pots in the compost recommended, and plunged in bottom heat 65° to 75° F. in a propagating frame. They are kept close and moist for a time until they recover, after which they may be taken out and placed in a more light-some and airy position. When fully established they may be placed in larger pots, either singly or several together, to make large specimens. Very few of the natural species are grown, having been displaced by the more beautiful garden varieties that have been raised principally from *C. bicolor*. The following, however, may be mentioned:—

C. adamantinum.—An ornamental plant with deflexed, sagittate leaves, dark green veined with white, and covered with numerous white dots along the borders of the veins (*Ill. Hort.* xxxviii. t. 132).

C. argyrites.—This is one of the smallest and at the same time one of the most popular members of the genus, being frequently used for the decoration of tables, edges of stages in the greenhouse, and even in dry and draughty exhibition places. The

small sagittate leaves have a light green ground colour, irregularly blotched with white, the borders and main veins being also white. (*Fl. d. Serr.* xiii. 1345; *Ill. Hort.* 1858, 158.) *C. lilliputianum* seems to be merely a variety of this (*Ill. Hort.* 1892, 186).

C. Baraquini.—Leaves 20 to 30 ins. long, with deep red centre and dark green margins (*Ill. Hort.* 1850, 257; *Fl. d. Serr.* xiii. 1377).

C. bicolor (*Arum bicolor*).—Leaves peltate cordate, sagittate, coloured bright red in the centre. Grows about 1 ft. high. (*Bot. Mag.* t. 820, 2543.) As already stated, many forms



FIG. 83.—*Caladium bicolor*. (3.)

have arisen from this species, and in past days many names were given to the most striking. The ginger-like roots of this species are eaten by the natives in the Tropics.

C. Cannarti.—Leaves green, with paler blotches and deep red veins.

C. Chantini.—Leaves bright crimson irregularly blotched with white, and bordered with dark green.

C. Devosianum.—Leaves angular, blotched with white and pink.

C. Hardyi.—Leaves reddish, slightly spotted with white.

C. Kochi.—Leaves green, spotted with white.

C. Lemaireanum.—Leaves green, veined with white (*Ill. Hort.* 1862, t. 311).

C. Leopoldi.—Leaves green, marbled with red and blotched with pink.

C. macrophyllum.—Leaves large, pale green, blotched greenish-white.

C. maculatum.—Leaves oblong, pointed, cordate at the base, clearly spotted with white.

C. marmoratum (*Alocasia Roezli*).—Leaves broad, peltate, over 1 ft. long, sagittate-ovate acute, dark bottle-green dotted and blotched with white. The variety *costata* is distinguished by having the midrib marked out with a tapering band of silvery grey.

C. medioradiatum.—An ornamental species with peltate, ovate-acute leaves notched at the base, dark green, with midrib and branches silvery white, the stalk being mottled with brown (*Ill. Hort.* xxxviii. t. 128).

C. Rougieri.—Leaves green, spotted white; centre paler green, veined red.

C. rubescens.—This species has a leaf-blade 6 ins. long by 2 ins. wide, ovate lance-shaped, wavy, with short basal lobes, crimson, edged with white. The spathe is 3½ ins. long, green with a blackish stripe. (*Gard. Chron.* 1893, xiv. 86.)

C. sagittatum.—A distinct species, having narrow sagittate leaves, deeply bilobed behind, dark green in colour, the midrib and main veins being feathered with red (*Ill. Hort.* xxxviii. t. 138).

C. sanguinolentum.—Leaves green, with a white midrib blotched with red.

C. Schomburgki (*C. Schalleri*; *Alocasia argyrroneura*).—Leaves green, veined with white (*Ill. Hort.* t. 297, fig. 2). The variety *Schmitzi* (*Alocasia erythraea*) has leaves with a whitish centre, the midrib and main veins being red and surrounded with a green network.

C. sub-rotundum.—Leaves roundish, spotted with red and white.

C. venosum.—The leaves of this species are about 10 ins. long by 4 ins. broad, green, veined with yellow and margined with red. The green spathe is about 3 ins. long. (*Gard. Chron.* 1893, xiv. 87.)

C. Verschaffelti.—Leaves somewhat heart-shaped, bright green, irregularly spotted with vivid red (*Bot. Mag.* t. 5263).

C. Wallisi.—Leaves dark olive green, irregularly spotted and blotched with pure white, and veined with yellowish-white.

The genus *Caladium* has been much confused with other genera like *Alocasia*, *Colocasia*, etc., to which the reader is referred. For garden varieties it is better to consult the current catalogues of specialists.

CALLA (*kallos*, beautiful). Nat. Ord. Aroideæ.—The only species of the genus—**C. palustris**—is a pretty little water plant found wild in parts of Central and Northern Europe and North America. It is popularly known as the "Bog Arum." It grows about 6 ins. high, and has smooth, deep green, heart-shaped leaves springing up above the water surface from creeping root-stocks. The male and female flowers on the same spadix appear in May and June, and are protected by a pure white spathe, the outer surface of which is tinged with yellow. (*Bot. Mag.* t. 1831.)

This pretty little plant is naturalised in parts of Britain. It grows freely on the sides of rivers, lakes, ponds, etc., or in marshy places, and is easily increased by division of the root-stocks.

Several other plants, popularly known as "CALLA," belong to the genus *Richardia* (which see).

CALLIPHURIA (*kallos*, beautiful; *phoura*, prison; in reference to the beauty of the spathe enveloping the flowers). Nat. Ord. Amaryllideæ.—A small genus closely related to *Eucharis*, and containing only the two species here mentioned.

C. Hartwegiana.—A pretty bulbous plant from the Andes of Bogota. The ovoid bulbs, with brown membranous tunics, are about an inch in diameter, and produce stolons freely. The bright green oblong-acute leaves are about 4 to 5 ins. long, and about 2 ins. broad. The white funnel-shaped flowers are borne in umbels of six to eight on slender peduncles about a foot long, about May and June. (*Bot. Mag.* t. 6259.)

C. tenera.—A native of the Andes of New Granada, with round bulbs about $\frac{3}{4}$ in. through. The white flowers are smaller than those of *B. Hartwegiana*, and are borne on shorter peduncles. This species is not in cultivation.

CALLIPSYCHE (*kallos*, beautiful; *psyche*, a butterfly). Nat. Ord. Amaryllideæ.—A genus closely related to *Eucharis* and *Eucrosia*, having only three species of bulbous perennials, natives of the Andes of Ecuador and Peru. The bulbs are tunicated, and furnished with oblong-stalked leaves which appear after the blossoms. These are funnel-shaped, with a short tube, and the stamens are remarkable for the great length of their filaments.

These little-known bulbous plants are not difficult to grow in an ordinary greenhouse or conservatory. They like a compost of sandy loam and leaf-mould, and may be grown in well-drained pots or planted out in the greenhouse border. They require proper attention in regard to watering when growing and flowering, the periods of which are erratic. Propagation by offsets from older bulbs.

C. aurantiaca.—Bulbs ovoid, about 1 in. through. Leaves oblong, heart-shaped, about 6 ins. long and 4 ins. broad. Flowers bright yellow, with a short green tube, six to eight in an umbel on top of a stalk $1\frac{1}{2}$ to 2 ft.

slender scape about 2 ft. high, and having the stamens protruding about 3 ins. beyond the tip of the perianth segments. Recorded as flowering in May. (*Bot. Reg.* 1845, t. 45.)

C. mirabilis (Fig. 84).—A very remarkable plant, with oblong brown-coated bulbs 2 ins. in diameter, and thin oblong-acute leaves about 1 ft. long, and 6 ins. or more across in the widest part. The greenish-yellow flowers, often thirty in number, form a dense umbel 8 to 9 ins. across, on top of a grey-green peduncle about 3 ft. high, and are remarkable for having the white filaments of the stamens protruding about 4 or 5 ins. beyond the tips of the perianth segments. (*Ref. Bot.* t. 168; *Gard. Chron.* March 31, 1900, 202, f.) Recorded as flowering in July, August, and December.



FIG. 84.—*Callipsyche mirabilis*. (3.)

long, and having the stamens protruding $2\frac{1}{2}$ to 3 ins. beyond the perianth segments. Recorded as flowering in February. (*Ref. Bot.* t. 167; *Bot. Mag.* t. 6841.)

C. eucrostoides.—Bulbs round, 2 ins. in diameter. Leaves oblong, about a foot long and 4 ins. broad. Flowers greenish-yellow, eight to ten in an umbel on top of a

CALLIRHOE (the name of the daughter of the river-god Achelous). Nat. Ord. Malvaceæ.—A small genus of N. American herbs, similar in appearance to the Mallows. The following have tuberous root-stocks:—

C. involuerata.—A hairy-stemmed perennial with whitish, turnip-shaped roots, and climbing stems 2 to 3 ft. long, furnished with three- to five-lobed leaves. The flowers, about 2 ins. across, appear in summer, and are crimson, shading to white at the base, with a cluster of yellow stamens in the centre.

C. macrorhiza.—This species has purple-carmine flowers; but there are forms with pale rose and white flowers.

These plants are easily grown in the open air in ordinary garden soil, but like warm, sunny positions. The stems may be allowed to ramble over the ground, or be trained up stakes or trellises. Seeds are produced freely, and fresh plants may be

obtained from them in spring; or the roots may be divided. In bleak spots it would be advisable to protect the root-stocks in winter.

CALOCHORTUS (*kallos*, beautiful; *chortus*, grass; in reference to the slender leaves). Nat. Ord. Liliaceæ (*Mariposa Lily*; *Star Tulip*).—A genus containing twenty to thirty species of beautiful plants, with tunicated bulbs, narrow leaves, and somewhat branched, few-flowered stems, bearing long-stalked, showy, erect or drooping flowers, yellow, bluish-purple, or white in colour. The perianth consists of six distinct segments, the three outer ones of which are sepal-like, and much narrower than the three larger and broader inner ones, which are bearded on the inside. In the *Cyclobothras*, or "Star Tulips," which are now included with this genus, all the perianth segments are bearded within and furnished with a honey-pit in the centre. Stamens six, hypogynous, or slightly adhering to the base of the segments.

Quoting mainly from the *Practical Guide to Garden Plants*, the Mariposa Lilies and Star Tulips should be planted not later than from September to the end of November, 3 ins. deep and about 3 ins. apart, in a raised sunny border with a slight slope to the south, in a soil composed of sharp sand, leaf-soil, and road grit. Great importance is attached to having the bed in which they are planted raised above the surrounding soil, as thorough drainage is thus secured, and it is essential to keep the bulbs as dry as possible in winter. It is safer, especially in unfavourable parts of the Kingdom, to cover the beds with reeds, bracken, straw, etc., so as to keep off heavy rains, and at the same time afford protection from

frost. This covering, whatever it is, should be removed in February and March, according to the season and the growth of the plants. After flowering, and when the stems have withered, the bulbs may either be lifted and carefully stored until planting time, or a light may be placed over them to keep them dry, and allow them to thoroughly ripen. The latter is the better plan if it can be adopted, and there is no necessity to lift the bulbs for about three years, unless for the purposes of increasing the plants by means of the offsets from them.

The main points to remember in growing Mariposa Lilies are—early planting, a light porous soil, sunny position, thorough drainage, protection from winter rains, plenty of water during active growth, and thorough ripening of the bulbs by lifting, or placing lights over them.

Mariposa Lilies may also be increased by seeds, or the small bulbils often produced on the upper portion of the stems, as in the case of some Liliums. The seeds may be sown as soon as ripe, or early in spring in cold frames, or under glass, but so thinly as to allow the seedlings plenty of space to develop without disturbing for one or two years. They may then be planted in light soil either in frames or singly in pots, and grown on until they reach the flowering stage, which is in three to six years after the seed is sown.

The following are some of the best species in cultivation. They are mostly natives of California, but one or two, as noted, come from Oregon, Arizona, and other parts of the States. A reference to the general hairiness of all the species is omitted from the following short descriptions.

C. albus (*Cyclobothra alba*).—A vigorous species 12 to 18 ins. high,

bearing eight to twelve roundish, drooping flowers of pearly white, having a deep blotch at the base of the segments. The variety known as the "Pearl" is larger, taller, and later than the type.

C. amabilis.—This is the name now given to the plant usually known as *C. pulchellus* (*Gard. Chron.* 1903, xxxiv. 133).

C. apiculatus.—A vigorous Star Tulip, with stout stems 9 to 18 ins. high, bearing pale lemon-yellow flowers, which become more creamy in colour in the smaller flowered form known as *minor*.

C. Bentharai (*C. elegans lutea*).—A beautiful species 4 to 8 ins. high, with long linear leaves, and bright canary yellow flowers in July and August (*Bot. Mag.* t. 6475).

C. clavatus.—A fine vigorous Mari-



FIG. 85.—*Calochortus clavatus*.

posa Lily, having a much-branched stem bearing large wide-open flowers

of a brilliant golden yellow during June and July (*Bot. Mag.* t. 7606).

C. cœruleus.—A dwarf Star Tulip from Sierra Nevada, growing 3 to 6 ins. high. The pretty flowers appear in July, three to five in an umbel, and are of a bright lilac or creamy white, densely bearded with bluish hairs, the outer segments being lined and dotted with dark blue. The variety *major* is a very large-flowered form, and *roseus* has a distinct rosy hue.

C. collinus.—A very rare species, with clear pale lilac flowers.

C. elegans.—An elegant species about 8 ins. high, producing in June three to five greenish-white flowers tinged with purple at the base. The variety *amœnus* is a beautiful free-flowering form with nodding flowers of a rich pink colour, the three broad inner segments having a deep zone near the base, the whole surface being covered with silky hairs. (*Bot. Mag.* t. 5976.)

C. flavus.—A Mexican species, having lance-shaped leaves and drooping yellow flowers, the three inner segments of which curve outwards and are covered with hairs except near the tips.

C. Goldyi.—A pretty species, intermediate between the two main sections of the genus, and having brownish-yellow flowers.

C. Greeni.—A vigorous species 1 ft. or more high, having broad glaucous-green leaves, and three clear lilac flowers in June, the inner segments being zoned with yellow and purple at the base, and often covered with long curly hairs.

C. Gunnisoni.—A native of the Rocky Mountains, with large bright lilac flowers 2 to 3 ins. across, tinged with yellowish-green below the middle of the segments, at the base of which is a deep purple zone.

C. Howelli.—A strong-growing

species 9 to 18 ins. high, with a long glossy leaf, and large creamy-white flowers.

C. Kennedyi.—This is a striking and beautiful species about 18 ins. high, freely producing in early summer its large bright orange-red or scarlet flowers, the black spots near the base being surrounded with bristles (*Bot. Mag. t. 7264*).

C. lilacinus (*C. umbellatus*; *C. uniflorus*).—A fine species with four to ten flowers of a pale pink, purple, or lilac, borne on a stem 6 to 8 ins. high. One bulb often throws up a dozen spikes of blossom. (*Bot. Mag. t. 5804*.)

C. longibarbus.—A native of Oregon and Washington Territory; about 1 ft. high, with pale purple-lilac flowers, having a darker purple band across the base of each inner segment.

C. luteus.—A fine species 1 to 2 ft. high, having cup-shaped flowers about 3 ins. across, appearing in July, and varying in colour from light to deep yellow and orange; the inner segments being usually bordered with purple hairs, and tinged with reddish-brown at the base (*Bot. Reg. t. 1567*). The variety *oculatus* has bright yellow flowers with a conspicuous dark purple eye-like blotch at the base of the inner segments; *concolor*, clear, buttercup-yellow, tinged with brown at the base (*Gard. 1895, t. 1043*).

C. Lyoni.—Flowers in June, pure white to rose, with a blackish spot at the base of the inner segments (*Gard. 1895, xvii. 426*).

C. macrocarpus.—Flowers in July, about 4 ins. across, usually one on a stem about 18 ins. high, and delicately tinted with purple-lilac, with a greenish line down the centre of the segments (*Bot. Reg. t. 1152*)

C. madrensis.—A Mexican plant

12 to 18 ins. high, having bright orange-yellow flowers as late as August and September.



FIG. 86.—*Calochortus madrensis*. (½.)



FIG. 87.—*Calochortus nitidus*. (½.)

C. Maweanus.—Flowers in June and July, on stems 6 to 10 ins. high;

the outer segments purplish in colour, the inner ones pure white with a purple base (*Bot. Mag.* t. 5976).

C. nitidus.—A strong-growing species, the stems of which bear five to ten large white flowers in an umbel in August. The three inner segments have a large indigo blotch in the centre. (*Gard.* 1896, ii.)

C. Nuttallii (*C. Leichtlini*).—The large flowers, about 3 ins. across, appear in June, two to three on a stem; the narrow outer segments are green striped with red, the larger inner segments being pure or creamy-white blotched with blackish purple at the base (*Bot. Mag.* t. 5862).

C. obispoënsis.—A rare and distinct species with branched stems 1 to 2 ft. high, having orange and purple outer segments, and lemon-yellow inner ones tipped with reddish-brown.

C. Plummeræ.—A fine species with broad leaves nearly 2 ft. long, and branching spikes of soft lilac flowers about 4 ins. across, in July; the lower half of the broader, inner segments being covered with golden-yellow hairs, and blotched with purple (*Gard.* Feb. 2, 1895).

C. pulchellus (*Cyclobothra pulchella*).—A charming species 9 to 12 ins. high, with glaucous stems and leaves, producing in June and July much-branched stems, each one ending in a cluster of three to four sweet-scented, bright orange-yellow, drooping flowers (*Bot. Reg.* t. 1662; *Bot. Mag.* t. 6527).

This is one of the hardiest species, the proper name of which appears to be *C. amabilis*.

C. Purdyi.—A graceful species 9 to 18 ins. high, bearing in June white flowers $1\frac{1}{2}$ to 2 ins. across. The narrow-pointed outer segments are spotted with purple, the much larger and roundish inner segments being densely covered with long white hairs,

and blotched and spotted with purple near the base. (*Gard. Chron.* 1898, xxiii. 394, f. 147.)



FIG. 88.—*Calochortus Purdyi*. ($\frac{1}{2}$.)

C. splendens.—A very old garden plant, and still one of the best. It produces its large pale lilac flowers in August, the inner segments being blotched with deep purple at the base. The variety *atroviolacea* has smaller purple flowers with a dark red blotch at the base of each inner segment; *rubra* is a fine new form. (*Bot. Reg.* 1676; *Fl. de Serr.* ii. 104, f. 2; *Gard.* 1884, 137.)

C. venustus.—A beautiful plant about 18 ins. high, with large, white, cup-shaped flowers nearly 3 ins. across. The three outer segments are small, narrow and tapering, and reflexed, the three large inner ones being yellow at the hairy base, deeply stained with crimson, and having a blotch of the same colour near the centre.

This is a very variable species, with numerous varieties such as *albus*, pure white; *brachysepalus*, having shorter outer segments or sepals than the type; *Leichtlini*, white with a purple blotch near base (*Bot. Mag.* t. 5862); *lilacinus*, deep lilac; *purpurascens*, deep lilac-purple; *roseus*, rosy purple



FIG. 89.—*Calochortus venustus*. ($\frac{1}{2}$.)

with deep purple spots; *Emperor*, flowers suffused with rose, white, maroon, and purple on a yellow ground; *citrinus*, lemon-yellow (*Bot. Mag.* t. 6200); *oculatus*, with brilliant purple-rose buds expanding into white, with a deep blackish-purple centre surrounded with yellow; *pictus*, flowers white, with rosy spots at the base, and a brown blotch on each segment (*Gard.* 1895, xlvii. 465); *sanguineus*, flowers varying from light to deep red; *vesta*, with flowers 4 ins. across, white flushed with rose, marked with brown and yellow at the base. This variety will grow in any soil, from heavy wet

clay to light loam, and increases rapidly. The varieties belonging to the Eldorado group have large flowers of great substance, and vary from pure white to pink, salmon, and deep purple.

C. Weedi.—A beautiful and remarkable species, with large, flattish, rich yellow flowers 3 ins. across, in July. The three outer segments of the perianth are narrow, lance-shaped, and tapering, while the three broad inner wedge-shaped segments are spotted with purple in the central portion and covered with long hairs. The short filaments, with long anthers, are a striking feature of the centre of the flowers.

CALOSTEMMA (*kallos*, beautiful; *stemma*, a crown). Nat. Ord. Amaryllidæ.—A small genus of Australian plants with tunicated bulbs and funnel-shaped flowers in umbels. Closely related to *Eurycles*.

These plants are easily grown in a greenhouse, and may be even fairly hardy in the warmest parts of the Kingdom. A compost of sandy loam and leaf-soil in well-drained pots suits them well.

C. album.—A pretty species from the Gulf of Carpentaria, frequently confused with *Eurycles Cunninghamhami*. It has long-stalked oblong-acute leaves, and white flowers $\frac{1}{2}$ in. long, borne in umbels of twelve to twenty on top of a slender peduncle 1 to $1\frac{1}{2}$ ft. high.

C. luteum (*C. candidum*). Similar to *C. purpureum*, except that the flower is larger and bright yellow in colour. Native of Queensland and N.S. Wales. (*Bot. Mag.* t. 2101; *Bot. Reg.* t. 421; *Bot. Reg.* 1840, t. 19; *Fl. d. Serr.* t. 1135.)

C. purpureum.—A native of S. Australia and N.S. Wales, having round bulbs about 2 ins. in diameter.

Leaves linear, produced after the flowers. These are dark purple, about $\frac{1}{2}$ in. long, as many as ten to twenty in an umbel on top of a slender compressed stalk 1 to 2 ft. long. The variety *carneum* (*Bot. Reg.* 1840, t. 26) has rather larger flowers, pale purple or white in colour. (*Bot. Mag.* t. 2100; *Bot. Reg.* t. 422; *Fl. d. Serr.* t. 1135.)

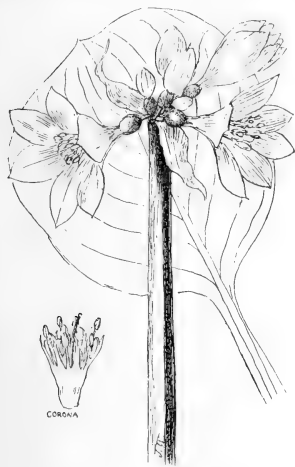


FIG. 90.—*Calostemma album*.

CAMASSIA (from *Quamash*, the name given by the N. American Indians, who eat the bulbs). Nat. Ord. Liliaceæ.—A small genus of N. American plants closely related botanically to the Scillas and Ornithogalums, having tunicated bulbs, linear or strap-shaped leaves, and blue, purplish, or whitish flowers in loose racemes. The perianth consists of six nearly equal, distinct, spreading segments, finely veined.

Camassias are excellent plants for massing in the ordinary flower-border,

which they embellish from May to July with their slender erect spikes of graceful blossoms. They flourish in any well-drained garden soil, but prefer a good sandy loam and leaf-soil in warm and sheltered spots. Heavy soil saturated with water is fatal to the bulbs during the winter. Increase in the stock is effected by detaching the offsets from the older bulbs late in the summer or early autumn, when the plants have finished their growth. The offsets and old bulbs should be replanted immediately, or stored in sand or dry soil till September. In any case they should be replanted not later than October, to secure a good display the following season. It is generally unnecessary to put stakes to the flower stems, although this may be necessary in very windy localities.

C. Cusicki.—A native of the Blue Mountains of Oregon and California, having large rosettes of broad grey-green leaves and stems 3 to 4 ft. high, with racemes of large delicate blue flowers.

C. Engelmanni, from the Rocky Mountains, has very much larger bulbs. The leaves are 9 to 12 ins. long, and about $1\frac{1}{2}$ ins. broad, and grey-green above, while the bright blue flowers are borne in loose racemes. This fine plant is not yet well known.

C. esculenta (*Quamash*).—A native of British Columbia, with white ovoid or roundish brown-coated bulbs. The linear, channelled leaves are about 1 ft. long. The scapes, $1\frac{1}{2}$ to 3 ft. high, appear from May to July, bearing ten to twenty blue flowers about 2 ins. across in loose racemes. The sixth segment is separated distinctly from the other five, and each one has about five distinct deeper blue nerves. There is a white-flowered variety, *flore-albo* (formerly

known as *Scilla*); and also one with deeper blue flowers than the type, known in gardens as *atrocarulea*; *atroviolacea* is similar, and *præcox* is an early-flowering form. (*Bot. Reg.* t. 1486; *Bot. Mag.* t. 2774.)

In its native country the inhabitants eat the bulbs of this species, which are floury and of a good flavour when baked or roasted like potatoes.

C. Fraseri (*Scilla esculenta*).—A native of the eastern United States, with sharp-pointed, narrow leaves, and flower-stems about $1\frac{1}{2}$ ft. high, bearing ten to thirty pale blue flowers, each about 1 in. across, in loose racemes in summer, often later than *C. esculenta* (*Bot. Mag.* t. 1574).

C. Leichtlini (*Chlorogalum Leichtlini*).—This is a handsome species from British Columbia and California, and is a taller and more vigorous grower than *C. esculenta*, of which it is considered by some to be only a variety. The flower-stems are 3 to 4 ft. high, and bear large racemes of beautiful creamy-white flowers. (*Bot. Mag.* t. 6287.) The variety *atroviolacea* has long spikes of deep purple flowers.

CANARINA (from the Canary Islands, its native habitat). Nat. Ord. Campanulacæ.—There is only one species in this genus, viz.—

C. Campanula (*Campanula canariensis*) (Fig. 91).—A very old but still practically unknown garden plant closely related to *Codonopsis*, having been introduced from the Canary Islands in 1696. It is a perennial herb, having milky tuberculous roots or rhizomes from which arise juicy, succulent stems, 3 to 4 ft. high, on which are borne opposite, triangularly heart-shaped leaves, irregularly toothed on the margins. The large and beautiful bell-shaped blossoms appear during the autumn and winter

season, sometimes as early as October, and sometimes as late as February and March. They are drooping or horizontal, fleshy in texture, red, yellowish-purple, or orange in colour, conspicuously veined with purple or deep red. The calyx and the corolla are both remarkable for having six divisions, thus differing from most of the Campanulacæ, which have five divisions as a rule. There are also six stamens free from the corolla, a stigma with six linear lobes, and an inferior ovary having six cells and numerous ovules; the fruit eventually being a large, fleshy, roundish berry. (*Bot. Mag.* t. 444; *Fl. d. Serr.* t. 1094.)



FIG. 91.—*Canarina Campanula*. (1.)

This charming plant is rarely seen outside botanical collections, the reason probably being that its cultural requirements are not yet quite understood. It is treated as a greenhouse plant, but being deciduous in character, is somewhat

difficult to manage. Growth usually appears in spring, and from then onwards should be encouraged with a fair amount of water, according to the rapidity or otherwise of vegetation. A mixture of loam, a little leaf-soil, and a fair sprinkling of coarse silver sand seems to be the most suitable compost, and quite nice bushy specimens may be obtained in pots 5 ins. to 8 ins. in diameter. When the shoots and leaves begin to turn yellow, less water should be given, and eventually withheld altogether during the time the tuberous root-stocks are resting. The plant may be propagated by division when repotting in spring, and also by taking short, half-ripened cuttings of the non-flowering side-shoots during the summer and inserting them in a very sandy soil in a close and shaded frame. This plant deserves to be more widely known and grown.

CANNA (*cane*, a reed), INDIAN SHOT. Nat. Ord. Scitamineæ.—A genus of erect and often tall-growing perennial herbs with thickish root-stocks, ornamental leaves, and often gorgeous flowers in erect simple or branched racemes. Sepals and petals three. Stamens petal-like, shortly tubular at the base, with narrow or wedge-shaped, oblong lobes, the outer ones nearly equal, imbricate, sometimes two more or less united, the third one free, sometimes all absent; the two inner ones narrower, one being sterile, the other bearing a linear one-celled anther with a petal-like lobe, adnate at the side. Fruit a spiny, three-celled capsule with numerous hard, roundish, shot-like seeds, whence the popular name "Indian Shot."

In regard to this genus one cannot do better than repeat the *Practical Guide to Garden Plants*, p. 885 :—

"Although nearly one hundred species have been described, Mr. J. G. Baker, who has studied these plants closely, is of opinion that they can all be reduced to about a dozen distinct species. These are of little use from an ornamental point of view, and are confined chiefly to botanical collections; but the magnificent hybrids which have been raised from them, and for which we are indebted in the first place to continental nurserymen, are among the most showy and ornamental of plants for the summer garden. One of the first to obtain *Canna* hybrids was a M. Année of Paris, who in 1848 raised *C. Annæi* from seeds of *C. nepalensis*, which had probably been fertilised with the pollen of some other unknown sort. This strain became so popular that in 1861 over 20,000 tufts of it were raised for the parks and squares of Paris, and from it has been derived a large number of the tall garden forms, having handsome foliage varying in colour from soft green to reddish-purple.

"In 1863 another fine strain was raised from the Peruvian *C. iridiflora*, and the Costa Rican *C. Warscewiczii*, and although believed to have been obtained first in Paris, was distributed by M. Kolb, inspector of the Botanic Gardens, Munich, being called at first *iridiflora hybrida*, but afterwards *Ehemanni*.

"Within the last quarter of a century several other species have been taken in hand by such French nurserymen as Crozy, Sisley, Vilmorin, and Lemoine, and now we have beautiful forms which are variously known as 'Gladiolus-flowered,' 'Orchid-flowered,' besides numerous others simply called 'large-flowered' varieties. Besides the species mentioned above, *discolor*, *flaccida*, *glauca*, *liliiiflora*, and *zebrina*

have played a part, and as the original types are no longer used, their progeny has become thoroughly mixed and blended in garden forms. The result has been a new race with flowers of every shade of colour, among them being red, scarlet, yellow, orange, bronze, and intermediate shades, many of them distinctly washed and blotched with other colours."



FIG. 92.—Canna, hybrid. (4.)

The Cannas—that is, the natural species—are chiefly natives of Tropical and subtropical America as well as the East Indies. Notwithstanding this fact, there are probably no other plants from the same regions that can be grown so easily in our climate as the numerous forms that have been raised by the gardener during the past sixty years.

Cannas are highly ornamental, whether grown as pot plants in the greenhouse or conservatory, or for massing in beds and borders in the open air during the summer months.

Indeed, they are as easily grown as Dahlias; and they possess the great advantage of having fine leaves, not only graceful and decorative in themselves, but also in having curiously shaped blossoms that are brilliantly coloured and marked, and somewhat puzzling in structure to the amateur botanist.

Although so free and vigorous in growth, Cannas will not stand the frost. Consequently they can only be grown in the open air in the British Islands from the early summer till about the end of autumn, during just that period of the year when we may hope to be fairly free from frost.

There are many ways in which Cannas can be made effective in the open garden. It must be remembered first of all that there are tall, dwarf, and medium growing kinds. These groups may be again divided into two classes according to the colour of the foliage—some varieties having soft green leaves, others having beautiful bronzy and purple shades. The point to bear in mind, therefore, when planting Cannas for effect is to make a judicious selection of varieties that will harmonise with each other either in height, colour of the foliage, or blossoms. Certainly tall-growing and dwarf-growing varieties should not be mixed up indiscriminately in what are known as "formal" beds. Whether the shape of these be circular, rectangular, elliptic, or square, it is generally advisable to keep the taller-growing varieties in the centre, and the dwarfer ones nearer the margins. The distance apart is largely a matter of taste, the main thing to bear in mind being not to overcrowd the plants too much on the one hand, or to plant them so far apart that great unfurnished gaps appear between them. The taller and

stronger growing plants that are likely to produce much foliage during the season should be about $2\frac{1}{2}$ to 3 ft. apart in the centre of the beds, while the shorter varieties may be "angled" with these in the rows, and placed from $1\frac{1}{2}$ to 2 ft. apart, according to size and vigour. It is an excellent plan to fill in the larger spaces between the plants with corms of such showy things as *Gladiolus brenchleyensis*, *G. Lemoinei*, *G. Childsi*, etc., the foliage and blooms of which harmonise so well with the Cannas in the early autumn.

The soil in which Cannas are to be grown in the open air should be deeply dug and well manured sometime previous to planting, say in April or May, so as to be thoroughly sweet, and well drained. A rich sandy loam is considered best, but any good garden soil will give excellent results with cultivation.

The positions for Cannas should always be open and sunny, and sheltered from strong winds as much as possible. The sunshine brings out all the beautiful colour of the foliage and flowers, while the shelter from winds prevents the leaves from being torn into shreds.

For indoor decoration Cannas may be grown in pots or ornamental tubs, or planted out in bold beds, using a compost of sandy loam, leaf-mould, or a little old cow-manure. The plants may be started into growth in January or February, keeping the soil fairly moist, and syringe freely as growth increases in vigour. A temperature of 65° to 70° F. early in the year will bring the plants along rapidly, and if any are required for the open air, care should be taken to harden them off in cooler and more airy quarters about April and May. By this means they will be fit for the open air at the end of May

or early in June, according to the state of the weather.

Whether grown in the open air or in pots, Cannas like plenty of moisture during the summer months. In addition to the ordinary waterings, liquid manure may be given two or three times a week when particularly good results are desired. In the autumn when the foliage begins to die down, the stout root-stocks should be lifted from the open, and if stored in dry, airy cellars or lofts free from frost, they will be perfectly safe till wanted again in spring. The root-stocks should be stored in sand or dry soil, to prevent shrivelling too much.

The propagation of Cannas is effected either by dividing the root-stocks in spring when starting them into growth, or by means of seeds. Each shoot of the root-stock, if severed with a strong, sharp knife, will produce a good plant in the course of the season, and this method of increase is the one adopted to keep special varieties quite true.

When seeds are used, the outer coats being exceedingly hard and horny, are often carefully filed to allow the enclosed radicle to emerge more quickly. It is perhaps a better and safer plan to soak the hard seeds (which are about the size of those of Sweet Peas) in water having a temperature of 80° to 85° F. for about twenty-four hours, the only difficulty in this being to maintain the water at the temperature mentioned. The seeds should be sown in rich sandy soil about half an inch deep, and placed in a temperature of 70° F. The soil must be kept moist, as anything like dryness is fatal to the "sprouting" seeds. When the seedlings are 2 or 3 ins. high, they will be well established, and may be then transferred carefully to little pots by themselves.

The following are some of the most distinct natural species, with heights, colours, country, etc., added:—

C. Achiras.—5 ft. Dark red. Mendoza.

C. aurantiaca.—4 to 6 ft. Orange. Brazil.

C. discolor.—6 to 10 ft. Scarlet. Trinidad. (*Bot. Reg.* t. 1231.)

C. edulis.—3 to 6 ft. Red. Peru. (*Bot. Reg.* t. 775; *Bot. Mag.* t. 2498.)

C. flaccida.—3 to 5 ft. Red. S. America. (*Lodd. Bot. Cab.* t. 562.)

C. gigantea.—4 to 5 ft. Red, yellow. Brazil. (*Bot. Reg.* t. 206; *Bot. Mag.* t. 2316; *Red. Lil.* vi. 331.)

C. glauca.—2 ft. Yellow. S. America. The variety *rufa* (*Bot. Mag.* t. 2302), from Mexico, has reddish-brown flowers.

C. indica.—Indian Reed. 2 to 3 ft. Scarlet. India. (*Bot. Reg.* t. 776; *Bot. Mag.* t. 454.)

C. iridiflora.—6 to 8 ft. Red. Peru. (*Bot. Reg.* t. 609; *Fl. d. Serr.* 1360; *Belg. Hort.* vii. 31; *Rev. Hort.* 1860, iii.; *Bot. Mag.* t. 1968.)

C. illiiflora.—8 to 10 ft. Yellow, rose. Veraguas. (*Rev. Hort.* 1884, 132; *Fl. d. Serr.* 1055-6.)

C. limbata.—2 ft. Red. Brazil. (*Bot. Reg.* t. 771.)

C. lutea.—2 ft. Yellow. E. Indies. (*Bot. Mag.* t. 2085.)

C. occidentalis.—3 ft. Reddish-yellow. W. Indies. (*Bot. Reg.* t. 772.)

C. speciosa.—3 ft. Red. Nepaul. (*Bot. Mag.* t. 2317.)

C. Warscewiczii.—3 to 4 ft. Scarlet. Costa Rica. (*Bot. Mag.* t. 4854; *Belg. Hort.* ii. 48.) There are many forms of this fine species.

Many other species or so-called species besides those given above have been described from time to time, but no interest is now taken in them except from a purely botanical standpoint. So far as the magnificent

garden varieties are concerned it would be useless to occupy a space in a work of this kind with a mere list of names, as these would probably be out of date in a very short time, owing to the appearance of newer and perhaps greatly improved forms. The reader is therefore advised to consult the current catalogues of various growers, if a modern collection of garden Cannas is desired.

CAULOPHYLLUM (*kaulon*, a stem; *phyllon*, a leaf; in reference to the stem appearing to be the leaf-stalk). Nat. Ord. Berberideæ.—This genus contains only one species—*C. thalictroides*—an attractive, tuberous-rooted N. American perennial, about 1 ft. high, resembling the allied genera *Bongardia* and *Leontice* (which see). The fern-like leaves are twice or thrice pinnately cut into narrow-pointed segments. The yellow flowers appear in loose racemes or clusters in April, and are succeeded by roundish, deep blue berries, contracted at the base to a long stalk. Sepals (or bracteoles) nine, the outer ones much smaller, the inner ones petaloid. Petals six, much smaller, nectary-bearing, dilated, and hooded. Stamens six, free.

This species prefers a compost of peat or leaf-mould with the light sandy soil, and also a partially shaded place in the rockery or garden. It may be increased by separating the offsets from the tubers in early autumn and winter in a cold frame; or in spring; and also by sowing seeds in cold frames when ripe. The root-stocks should be protected from heavy rains in winter with a sheet of glass or a hand-light.

CEPHALANDRA (*kephale*, a head; *andra*, a man). Nat. Ord. Cucurbitaceæ.—A genus containing a dozen or more species of smooth or scabrous

climbing herbs, often having thick or tuberous roots, deltoid-angled leaves, and diœcious, bell-shaped flowers. Stamens three, in the male flowers,

C. palmata.—This seems to be the only species of any note. It is a native of S. Africa, and has a very large tuberous root-stock; climbing stems with ivy-like leaves; the female plants bearing small scarlet fruits marbled with white.

The species is no doubt easily raised from seeds, and may be grown in a greenhouse or in the open air during the summer months, in sunny, sheltered spots.

CEROPEGIA (*keros*, wax; *pege*, a fountain; in allusion to the form and waxy appearance of the peculiar flowers). Nat. Ord. Asclepiadeæ.—A large genus of tuberous plants, mostly with twining stems, opposite leaves, and flowers with a funnel-shaped corolla more or less dilated at the base and often conspicuously streaked or blotched, and with the segments often cohering at the apex. The corona is fixed to the staminal tube, and is composed of five to ten lobes.

The Ceropegias or Wax Fountain Flowers are found largely in the East Indies and Tropical Asia generally, and also in South Africa, and are also indigenous to Tropical Africa and Madagascar. While capable of affording amusement and interest to botanists for quite a long time, but very few species attract even passing attention from the gardener. The plants although highly interesting are by no means conspicuous for form or colour, and are looked upon purely as floral curiosities fit only for botanical collections. Some of the species (e.g., *C. nana*, *C. pusilla*, *C. spiralis*, *C. attenuata*, *C. esculenta*, and *C. pygmaea*) are dwarf erect-growing plants vary-

ing from 3 to 6 ins. high, having narrow linear leaves and small flowers, but comparatively large tubers. Other species like *C. Thwaitesi*, *C. Sandersoni*, *C. hirsuta* (or *C. vincaefolia*, *C. Decaisneana*), have slender twining stems, and large ovate or lance-shaped leaves. Perhaps the species best known are *C. Barklyi* (*Bot. Mag.* t. 6315), *C. Boukeri* (*Bot. Mag.* t. 5407), *C. elegans* (*Bot. Mag.* t. 3015), *C. Gardneri* (*Bot. Mag.* t. 5306), *C. Monteiroæ* (*Bot. Mag.* t. 6927), and *C. Thwaitesi* (*Bot. Mag.* t. 4758). To these must be added *C. Woodi*, an interesting species from



FIG. 93.—*Ceropegia Woodi*. (3.)

Natal, having slender drooping stems opposite broadly heart-shaped leaves marbled with pale green and silver, and small flowers. The stems frequently bear roundish tubers with a spiny surface, as shown in sketch (Fig. 93). This species is frequently grown in hanging pots or baskets for its curious appearance (*Gard. Chron.*

1897, xxii. 357, f.). *C. gemmifera* is another extremely interesting little species. *C. hybrida* is a natural hybrid between *C. Sandersoni* (*Bot. Mag.* t. 5792) fertilised with the pollen of *C. similis*, and is interesting owing to the fact that there is considerable difficulty in placing the waxy pollen masses of one flower on to the stigmas in another (see *Gard. Chron.* 1906, xl. 383, ff.).

In a natural state it would appear that the tubers of these plants are eaten by the natives and wild animals, and it is certainly so recorded of one species, *C. esculenta*, from the Indian Hills.

These plants, if grown at all, require the warmth and protection of a stove or greenhouse, and may be suspended in pots or baskets from the roof. A compost of gritty loam and leaf-mould suits them well, and they may be increased by cuttings of the young shoots placed in sandy soil, and by means of the tubercles that are borne on stems of some species like *C. Woodi*. It would probably be worth while to make garden plants of *C. Thwaitesi*, *C. Gardneri*, *C. Decaisneana*, *C. pygmæa*, and *C. elegans*, all of which have rather large and ornamental flowers, more or less beautifully striped and blotched with distinct colours.

CHAMÆLIRIUM (*chamai*, dwarf; *lirion*, a lily; in reference to the height). Nat. Ord. Liliaceæ.—The only species is *C. Carolinianum*, an attractive N. American herb, 9 to 12 ins. high, having thickish knotty rhizomes and tufts of bright green oblong-elliptic leaves. The small pure white flowers are borne in dense cylindrical racemes in June—the females being borne on one plant, the males on another.

This charming little plant flourishes

in cool moist spots in the rock-garden in sandy peat, and may be raised from seeds sown in frames, or by division of the root-stocks in early autumn or spring.

CHIONODOXA (*chion*, snow; *doxa*, glory; in their native habitats the flowers appear amidst the melting snow). Nat. Ord. Liliaceæ.—A small genus of charming bulbous plants closely related to the Squills (*Scilla*) and Hyacinths. They are natives of the mountains of Crete and Asia Minor, where in the early spring the beautiful starry blossoms appear in profusion as the snows begin to melt. This fact so impressed the French botanist Boissier, who discovered *C. Lucilie* at an elevation of 7000 ft. in 1842 in Asia Minor, that he coined the above generic name, the literal translation of which—Glory of the Snow—has now become so well known in British gardens.

Chionodoxas are perfectly hardy in our climate, and as they are amongst the earliest and loveliest of early spring flowers, the bulbs should be planted in the autumn in hundreds and thousands if possible. They are suitable for almost any part of the flower-garden, but are particularly charming when used for naturalising in the grass, for massing in the rockery, and for planting beneath such early flowering deciduous shrubs as the Golden Bells (*Forsythias*), the Witch Hazels (*Hamamelis*), the Almonds, the Magnolias, Ghent Azaleas, Cherries, Plums, etc., etc., that are now such a feature of every large garden. With other suitable bulbous plants, such as *Narcissus minimus* and the various Snowdrops, the Chionodoxas form an excellent contrast, and produce a delightful effect during the dullest season of the year. They are not difficult to grow,

and only require the soil to be well drained, and of a rich and somewhat gritty nature. When planted in the autumn, say in September or October, the bulbs may be left to take care of themselves, and they will rapidly increase and multiply by offsets in the course of a few years. To keep them in good condition a mulching or top-dressing of old, short, and well-rotted manure should be given every autumn. This will help to keep up the vigour and beauty of the flower-spikes year after year.

Apart from open air-cultivation, Chionodoxas are also excellent plants for forcing into early blossom during the winter months. By potting up in September and October, and keeping the plants covered with a few inches of soil or coco-nut fibre, or in a cold frame, until the end of November or December, they may then be brought into the greenhouse or conservatory in a well-rooted condition. In this way the blossoms can be had early in January. The following are the best-known kinds :—

C. cretica.—A pretty species from the mountains of Crete, having slender scapes 6 to 10 ins. high, which bear as a rule only one or two white or pale blue blossoms over $\frac{1}{2}$ in. across. The variety *albiflora* has white flowers.

C. Luciliae (*C. Forbesi*).—A beautiful species having small white pear-shaped bulbs, and beautiful flowers about $\frac{3}{4}$ in. across, of a brilliant blue, shading to a zone of pure white in the centre.

There are several fine forms of *C. Luciliae*. That known as *gigantea* or *grandiflora* is particularly fine and free, having flowers about twice as large as those of the type. The variety *sardensis* derives its name from the ancient town of Sardis, near which it grows at an elevation of 4000 to 5000 ft. It has Gentian-blue

flowers, borne on nodding scapes, without a distinct white zone at the base of the segments. The variety *Tmolusi* has flowers of a deeper blue and with a larger white zone than in *Luciliae*, and is valuable on account of its later flowering. The variety *alba* has flowers wholly white; *Boissieri*, flowers large, soft lavender-blue, snowy white in centre; and *Alleni* is a large-flowered form with blue, white, and pink flowers. A hybrid between this species (*C. Luciliae*) and *Scilla bifolia* has received the name of *Chiono-Scilla*.



FIG. 94.—*Chionodoxa Luciliae*. (3.)

C. nana.—A pretty little Cretan species with linear leaves 2 to 4 ins. long, and umbels of white- or lilac-tinted blossoms about $\frac{1}{2}$ in. across, produced in March and April on stems 3 or 4 ins. high.

The plant known as *C. amabilis Leichtlini* produces its large creamy-white flowers shaded with rose-purple a fortnight or so earlier than others.

CHIONOGRAPHIS (*chion*, snow ; *graphis*, a pencil ; in reference to the slender flower-spikes). Nat. Ord. Liliaceæ. — The only species — **C. japonica**—is a remarkable and pretty herbaceous perennial 6 to 12 ins. high, native of Japan. It has a short thick root-stock and tufts of narrow lance-shaped leaves, which are smaller on the stem. The small pure white flowers are borne in spring in a spiked raceme 4 to 5 ins. long, and consist of two rows of two, three, and four, or six, linear segments, the lower ones being very small or absent altogether.

This plant is very little known, but is cultivated at Kew. It succeeds in a compost of sandy loam and peat, and is effective when planted in bold masses in warm corners of the rock-garden. It may be increased in September by dividing the root-stocks, or sowing the seeds in cold frames as soon as ripe.

CHLIDANTHUS (*chlideios*, delicate ; *anthos*, a flower). Nat. Ord. Amaryllidææ. — A genus closely related to the Sternbergias, Hippeastrums, Sprekelias, and Zephyranthes.

C. Ehrenbergi. — This Mexican species differs from *C. fragrans* in being taller, in having horizontal flowers, each with a distinct stalklet, and in having the three outer segments distinctly wider than the inner ones (*Gard. Chron.* 1901, xxix. 312).

C. fragrans (*Paneratium luteum*). — This is a native of the Andes of Peru, and is recognised by its large ovoid bulbs, grey-green linear leaves, which are contemporary with the bright yellow, erect, funnel-shaped flowers. These appear in May and June, one to four in an umbel on top of a stoutish two-edged peduncle, and are from 3 to 5 ins. long, with a

fragrant odour. (*Bot. Mag.* t. 640 ; *Fl. d. Serv.* t. 326.)

These species are not quite hardy, but might be grown in the open air with a fair degree of success in the mildest parts of the Kingdom. If grown in the open, the soil should be a rich sandy loam with a little peat or leaf-mould, and the warmest and most sheltered spots in the border or rockery should be chosen for them. In the autumn the bulbs may be either taken up and stored in sand or dry soil until the spring ; or they may be covered with a dome of sand or ashes to keep the wet and frost from injuring them during the winter. Late in March or early in April the bulbs start into growth again, and at that time the offsets should be detached from the parent bulbs to increase the stock.

CHLOROGALUM (*chloros*, green ; *gala*, milk ; in reference to the green sap). Nat. Ord. Liliaceæ. — A small genus of Californian bulbous plants not of great garden value.

C. divaricatum (*Ornithogalum divaricatum*), known as the "Straggling Star of Bethlehem," is very similar, but has white flowers veined with green (*Bot. Reg.* 1842, t. 28).

C. pomeridianum (*Anthericum* and *Phalangium pomeridianum*). — This, the best-known species, is known as the "Soap plant" of California, owing to the soapy matter contained in the bulbs. It is a distinct-looking plant with flaccid grey-green leaves having roughish margins. The white flowers veined with purple are borne in June and July on loosely branched stems, about 2 ft. high, but they expand only in the afternoon, a fact alluded to in the specific name. (*Bot. Reg.* t. 564.)

These bulbs are easily grown in ordinary good garden soil that has

been deeply dug and is well-drained in consequence. They are quite hardy in most places, and are easily increased by offsets from the older bulbs.

CHLOROSPATHA (*chloros*, green; *spathe*, spathe; in reference to the colour of the spathe). Nat. Ord. Aroideæ.—A genus with only one species—

C. Kolbi.—A native of Colombia, having a tuberous root-stock, large green leaves with spotted stalks, and cylindrical greenish spathes (*Gartenfl.* t. 933).

This species requires to be grown in plenty of heat and moisture in the same way as *Alocasias* and other tropical Aroids. It is not of much ornamental value, however.

CISSUS (*kissos*, Greek name for the Ivy, in reference to the habit). Nat. Ord. Ampelideæ.—A genus closely related to *Ampelopsis*, and containing several ornamental-leaved plants, the best known being the fibrous-rooted *C. discolor*. A little-known species with tuberous roots is—

C. adenopodus, a native of Uganda, with climbing stems and tendrils, and leaves consisting of three ovate, pointed and coarsely toothed leaflets of a bright red, like the young shoots. The small flowers are borne in flat panicles. (*Kew Bulletin*, 1906, 247.) This species may be grown in a stove house in the same way as *C. discolor*, in a mixture of turfy loam, with a little peat or leaf-soil, and some coarse sand added.

CLAYTONIA (after *John Clayton*, who collected plants in Virginia). Nat. Ord. Portulacææ.—A genus containing about twenty species of plants, some of which referred to below have tuberous root-stocks.

C. sibirica.—A Siberian perennial with spindle-shaped root-stocks, ovate leaves, and rosy flowers with lobed petals (*Bot. Mag.* t. 2243).

C. virginica (*C. grandiflora*).—A dwarf-growing native of N. America, with linear lance-shaped leaves, and white flowers with notched petals (*Bot. Mag.* t. 941).

These species flower early in the year, and should be grown in warm sunny spots in the rockery or border. They are quite hardy, and may be increased by division of the root-stocks in early autumn, or from seeds.

CLIVIA (after a member of the *Clive* family). Nat. Ord. Amaryllideæ.—A small genus of herbaceous plants having imperfect bulbs consisting only of leaf-bases, but having very stout root fibres. The strap-shaped leaves are arranged in two rows (distichously), and are deep green and ornamental in appearance, and leathery in texture. The scentless, more or less erect, funnel-shaped flowers are borne in umbels on top of a stout peduncle. The following are the only kinds known, often under the name of *IMANTOPHYLLUM* :—

C. cyrtanthiflora.—This is considered to be a hybrid between *C. nobilis* and *C. miniata*. The drooping tubular flowers of a beautiful salmon-red are borne in large clusters during the winter and early spring months (*Fl. d. Serr.* t. 1877).

C. Gardeni.—This species from the Transvaal and Natal is often called *C. Gardneri*. It was named after Capt. Garden, who introduced it in 1855. The bright green leaves are 1½ to 2 ft. long, and the orange-red or yellow flowers with green tips are borne in umbels of twelve to twenty on stalks as long as the leaves, during the winter months from December to February. (*Bot. Mag.* t. 4895.)

C. miniata.—A fine species from Natal with bright green leaves, and stout two-edged stalks 1 to 1½ ft. high, bearing an umbel of twelve to twenty bright scarlet funnel-shaped flowers with a yellow throat, in spring and early summer. There are many lovely forms of this species in cultivation, among them being *atrosanguinea*, *aurantiaca*, *eruenta*, *Cooperi*, *grandiflora*, *Lindeni*, *splendens*, *sulphurea*, etc. (see *Gartenfl.* 1864, t. 434; *Bot. Mag.* t. 4783; *Rev. Hort.* 1859, tt. 29, 30; *Fl. d. Serr.* tt. 949-950, 2373-2374; *Ill. Hort.* n.s. t. 343). The



FIG. 95.—*Clivia miniata*. (4.)

variety *striata* has the leaves freely striped; and *citrina* has pale creamy flowers tinged with orange at the base (*Gard.* 1899, t. 1246).

C. nobilis (*Imantophyllum Aitonii*).—The genus *Clivia* and the genus *Imantophyllum* were both founded at the same time and on the same plant, but by two different authorities.

Lindley called the plant *Clivia nobilis*—in the *Bot. Reg.* t. 1182; and Hooker called it *Imantophyllum Aitonii*, in the *Bot. Mag.* t. 2856. Curiously, the longer name *Imantophyllum*—which is derived from *imas*, a leather thong, and *phyllon*, a leaf, in allusion to the shape and texture of the leaves—is even now more popular amongst gardeners than the shorter name of *Clivia*; and some use both names indiscriminately. The species under notice, *C. nobilis*, is a native of Cape Colony whence it was introduced by Bowie in 1828. It has tufts of bright green strap-shaped leaves 1 to 1½ ft. long, with roughish margins. The bright red and yellow funnel-shaped flowers, tipped with green, are borne in umbels of forty to sixty on top of a stalk about a foot long, between May and July.

Amongst greenhouse plants the *Clivias* have always held a high rank as decorative objects, not only on account of their beautiful foliage, but also for their trusses of brilliant blossoms. They are easily grown in a winter temperature of 50° to 60° F., and during the summer months might almost be grown in the open air, if well supplied with water and syringed regularly every day. The plants may be grown much in the same way as the *Agapanthus*, in ordinary pots or ornamental tubs, and are effective in the greenhouse, conservatory, or dwelling-house when in blossom. They flourish in a compost of rich sandy loam and leaf-soil, and although the roots are thick and fleshy, and absorb food freely, the plants should not be over-potted, that is, put into receptacles much too large for the accommodation of the roots. There is no necessity to repot the plants every year. Indeed, when left undisturbed for a few years, after properly potting in the first

place, they seem to thrive and flower better year after year; and it is possible to develop specimen plants in the course of time to a diameter of 5 or 6 ft. in pots not more than 15 or 16 ins. in diameter. During growth in spring and summer plenty of water must be supplied, but when resting only sufficient should be given to keep the plants from shrivelling. Clivias may be forced into early blossom by placing them in a temperature of 65° to 70°, about January, but when in flower it is well to remove to a cooler place so as to keep the blossoms fresh for a longer period.

Clivias are easily propagated by carefully dividing the tufts in spring just as the plants are about to start into growth. The plants should be taken out of the pots, and have all the old soil shaken away, or washed away in a bucket of tepid water. One can then see more easily where it is possible to divide the root-stocks with a strong, sharp knife. Each portion—large or small according to requirements—should be potted up singly in pots varying in size according to the portions, using good loamy soil and a little sharp sand and leaf-mould. If placed in a temperature of 65° F., the divided portions soon become established, if kept nicely syringed or sprinkled, and with a fairly humid atmosphere surrounding them. Clivias may be also raised from seeds. These are large, round, and white, and produced in bright red berry-like fruits. They should be sown in sandy loam and leaf-soil when thoroughly ripe, and should be kept warm and moist. When the seedlings are a few inches high, they should be potted up singly in small pots, and grown on until large enough to be moved into a larger size. Unless one is engaged com-

mercially in the production of new varieties, it is scarcely worth while raising Clivias from seeds.

CODONOPSIS (*kodon*, a bell; *opsis*, like; in reference to the shape of the flowers). Nat. Ord. Campanulacæ.—A genus containing about a dozen species of annual or perennial herbs, the latter having tuberous root-stocks, climbing, erect, or decumbent stems, and alternate or irregularly opposite-stalked leaves. Calyx tube adnate, hemispherical, five-parted, leafy; corolla broadly tubular or bell-shaped, five-cleft. Stamens free. Ovary inferior, or half superior, three- to five-celled. The genus *Glossocomia* is now included in *Codonopsis*.

These plants are not very well known, although they are well worth a place in the flower-border. They thrive in ordinary good garden soil of a gritty nature, and are probably better raised from seeds than by dividing the roots. They are not quite hardy except in the most favoured parts of the Kingdom, hence it becomes necessary either to protect the root-stocks in winter with hand-lights, bell-glasses, or a covering of litter, etc. Grown in pots, they are handsome for the decoration of the cool greenhouse. The following kinds may be grown:—

C. clematidea.—A Himalayan perennial 2 to 3 ft. high, with ovate-pointed leaves, and white bell-shaped flowers tinged with blue.

C. ovata.—Another Himalayan species, 12 to 18 ins. high, having opposite and alternate ovate leaves, and pretty, drooping, bell-shaped flowers about 1½ ins. long, borne in June and July. They are pale blue with deeper coloured veins, a purple basal zone outside, and two zones of yellow and one of black inside. (*Gard. Chron.* 1886, 468.) Fig. 96.

C. Tangshen.—A native of Central China, having long thickened roots much used by the natives as a tonic medicine. The slender stems are 2 ft. or more long, with ovate or ovate lance-shaped leaves $1\frac{1}{4}$ to $2\frac{1}{2}$ ins. long, slightly toothed on the margins. The greenish bell-shaped flowers are spotted with purple, and striped inside. (*Bot. Mag.* t. 8090.)



FIG. 96.—*Codonopsis ovata*. (½.)

COLCHICUM (after *Colchis*, one native habitat in Asia Minor), MEADOW SAFFRON. Nat. Ord. Liliaceæ.—A genus containing about thirty species of beautiful herbs, closely related to the *Bulbocodiums* and *Merenderas*, and recognised by having tunicated corms, oblong strap-shaped or linear leaves, and short scapes bearing from one to three or more showy flowers, usually lilac in colour, but sometimes yellow. The blossoms are funnel-shaped, with a long slender tube, and six oblong segments, erect

or somewhat spreading, and with six stamens attached at the base. The ovary or seed-pod is unstalked, and three-celled, three-ribbed, and many seeded, and although at first underground is eventually pushed above the surface.

The *Colchicums* are often popularly described as Autumn Crocuses, owing to the fact that they bloom in autumn. They have nothing, however, to do with the *Crocuses* proper—either spring- or autumn-flowering varieties—as it will be seen that the true *Crocuses* belong to the same natural family as the *Iris* and *Gladiolus*, to the *Iridææ* and not to the *Liliaceæ*. It is therefore better when using popular names to apply the accepted term “Meadow Saffron” to the *Colchicums*, to avoid confusion with the Autumn *Crocuses* proper.

Colchicums flourish in any rich and well-drained garden soil, containing, however, a certain amount of natural moisture. The corms should be planted not later than August, if an effect is desired the following autumn, and also to avoid loss of vitality by being kept out of ground. When planted in bold masses in the flower-border, the margins of shrubberies in the rock-garden, or in grassland, lawns, banks, etc. *Colchicums* are wonderfully effective in the autumn, when they carpet the ground devoid of any foliage. The leaves appear after the flowers have died away, and during the spring and summer months are elaborating food from the air for the benefit of the corms in the soil. Once planted, *Colchicums* may be left to themselves to increase and multiply, and to encourage this a top-dressing of short, well-rotted manure should be given after the flowers have vanished. When the plants have become overcrowded at the end of a few years, they should

be lifted when the leaves have died down in summer—about July—and replanted, separating the smaller corms from the larger.

Colchicums may also be raised from seed, but it takes from three to four years to produce flowering corms in this way. The seeds should be sown when ripe in a specially prepared bed, and covered with about $\frac{1}{2}$ in. of fine gritty mould. Each year after the leaves have withered, a little more soil should be placed on top of the young plants, and at the end of the third or fourth year the corms may be lifted and transplanted.

The following are amongst the best Colchicums grown.

C. agrippinum (*C. tessellatum*).—A very old species or variety of *C. variegatum*, native of S. Europe, having purple flowers in August.

C. alpinum (*C. montanum*).—This Apennine species produces its purple or deep rose flowers in September and October.

C. autumnale.—This is a common Meadow Saffron often met with in a wild state in various parts of the Kingdom. It has large egg-shaped corms and lance-shaped leaves, 6 to 10 ins. long, produced in spring. The bright purple cup-shaped flowers appear from August to October and November. There are many varieties, such as *album*, white; *album flore pleno*, white, double; *crociflorum* (*Bot. Mag. t. 2673*) *maximum*, purple; *purpureum*, purple-rose; *striatum*, striped red or lilac on white; there is also a double form, *roseum plenum*, with rose-coloured flowers; *amabile*, rose-coloured, sometimes faintly chequered.

C. Bivonæ.—A strong-growing native of S. Europe, with linear grooved leaves produced in spring, and flowers in autumn prettily chequered with white and purple.

C. Bornmülleri.—A fine species from Eastern Europe, closely related to *C. speciosum*, having beautiful, cup-shaped, long-tubed flowers of rosy-lilac.



FIG. 97.—*Colchicum autumnale*. (1.)

C. byzantium.—A vigorous species from the Levant, having large, roundish, depressed corms, often producing in autumn clusters of twelve to fifteen pale rose flowers larger than those of *C. autumnale*. The leaves appear in spring, and are broad, wavy, and plaited. The variety *cilicicum* has flowers as large as those of *C. speciosum*. There is a form with finely variegated foliage, and another one called *veratrifolium*, having longer floral segments and leaves.

(See *Gartenfl.* t. 755; *Red. Lil.* t. 468.)

C. Decaisnel.—A fine species from Mount Lebanon, with a profusion of handsome pale rose blossoms in September and October, sometimes striped with white; the lance-shaped leaves appearing in spring like other species.

C. fascicularis.—A native of Greece, remarkable for producing its leaves and flowers at the same time, the blossoms being pink and white in colour.

C. giganteum.—A fine species of the *speciosum* group from the Zigana Dag, or Gipsy Mountain, bearing very large and handsome blossoms of a delicate soft rose shading to white at the base (*Flora and Sylva*, June 1905).

C. Hausknechti.—A rare species, with short leaves and pretty globular flowers of a pink or bright rose colour, sometimes striped with white.

C. hydrophyllum.—A native of the Taurus Mountains, producing clear bright rose flowers in early spring (*Gard Chron.* 1901, xxix. 102, f. 43).

C. libanoticum.—From the Lebanon



FIG. 98.—*Colchicum libanoticum*.

Mountains; resembles *C. montanum*, but has broader and shorter leaves, and flowers ranging from white to pale rose during the winter season.

C. luteum.—A rare species, with large corms, from Kashmir and

Afghanistan, at an elevation of 7000 ft., is remarkable for being the only yellow-flowered species in cultivation. The blooms are 3 to 4 ins. high, appear in spring, and are attended by two narrow strap-shaped leaves. (*Bot. Mag.* t. 6153.)

C. montanum (*C. bulbocodioides*).—A native of the Mediterranean region, with short, narrow, lance-shaped or linear sickle-like leaves appearing almost with the lilac-purple or whitish flowers in February and March. This species must not be confounded with another, sometimes called *montanum* but properly *alpinum*, which flowers in autumn. Closely related to the true *montanum* is *C. brachyphyllum*.

C. neapolitanum.—A variable species, with rosy bright purple or bright rose blossoms late in the season.

C. Parkinsoni.—A strikingly distinct plant from Asia Minor and the Greek Archipelago, having ovate, lance-shaped, wavy leaves in spring, and large white starry flowers in autumn, chequered with violet-purple. (*Bot. Mag.* t. 6090).

C. Sibthorpi (*C. latifolium*).—A fine form of the *C. variegatum* type, native of the Levant. The beautiful lilac flowers, more or less clearly chequered with deep purple, appear in September and October, standing erect on stout tubes about 8 ins. high.

C. Sieheanum.—From Mersina; resembles *C. arenarium*, but produces its reddish-purple flowers and leaves together about the end of November. *C. arenarium* flowers in autumn, but does not produce its leaves till spring. (*Gard.* 1903, lxiv. 408.)

C. speciosum.—A very distinct and handsome Caucasian species remarkable for its broad, elliptic, sheathing leaves about a foot long and 2 to 4 ins. broad. These appear in spring,

throwing the seed-capsule nearly a foot above the ground. The flowers appear in September and October, and vary from a clear red or rosy-purple to deep crimson-purple with a white throat, at the top of a very long tube. (*Bot. Mag.* t. 6078.) The variety *album* is a very rare white-flowered form, and *maximum* has deep rosy-mauve flowers with a white base.

C. Steveni.—A beautiful species from Syria and Arabia, with linear leaves appearing at the same time as the clusters of pale rosy-lilac flowers (*Bot. Mag.* t. 8025).

C. Troodi.—A rare species from Cyprus, with white flowers in autumn. Not yet well known. (*Bot. Mag.* t. 6901.)

C. umbrosum.—A Crimean species, with fleshy, lance-shaped leaves in spring, and rather small, violet-purple, long-tubed flowers in autumn (*Bot. Rey.* t. 541.) *C. arenarium* and *C. tauricum* are closely related. This group is best for the rockery.

C. variegatum (*C. chionense*).—A fine species from Eastern Europe and Asia Minor, having large egg-shaped corms and long, narrow, wavy leaves in spring. From August to October the rose-coloured blossoms, beautifully chequered with purple-violet, appear in great profusion. (*Bot. Mag.* t. 1028; *Red. Lil.* 238.)

COLOCASIA (*kolokasia*, the Greek name for the root of an Egyptian plant). Nat. Ord. Aroidæ.—A small genus closely related to *Alocasia*, having five or six species of tall-growing, tuberous-rooted, milky herbs, mostly natives of Tropical Asia. They have long-stalked, peltate-ovate, heart-shaped or sagittate leaves, which constitute the chief feature of the plants from a garden point of view.

The *Colocasias* require almost pre-

cisely the same cultural treatment as the *Alocasias* and *Caladiums*, that is, plenty of heat and moisture during growth, and sufficient shade from the scorching rays of the sun, although some, like *C. antiquorum*, require less warmth. Considerable space is required to enable one to produce fine specimens, and for this reason the culture of this class of plants is somewhat restricted. They are easily propagated by separating the offsets from the older tubers.

C. antiquorum.—An East Indian plant about 2 ft. high, with more or less oval, heart-shaped leaves, about a foot long, and about as wide in the centre.

This species and *C. esculenta* are cultivated in the Tropics for the production of "Taro," a nourishing food obtained by roasting or boiling the tuberous root-stocks. From an ornamental point of view, this species is also much used on parts of the Continent for giving subtropical effects to the outdoor garden during the summer months. The tubers are started into growth early in spring in a hot-bed, and are hardened off by the end of May or early in June. They are then planted in warm sheltered spots in light rich sandy soil and leaf-mould. To secure the finest foliage effects, the side-shoots are suppressed at an early stage, and during growth plenty of water is given, with occasional doses of liquid manure. In autumn the old leaves are cut down within a couple of inches of the soil, the tubers are lifted, cleaned, and stored away in sand or dry soil, in a place safe from frost, for the winter.

C. Devansayana.—A native of New Guinea, with large, erect, oval peltate leaves, very smooth and green, and with a large triangular notch at the base. The brownish

main veins are very prominent on the under-surface, and the long sheathing stalks are of a coppery brown. (*Ill. Hort.* 1886, 601.)

C. esculenta (*Arum* and *Caladium esculentum*).—A native of the Sandwich Islands, with peltate heart-shaped leaves, about 2 ft. long, and 18 ins. broad, borne on stalks a yard or more in length.

C. indica (*Arum indicum*).—Also a native of the Sandwich Islands, about 6 ft. high, with oval heart-shaped leaves, divided at the base into two roundish lobes, and ending in a sharp point at the apex.

C. neo-guineensis.—This comes from New Guinea, and is remarkable for having the leaves blotched with white (*Ill. Hort.* t. 380).

C. nymphææfolia.—An East Indian species about 4 ft. high, with peltate heart-shaped sagittate leaves, reminding one of those of the Water-lily.

COMMELINA (named after *J.* and *G. Commelin*, Dutch botanists), SPIDER-WORT. Nat. Ord. Commelinaceæ.—Although there are ninety species of herbaceous plants, annuals, deciduous perennials, and evergreen climbers belonging to this genus, the only one worthy of note in this work is—

C. tuberosa (*C. undulata*).—This is a tuberous-rooted perennial plant, about 18 ins. high, from Mexico. It has oblong lance-shaped, pointed leaves, sheathing at the base, and there fringed with hairs. The bright blue flowers, borne on downy stalks issuing from heart-shaped, pointed spathes, appear in June and July. There is a fine white-flowered form called *alba*, and another blue one called *elegans*. The tuberous roots of this species are edible when cooked. (*And. Bot. Rep.* t. 399; *Lodd. Bot. Cab.* t. 1553.)

This species flourishes in warm sheltered spots in the open air in the milder parts of the Kingdom, but in severe winters it is wise to cover the roots with litter, etc. Propagation is effected by division of the tuberous roots in spring, and by sowing seeds.

CONANTHERA (*konos*, a cone; *anthera*, an anther; in reference to the six anthers forming a cone in the early stage of blossom). Nat. Ord. Hæmodoraceæ.—A small genus of plants closely related to *Tecophilæa*. They have corms with netted fibrous coats, narrow leaves, and loose panicles of blue flowers. They are not well-known plants, and are probably only to be found occasionally in botanical collections. Being natives of Chili, they are regarded as only half-hardy, and somewhat difficult to grow successfully. They appear to prefer a rich and very sandy soil that is well drained, and they should be planted in the hottest and most sheltered part of the garden. If treated in the same way as recommended for the Mariposa Lilies (*Calochortus*), or for some of the rarer Bulbous Irises (see p. 294), it is possible they would be able to go through the winter. It is, however, safer to lift the bulbs in autumn, and store them in dry soil in a frost-proof place during the winter. When replanting, the offsets, if any, may be detached from the older bulbs to increase the stock.

C. bifolia (*C. Simsi*).—This species with grassy leaves grows 6 to 18 ins. high, and produces its blue flowers in April.

C. campanulata (*Cumingia campanulata*) is very similar, and produces its blue flowers at the same period (*Bot. Reg.* t. 1193; *Bot. Mag.* t. 2496).

CONVALLARIA (*convallis*, a valley; *vica*, a mantle; in allusion to the dense covering of leaves). Nat. Ord. Liliaceæ.—In a book devoted to bulbous and tuberous plants it is rather difficult to squeeze in a plant like Lily of the Valley, which really has neither bulbs nor tubers. It is, however, so generally associated with plants of this character, and it also has creeping root-stocks and fleshy crowns, that it may appropriately find a place in this volume.

C. majalis (*Lily of the Valley*).—Notwithstanding the fact that the

shoots usually bearing two, but sometimes three, ovate lance-shaped leaves, 6 to 8 ins. long, deep green, smooth, and leathery in texture. In the open air the beautiful, drooping, broad, and flatly bell-shaped blossoms are borne in May or June on angular stalks 6 to 12 ins. high, springing up at the side of the leaves. The flowers are pure white, with six short recurved lobes, and from ten to twenty are borne on each stalk, emitting a delightful perfume. If allowed to wither, they are succeeded by round, fleshy, red berries containing the seeds in autumn.

There are now many varieties of Lily of the Valley in cultivation, differing chiefly in the size, purity of colour, and number of the blossoms or "bells" borne on the stalks. There are Dutch and German varieties, the latter being considered best for forcing purposes. Such varieties as *Fortin's*, *Giant-flowered*, and *Victoria* are perhaps the most popular; but others such as *prolificans* (which has large white flowers flushed with pink), *rosea* (rose-tinted), and *flore pleno* (a poor form with "double" flowers) are also known.

OPEN - AIR CULTURE.— Provided Lilies of the Valley are planted in a rich loamy soil, well drained and containing a certain amount of sand or grit, and in a moist, partially shaded position, there is practically no difficulty in growing them to perfection. A position facing north or west is generally a good one. The best time for planting the "crowns" or growths from the creeping root-stocks is in September or October. The fattest and plumpest crowns are those most likely to flower the following year, as they have already been in existence for a couple of seasons. The thin-pointed crowns, although perfectly sound and healthy, represent



FIG. 99.—*Convallaria majalis*. (½.)

Lily of the Valley is a native—although a rare one—of England, it is one of the most popular of garden plants. It has a creeping underground rhizome, from which arise

the first year's growth only, and therefore require at least another year's nourishment before they reach the flowering stage.

When planting, the crowns should be placed from 3 to 4 ins. apart, and it is best to put them in in straight rows. Fine rich sandy loam and leaf-mould, if possible, should be worked in between the crowns, the tops of which should be about 2 ins. beneath the surface. Once properly planted, a Lily of the Valley bed may be left undisturbed for several years—until the plants are so obviously overcrowded that replanting becomes a necessity. To secure a good display of blossom, it is advisable to give a good mulching or top-dressing of well-decayed manure every autumn—about September or October, when the foliage has died down and is in a rotting condition. When the plants are coming into flower, a great improvement in the purity of the blossoms may be easily secured by placing an old light or two over the plants, to ward off the rains and wind. A piece of thin canvas stretched over them will answer the same purpose.

Many amateurs completely ruin their stocks of Lily of the Valley by the injudicious way they pick the flowers. When picking these, the stalks should be given a sharp upward jerk. If leaves are also wanted, it should be borne in mind that as each plant usually has only two leaves, at least one of these should be left to carry on the work of assimilation from the atmosphere. If both leaves are cut from each plant, it is impossible for a fresh store of atmospheric food (carbonic acid gas) to be secured—hence the root-stocks languish for nourishment, and are unable to throw up any flower-stems the following season.

FORCING.—Millions of crowns of Lily of the Valley are forced into early growth during the winter months, to supply the constant demands of the florist in the big markets. The "crowns" are planted almost side by side in boxes, pots, or pans, in a finely sifted sandy compost, the points being about level with the top of the soil. They are plunged in coco-nut fibre, ashes, or soil for a few weeks until root action begins. They are then brought into a dark chamber with a moist atmosphere, and a temperature of 80° to 100° F. during the day and night. Abundance of water is given, and in a short time the leaves shoot up thin in texture and yellowy in colour, and after them the flower-stems. The plants are then given a little more light each day to develop the beautiful soft green eau de Nil colour in the leaves, and in from fourteen to twenty-five days the pure white blossoms will be developed under these conditions. Both flower-stems and leaves, which are much longer grown in this way, are cut, and the forced and exhausted root-stocks are thrown away, being of no further value. This work of forcing is carried on from November till March and April, batches of plants being placed in the forcing chambers at different intervals, to secure a proper succession.

RETARDING.—Just as great heat and moisture start Lilies of the Valley into premature growth in winter, so the converse conditions—cold and dryness—prevent the plants from starting into growth. By means of refrigerating apparatus, millions of crowns of Lily of the Valley are kept by trade growers at a temperature of about 30° F. for as long as necessary during the summer months. The plants that would thus have naturally bloomed in May and June are

prevented from doing so by the low temperature. This process is known as "retarding" the crowns. When, however, the plants are taken from the refrigerator and placed in fine gritty mould, and given a good watering, their pent-up energies soon start into growth during the summer months, even in an ordinary well-lighted dwelling-room. Water is given as often as necessary, and in this way "retarded" Lilies of the Valley can be had in bloom from the time those in the open air fade until the "forced" crowns in November and December again come into season.

COOPERIA (after Mr *Cooper*, formerly gardener at Wentworth House, Yorks). Nat. Ord. *Amaryllidæ*.—A small genus of bulbous plants closely related to *Anoiganthus* and *Sternbergia*, and with the habit of the *Zephyranthes*, from which it may be distinguished by its stamens and long, cylindrical tube. Flowers solitary, funnel-shaped, with spreading segments. Leaves linear, appearing at same time as flowers.

C. Drummondii.—A pretty species about 1 ft. high, native of Mexico and Texas. It has roundish, short-necked bulbs about 1 in. through, and narrow linear leaves about 1 ft. long. The white, sweet-scented, starry flowers, tinged with red on the outside, appear during the summer months on slender stalks 6 to 12 ins. high, but only expand fully in the cool of the evening. (*Bot. Reg.* t. 1835.) The variety *chlorosolen* has stouter flower-stems, flowers tinged with green, and having less spreading segments (*Bot. Mag.* t. 3482).

C. pedunculata (*Sceptranthus* and *Zephyranthes Drummondii*).—A stronger-growing plant than *C. Drummondii*, with long-necked bulbs, and

leaves about 1 ft. long and $\frac{1}{4}$ in. broad. The flowers are about $1\frac{1}{2}$ ins. long, white tinged with red or orange outside. (*Herb. Amaryll.* 179, t. 42; *Bot. Mag.* t. 3727.)

Being natives of Mexico and Texas, the Cooperias are probably only hardy in the mildest parts of the Kingdom. In other places it is safer to treat them as cool greenhouse plants. They may be grown in the open air during the summer months if the bulbs are planted in rich gritty soil under a south or west wall about March or April. To secure a fine effect during the summer months several bulbs should be planted within a couple of inches of each other, and about 3 ins. deep. In the autumn they may be taken up and stored in dry soil or sand in a frost-proof place during the winter. Increased by offsets from the older bulbs.

CORYDALIS (*korydalos*, a lark; the spur of the flowers resembling that of a lark), FUMITORY. Nat. Ord. *Fumariaceæ*.—A genus containing about seventy species of smooth grey-green herbs with tuberous or tufted rootstocks, slender stems, much-divided leaves, and irregular flowers in terminal or leaf-opposed racemes. Sepals two, often scale-like. Petals four, the two outer ones larger than the others. Stamens six, in two bundles opposite the outer petals.

C. Alleni.—This appears to be a hybrid between *C. cava* and another species. It produces its yellowish-white flowers tinged with purple early in the year. (*Gard.* 1908, 294, f.)

C. angustifolia.—A tuberous-rooted Fumitory from the Caucasus and Persia, about 8 ins. high, with leaves twice ternately divided into long linear segments. The flowers are flesh or cream-coloured, and are borne in loose racemes. (*Gard. Chron.* 1904,

xxxv. 306, f. 131; *Gard.* 1904, lxv. 110.) Quite hardy.

C. bracteata.—A Siberian perennial about 9 ins. high, with twice ternate leaves cut into linear-lobed segments. The sulphur-yellow flowers appear in May and June.

C. cava (*C. tuberosa*).—A European perennial about 6 ins. high, with twice ternate leaves cut into wedge-shaped segments. The purple flowers appear from February to May, in loose racemes at the ends of the shoots. The variety *albiflora* has white flowers. (*Bot. Mag.* tt. 232, 2340.)

C. cheilanthifolia.—A Chinese species, with elegant fern-like leaves and erect racemes of yellow flowers. Hardy in favoured spots.

C. Gortschakowi.—A glaucous green perennial 1 to 1½ ft. high, native of Turkestan. The leaves are twice pinnately divided or cut, the lower ones being 5 to 6 ins. long. The golden-yellow flowers appear in summer in close racemes. (*Gartenfl.* t. 1183.)

C. Kolpakowskiana.—A tuberous-rooted perennial from Turkestan, 6 ins. high, with smooth deeply divided leaves, and long-spurred pink or purple flowers borne in summer in loose racemes (*Gartenfl.* t. 948).

C. Ledebouriana.—A pretty herbaceous perennial about 1 ft. high, native of the Altai Mountains. It has tuberous root-stocks and leaves twice ternately cut into obovate glaucous segments. The purple flowers appear in summer, and have rather a thick pale purple spur.

C. Marschalliana.—A perennial about 9 ins. high, native of Tauria. Leaves twice ternate, with oval entire or bifid lobes, and sulphur-yellow flowers produced in April and May. (*Gartenfl.* t. 501.)

C. nobilis (*Fumaria nobilis*).—A lovely Siberian perennial about 9 ins.

high. Leaves twice pinnate, with wedge-shaped segments cut at apex. Flowers in May, pale yellow, tipped with green, and having a long blunt spur. (*Bot. Reg.* t. 395; *Bot. Mag.* t. 1983.)

C. pallida.—A juicy herb 1 to 1½ ft. high, native of China and Japan. The pale green leaves are thrice pinnately cut or divided, and the bright yellow flowers tipped with brown appear in summer. (*Bot. Mag.* t. 6826.)

C. Seworowii.—A pretty species 12 to 18 ins. high, native of Turkestan, with finely divided grey-green leaves, and deep yellow flowers in April and May. Spur short, saccate. (*Gartenfl.* t. 1077.)

C. solida (*C. bulbosa*).—A tuberous perennial, 6 ins. high, native of Europe, and naturalised in woods and dampish places in Britain. The twice ternate leaves are cut into oblong or wedge-shaped segments, and the large purplish flowers about 1 in. long are produced in April and May. (*Bot. Mag.* t. 231.)

The above Fumitories are amongst the best of the tuberous-rooted kinds for garden purposes. They are easily grown in ordinary well-drained garden soil, and prefer partial shade and moist places either in the ordinary border or in nooks in the rock-garden. They are easily increased in spring or early autumn by separating the offsets from the older tuberous roots. Seeds may also be sown, but some species do not ripen them freely.

COSTUS (ancient name of an Indian perfume). Nat. Ord. Scitamineae.—A genus containing about thirty species of hothouse plants, from America, Africa, Asia, and Australia. They have tuberous root-stocks, fleshy leaves, and flowers borne in spikes furnished with imbricating bracts.

The calyx is tubular and three-lobed, the corolla having a funnel-shaped tube, the spreading limb being composed of three equal divisions.

These plants flourish in a rich sandy loam and leaf-soil or a little peat, and like plenty of heat and moisture during the period of active growth. They may be grown in pots or pans, or planted out in rockeries in the stovehouse. Propagation is effected easily by dividing the root-stocks or tufts.

C. Afer.—A native of Sierra Leone, about 2 ft. high, with oval-elliptic pointed leaves, and white flowers tinted with yellow.

C. cylindricus.—This species from the Trinity Islands grows about 6 ft. high, and has oboval pointed leaves and yellow flowers with red bracts.

C. discolor.—A Brazilian species about 3 ft. high, with broadly lance-shaped pointed leaves, green above, purple beneath. The large white flowers appear in spring and summer in pairs, and have red bracts at the base.

C. Englerianus (*C. unifolius*).—A dwarf plant from Tropical Africa, having bluntly elliptic, fleshy, deep green leaves, and small white and yellow flowers.

C. Friedrichseni.—This species, long cultivated as *C. comosus*, is 6 ft. or more high, and has stalkless lance-shaped pointed leaves 9 to 18 ins. long, and 2 to 5 ins. broad, and large bright yellow flowers in thick ellipsoid or ovoid spikes (*Gartenfl.* 1903, t. 1521).

C. igneus.—A fine Costa Rican plant 1 to 3 ft. high, having smooth elliptic, pointed leaves, and bright orange-scarlet flowers (*Bot. Mag.* t. 6821).

C. Lucanusianus.—A fine species from the Cameroons, with lance-shaped pointed leaves, white on the under-

surface. Flowers purple with a yellow lip.

C. Malortieanus.—A native of Costa Rica, 1 to 3 ft. high, having large oboval pointed leaves with short stalks. Flowers golden-yellow, irregularly streaked with orange-red.

C. micranthus.—This species, supposed to be a native of Martinique, grows 5 to 6 ft. high, the lance-shaped leaves being spirally arranged on the stems, and the orange-red and yellow flowers being in cone-like spikes. The narrow tubular lip is purple.

C. musaicus.—A distinct and pretty species from the Congo. The leaves are obliquely lance-shaped, 3 to 5 ins. long, deep green in the centre, the remaining portion of the surface being beautifully chequered or barred with silvery grey lines.

C. pictus.—A Mexican species about 1½ ft. high, having lance-shaped, pointed, shortly stalked leaves, downy above, smooth beneath. Flowers in summer and autumn, yellow, with a golden-yellow and purple, oblong, wedge-shaped lip. (*Bot. Reg.* t. 1594.)

C. speciosus.—A fine East Indian species, 1½ to 3 ft. high, with cylindrical stems, lance-shaped pointed leaves, velvety on the under-surface. Flowers large white, pink on the outer segments, and having red bracts. (*Bot. Reg.* t. 665 B.)

C. spiralis.—A Brazilian plant 2 to 3 ft. high, with fleshy, oblong elliptic, lance-shaped leaves, smooth and glossy green on both surfaces, but with a downy midrib. Flowers in summer and autumn, pink, with deep scarlet bracts.

CRINUM (*krinon*, the Greek name for Lily). Nat. Ord. Amaryllidæ.—A genus containing about eighty species of evergreen herbaceous plants, having large short or long-necked bulbs, broad or narrow strap-shaped

leaves, more or less funnel-shaped flowers in umbels on a stout, fleshy stalk or peduncle. They are found in widely different parts of the world, being distributed over Tropical Asia, Tropical America, Tropical Africa, Australia, Polynesia, and South Africa.

CULTURE.—With few exceptions, most of the *Crinums* require to be grown in warmth and moisture throughout the year. They are all noble plants. Even when not in blossom the foliage alone is ornamental, and wherever space is available, it is worth while to mass a few plants in borders in the stove or warm greenhouse. Coming from all parts of the tropical and subtropical world, and from various altitudes and situations, a little judgment must be exercised in regard to the cultural treatment given to the different species. Generally speaking, all *Crinums* like to grow in a mixture of rich loam, peat, and leaf-soil, and a fair sprinkling of coarse sand or grit. During rapid growth, readily recognised by the appearance of new leaves, they like plenty of water at the roots, and a syringing with tepid water two or three times a day during the summer months is also highly beneficial. It freshens up the foliage, and at the same time keeps it free from disease and dirt. Although the great majority are evergreen, there is a period of rest when no growth is made. Then the plants require but little water at the root, and it will generally be sufficient to syringe the plants occasionally, the water thus running down the channelled faces of the leaves to the bulbs and roots.

The plants may be grown either in pots or planted out in borders under glass. The pots should never be much larger than the bulbs, and they should

be well-drained in all cases by putting plenty of broken "crocks" or potsherds in the bottom, afterwards covering these with a layer of moss or fibre before filling in with soil.

Crinums are easily propagated, either by detaching the offsets, which in some species are produced freely around the old bulbs, or by means of the large, irregular, fleshy fruit or seed that often follows the flowers. The offsets are simply potted up or planted



FIG. 100.—*Crinum*, seedling. (J.)

out and grown on until they reach the flowering stage, after which they in turn produce other offsets and seeds. When seeds are sown, the large fleshy fruits are placed on the moist sandy soil, or slightly buried. A short fleshy radicle is soon thrown out, and then ceases to grow, as in other monocotyledons. Fleshy roots soon develop into the soil, and the first leafy growth shoots upwards—as shown in the sketch. The second or third season the plants are quite

large, and have reached the flowering stage. By pollinating the stigmas there is an excellent chance of producing seeds in due course, and from these it would be possible to raise an acclimatised race of *Crinums* in a comparatively short time.

The following is a fairly good list of *Crinums* to be met with in cultivation:—

C. abyssinicum.—A native of the Abyssinian mountains, with ovoid short-necked bulbs 3 ins. in diameter; leaves about 1 ft. long, $\frac{1}{2}$ to 1 in. broad, and rough on the edges. From four to six flowers in an umbel on a stoutish stalk 1 to 2 ft. high. The perianth-tube is short, slender, and curved, $1\frac{1}{2}$ to 2 ins. long, while the limb is 2 to 3 ins. long, with oblong acute segments.

C. amabile (*C. superbum*).—This species is a native of Sumatra. It has small bulbs with necks a foot or more long, and clusters of bright green, strap-shaped, tapering leaves, 3 to 4 ft. long and 3 to 4 ins. broad. The two-edged peduncle, 2 to 3 ft. long, bears from twenty to thirty sweetly scented flowers during the winter months. The erect cylindrical perianth-tube is bright red, 3 to 4 ins. long, and the segments are 4 to 5 ins. long. (*Bot. Mag.* t. 1605.)

C. americanum.—A native of the S. United States, having short-necked ovoid bulbs 3 to 4 ins. in diameter, and strap-shaped arching leaves 2 to 3 ft. long, $1\frac{1}{2}$ to 2 ins. broad. The stoutish peduncles carry three to six flowers, having straight tubes 4 to 5 ins. long, and narrow pure white segments 3 to 4 ins. long. (*Bot. Mag.* t. 1034.)

C. amœnum.—This species grows wild in the Eastern Himalayas and the Khasia hills, and is found at an elevation of 6000 ft. in Sikkim. The short-necked roundish bulbs are 2 to

3 ins. in diameter, the bright green rough-edged leaves being $1\frac{1}{2}$ to 2 ft. long and 1 to 2 ins. broad. From six to twelve flowers are borne on a roundish peduncle 1 to 2 ft. high. The greenish perianth-tube is 3 to 4 ins. long, the lance-shaped spreading segments being 2 to 3 ins. long. The variety *caudiceum* from Ceylon has a bulb with a cylindrical neck; and the variety *verecundum* has blunter, more spreading and lacunose leaves than the type. The variety *Mearsi*, from Upper Burma, has white salver-shaped flowers smaller than the type (*Gard. Chron.* 1907, xlii. 62, f.).

C. angustifolium (*C. australasicum*; *C. arenarium*).—A native of N. Australia, with roundish short-necked bulbs 3 ins. in diameter, and rough-edged leaves $1\frac{1}{2}$ to 2 ft. long, 1 to $1\frac{1}{2}$ ins. broad. The peduncle is about a foot long, with few flowers, having slender tubes 3 to 4 ins. long, and lance-shaped segments $2\frac{1}{2}$ to 3 ins. long and $\frac{1}{2}$ in. broad (*Bot. Mag.* t. 2355). The variety *confertum* (*Bot. Mag.* t. 2522) is distinguished by its stalkless flowers and longer perianth segments; while the variety *blandum* (*Bot. Mag.* t. 2531) has broader leaves and perianth segments than in the type, the filaments also being whitish instead of bright red.

C. asiaticum (*C. toxicarium*).—This is known as the "Asiatic Poison Bulb." It is widely distributed throughout Tropical Asia, and was introduced nearly 180 years ago. The bulbs are 4 to 5 ins. through, with necks 6 to 9 ins. long, bearing masses of thin, bright green, tapering leaves 3 to 4 ft. long and 3 to 4 ins. broad. The thick two-edged peduncle, $1\frac{1}{2}$ to 2 ft. high, carries from twenty to fifty flowers, the tube of which is tinted green, and 3 to 4 ins. long, the linear segments being $2\frac{1}{2}$ to 3 ins. long. (*Bot. Mag.* t. 1073.)

There are several geographical varieties of this species, the most distinct being:—*declinatum*, from Silhet, having a longer perianth-tube and limb, the latter tinted with red (*Bot. Mag.* t. 2231). *C. sinicum*, from China, with wavy leaves about 5 ins. broad, peduncles 3 ft. long, and longer tube and segments. *C. procerum*, from Rangoon, has leaves 5 ft. long and 6 ins. broad, the perianth-tube and limb each 5 ins. long, the latter tinted with red (*Bot. Mag.* t. 2684). *C. anomalum* (*C. plicatum*), from China, has the "leaves expanded suddenly at some distance above the base into a broad, membranous, plicate, variegated wing" (*Bot. Mag.* t. 2908). *C. japonicum*, from Japan, has leaves firmer in texture, 2 to 2½ ins. broad, with longer pedicels, and perianth-tube 2 to 2½ ins. long.

C. augustum.—This species inhabits the marshes and stream-sides in Mauritius and the Seychelles, and was once considered to be a variety of *C. amabile*. It has a regular conical bulb 6 ins. in diameter, and sometimes a foot long. The numerous bright green strap-shaped leaves are 2 to 3 ft. long and 3 to 4 ins. broad. The lateral and much compressed peduncle is 2 to 3 ft. high, of a deep claret red upwards, and bears an umbel of twelve to thirty flowers. The stout perianth-tube is bright red, 3 to 4 ins. long, while the lance-shaped segments are 4 to 5 ins. long, ½ to ¾ in. broad, and bright red outside. (*Bot. Mag.* t. 2397; *Bot. Reg.* t. 679.)

C. Balfouri.—This species from the Island of Socotra is named after its discoverer, Prof. Isaac Bayley Balfour, of Edinburgh. It has round short-necked bulbs 3 ins. in diameter; strap-shaped leaves under a foot long and 2 to 2½ ins. broad; and about a dozen sweet-scented flowers

on top of a compressed peduncle a foot or more high. The greenish perianth-tube is about 2 ins. long, and the pure white segments as long as the tube, about ½ in. broad. (*Bot. Mag.* t. 6570.)

C. brachynema.—A native of Bombay, with ovoid, practically neckless bulbs 2½ to 3 ins. in diameter, and bright green strap-shaped leaves 1½ to 2 ft. long, 3 to 3½ ins. broad, developed after the flowers. The roundish peduncle bears fifteen to twenty flowers, of which the greenish perianth-tube is 1½ to 2 ins. long, the pure white segments being 2 ins. long and about ¾ in. broad. This species is readily distinguished by its short stamens and style. (*Bot. Mag.* t. 5937; *Fl. d. Serr.* t. 2303.)

C. bracteatum (*C. brevifolium*).—A native of the Seychelles, with short-necked ovoid bulbs 3 to 4 ins. in diameter, bluntish strap-shaped leaves 1 to 1½ ft. long, 3 to 4 ins. broad, and crisped on the margins. The stoutish, much compressed peduncle is about a foot long, bearing ten to twenty flowers. The slender, erect tube is 2½ to 3 ins. long, and greenish-white; the linear segments are pure white. (*Bot. Reg.* t. 179.)

C. campanulatum (*C. aquaticum*; *C. caffrum*; *Hæmanthus hydrophilus*).—A very distinct species, native of the ponds and marshes of S. Africa. It has small ovoid bulbs, deeply channelled linear leaves 3 to 4 ft. long, ½ to 1 in. broad; and slender peduncles a foot or more high, carrying six to eight bell-shaped flowers, the cylindrical perianth-tube of which is 1½ to 2 ins. long, while the bluntly oblong connivent segments are rose-red or purple. (*Bot. Mag.* t. 2352.)

C. Careyannum.—A native of the marshy places in Mauritius and the Seychelles, and considered by Mr Baker to be scarcely more than a

variety of *C. latifolium*. It has short-necked roundish bulbs 3 to 4 ins. through, with reddish-brown tunics. The thin, bright green, wavy leaves are 1 to 2 ft. long and 2 to 3 ins. broad. The roundish peduncle is about a foot high, and bears about half a dozen flowers about November. The curved greenish perianth-tube is 3 to 4 ins. long, the oblong acute segments, about 1 in. broad, being washed with rose-red near the centre. (*Bot. Mag.* t. 2466.)

A hybrid between this species and *C. capense* has been called *C. grandiflorum*.

C. Commelyni (*C. attenuatum*; *C. Lindleyanum*; *C. revolutum*; *C. viridifolium*).—A native of the Amazon Valley closely related to *C. erubescens*. The short-necked ovoid bulbs, $1\frac{1}{2}$ to 2 ins. thick, are remarkable for producing copious stolons. The leaves are 2 to 3 ft. long and about an inch broad. The slender compressed peduncle, 1 to 2 ft. high, bears about half a dozen flowers in summer. The slender perianth-tube is 4 to 6 ins. long, the reflexed lance-shaped segments being 2 to 3 ins. long.

C. crassipes.—Probably a native of Tropical Africa. It has very large conical bulbs, dark green strap-shaped leaves about 4 ins. broad, and stout compressed peduncles under a foot high, with fifteen to twenty flowers in summer. The nearly straight green perianth-tube is about 3 ins. long, the lance-shaped segments being white with a red centre.

C. cruentum.—A Mexican species with large, short-necked, stolon-bearing bulbs, and dark glossy green leaves 3 to 4 ft. long and 2 to 3 ins. broad. The stout compressed peduncle, about 3 ft. high, bears six to eight almost stalkless flowers in summer. The erect perianth-tube is 7 to 8 ins. long,

the bright pink linear segments being about 3 ins. long. The variety *Loddigesianum* has dark purple segments. (*Bot. Reg.* t. 171; *Lodd. Bot. Cab.* t. 346.)

C. deflexum (*C. Roxburghi*; *Amaryllis vivipara*).—A species found wild in the muddy and swampy banks of rivers about Calcutta and throughout India. The long, cylindrical-necked, ovoid bulbs are 2 to 3 ins. through, bearing deeply channelled leaves 2 to 3 ft. long and about 1 in. broad, tapering to a point. The stoutish peduncle, $1\frac{1}{2}$ to 2 ft. high, carries from six to fifteen flowers in autumn. The slender perianth-tube is $2\frac{1}{2}$ to 3 ins. long, with linear segments (*Bot. Mag.* t. 2208). The variety *ensifolium* has a longer perianth-tube, and leaves more acute. (*Bot. Mag.* t. 2301.)

C. distichum (*Amaryllis ornata*).—A species from Sierra Leone, closely related to *C. yuccæflorum*, from which it may be distinguished by its linear, channelled leaves, being arranged distichously from the small round bulbs. The white stalkless flowers, keeled with bright red, are usually borne singly on a scape about a foot high, during the summer months. (*Bot. Mag.* t. 1253.)

C. Doriæ.—An Abyssinian species with broad wavy leaves and short scapes, surmounted by a many-flowered umbel of scented white, red-striped flowers.

C. erubescens.—This variable species is widely distributed over Tropical America, and has been in cultivation since about 1784. The short-necked ovoid bulbs are 3 to 4 ins. in diameter, and give rise to numerous thin, strap-shaped, arching leaves 2 to 3 ft. long and 2 to 3 ins. broad. From four to twelve flowers are borne on top of a peduncle 2 ft. or more in height. The erect perianth-tube is 5 to 6 ins. long, the

whitish lance-shaped segments being reflexed and washed with claret-purple on the outside, while the filaments are bright red and about 2 ins. long. There is a smaller-flowered form called *minus* or *Roozenianum*. (*Red. Lil.* t. 27; *Lodd. Bot. Cab.* t. 31; *Bot. Mag.* t. 1232.)

C. fimbriatum.—This species grows wild in the low-lying marshy meadows of Angola, in the province of Loanda, where it flowers in March. The thin, strap-shaped, grey-green leaves are 2 to 3 ft. long, and about 3 ins. broad, gradually tapering to a point. From three to seven flowers are borne on a peduncle about 2 ft. long, having a greenish perianth-tube 4 to 5 ins. long, and whitish, oblong lance-shaped segments streaked with red down the centre.

C. flaccidum (*Amaryllis australisica*; *C. Weinmanni*?).—A native of New South Wales and Southern Australia, having very short-necked ovoid bulbs, 3 to 4 ins. in diameter. The rough-edged leaves are 1½ to 2 ft. long and 1 to 1½ ins. broad, and umbels of six to eight pure white flowers are borne on a much compressed peduncle 1½ to 2 ft. high. The perianth-tube is usually curved, 3 to 4 ins. long, the segments being oblong lance-shaped. (*Bot. Mag.* t. 2133; *Bot. Reg.* t. 426.)

C. Forbesianum (*Amaryllis Forbesi*).—A native of Delagoa Bay, with large roundish bulbs 6 to 8 ins. in diameter, and grey-green, strap-shaped leaves 3 to 4 ft. long and 3 to 4 ins. broad, the edges being conspicuously fringed with hairs. From thirty to forty funnel-shaped flowers are borne on a stout compressed peduncle about 1 ft. high, the spathe-valves being tinted with red. The white oblong-acute segments, over 4 ins. long, are distinctly

keeled with red, while the bright red filaments are almost as long as the segments. (*Bot. Mag.* t. 6545.)

C. giganteum (*C. vanillodorum*; *C. nobile*; *Amaryllis gigantea*; *A. latifolia*; *A. ornata*; *A. candida*).—A native of Central and Western Tropical Africa, whence it was introduced to cultivation about 1780. The short-necked bulbs are 5 to 6 ins. in diameter, and are furnished with thin green leaves 2 to 3 ft. long, 3 to 4 ins. broad about the middle, but much narrower towards the base, and distinctly cross-veined. The stout, green, compressed peduncle is 2 to 3 ft. high, and bears from four to twelve flowers, almost or quite stalkless. The pure white bell-shaped flowers, 7 to 8 ins. deep, have oblong obtuse segments and a slender curved perianth-tube. The filaments are pure white, and about an inch shorter than the segments.

C. Hildebrandti.—A native of Johanna Island (Comoro Islands), where it grows on the mountains at an altitude of 3000 ft. The ovoid bulbs are 2 to 3 ins. in diameter, with a neck 4 to 5 ins. long. The strap-shaped leaves are bright green, 1½ to 2 ft. long and 1½ to 2 ins. broad, while the slender compressed peduncle, about 1 ft. high, carries four to eight or more flowers 8 to 12 ins. deep, and pure white. (*Bot. Mag.* t. 6709; *Ill. Hort.* 1886, t. 615.)

C. humile.—This species was introduced about 1826 from Tropical Asia, but appears to have disappeared from cultivation. The small roundish and greenish bulbs have very short necks, and the linear leaves are about a foot long. The white flowers, about 5 ins. deep, are borne in umbels of six to nine on a slender roundish peduncle, and have bright red filaments. (*Bot. Mag.* t. 2636.)

C. Johnstoni.—A native of British Central Africa, having large white flowers tinted with pink, like those of *C. latifolium*, and leaves 5 to 6 ft. long, and 2 to 2½ ins. broad in the middle (*Bot. Mag.* t. 7812). This fine species has proved to be quite hardy in Sir Trevor Lawrence's garden at Dorking, Surrey. It is therefore a great acquisition to the hardy flower-border, and ought to become very popular.

C. Kirki.—A native of Zanzibar, with roundish bulbs 6 to 8 ins. in diameter, and neck about 6 ins. long. The bright green strap-shaped leaves are 3½ to 4 ft. long, 4 ins. or more broad, and with roughish edges. The stout compressed peduncles are 1 to 1½ ft. high, two or three sometimes springing from one bulb, and bearing a dozen or more white flowers, broadly keeled with bright red. (*Bot. Mag.* t. 6512.) *Brunsvigia Massaiana*, figured in the *Illustration Horticole*, 1887, t. 55, seems to be identical with *C. Kirki*, but has a longer flower-tube.

C. Lasti.—A native of the Kongone Mountains, about 100 miles inland from Zanzibar, whence it was introduced in 1887. The short-necked bulbs are 4 to 5 ins. in diameter, the distichous, sword-shaped leaves being about 1 ft. long. Several pinkish flowers, 4 to 6 ins. deep, and with narrow segments, are borne on the stout and much compressed peduncle.

C. latifolium (*C. Linnæi*).—A species widely distributed in Tropical Asia, having short-necked, roundish bulbs 6 to 8 ins. in diameter, and numerous thin, bright-green, strap-shaped leaves 2 to 3 ft. long, 3 to 4 ins. broad, and somewhat roughish on the margins. From ten to twenty flowers are borne on a peduncle 1 to 2 ft. high. The curved perianth-tube is greenish, 3 to 4 ins. long,

while the oblong lance-shaped segments are washed with pink. (*Bot. Reg.* t. 1297; *Wight, Ic.* tt. 2019-2020.)

Forms of *C. latifolium* are *C. longistylum*, *C. moluccanum* (*Bot. Mag.* t. 2292), *C. speciosum*, (*Bot. Mag.* t. 2217), and *C. insigne* or *Amaryllis insignis* (*Bot. Reg.* t. 597), according to Mr Baker.

C. leucophyllum.—A native of Damaraland, with ovoid bulbs 5 to 6 ins. in diameter, and thick, fleshy, whitish-green, strap-shaped leaves 1½ to 2 ft. long, 5 to 6 ins. broad, arranged in two rows, and with denticulate margins. From thirty to forty pale pink flowers about 6 ins. deep, and with linear spreading segments, are produced in a dense umbel on a stout, much compressed peduncle a foot high. (*Bot. Mag.* t. 6783.)

C. lineare (*C. revolutum*; *C. algoense*; *Amaryllis revoluta*; *A. r. gracilior*).—This species was cultivated at Kew in 1779, having been introduced from S. Africa. It has small ovoid bulbs, and grey-green leaves 1½ to 2 ft. long, about ½ in. broad, and channelled down the face. About half a dozen flowers are borne on a slender roundish scape about 1 ft. high. The white oblanceolate-acute segments are tinted with red on the outside, the filaments being bright red. (*Bot. Mag.* tt. 623, 915.)

C. longifolium (*C. capense*; *C. riparium*; *Amaryllis longifolia*; *A. capensis*; *A. bullisperma*).—This fine species is spread throughout the whole of S. Africa, and has been in cultivation since 1752. It has ovoid bulbs 3 to 4 ins. in diameter, and gradually narrowed into a long cylindrical neck. The grey-green strap-shaped leaves are 2 to 3 ft. long, 2 to 3 ins. broad, and roughish on the margins; from six to twelve

large white flowers, usually flushed with red down the back, are borne on a roundish peduncle about 1 ft. high. (*Bot. Mag.* t. 661; *Red. Lil.* t. 347.)

There are several forms of this species, including *album*, with pure white flowers; *striatum*, white striped with pink; and *Lariniatum*, from the Kalahari Desert, with narrow, funnel-shaped, pink flowers, very long leaves, and a very long-necked bulb.

CULTURE AND PROPAGATION.—*C. longifolium* is quite hardy in the most favoured parts of the British Islands, and often flowers well during the summer months in the open air. Even in some of the less favoured spots it may be grown in the open air, but it is then essential to protect it with straw, litter, bracken, etc., during the winter months. It flourishes in a deep rich loamy soil, and enjoys an abundance of moisture during the summer season. When planted boldly in clumps, *C. longifolium* produces a luxuriant effect rarely seen in British gardens. New plants are readily obtained by detaching the offsets from the base of the old bulbs about April and May, or in the early autumn. If placed in pots in rich loamy soil, and grown on in a greenhouse or cold frame, with proper attention to watering, and sprinkling overhead occasionally, the young plants soon become established. Another method of propagation is by means of the large fleshy and peculiar bulb-like seeds, which are often freely produced in irregular, roundish capsules. When ripe, these fleshy seeds should be placed on the surface of moist soil in a greenhouse, and they will soon germinate.

C. longifolium, in conjunction with *C. Moorei*, has produced the charming hybrid named *C. Powellii*—which see.

The variety *album*, crossed with *C. yemense*, has produced a hybrid called *Alexandrae*. A form called *riparium*, crossed with *C. pratense*, has produced *C. Belladonna*. *C. longifolium* itself and *C. lineare* has produced a hybrid known as *Victoriae*. Many other garden hybrids have been raised from *C. longifolium* and others.

C. Lugardæ.—A distinct species from the Kwebe Hills, S. Central Africa, having small bulbs, long, narrow, rough-edged leaves, and white flowers with a light pink median stripe, borne on scapes 4 to 12 ins. high (*Gard. Chron.* 1903, xxxiv. 49).



FIG. 101.—*Crinum Moorei*. ($\frac{1}{2}$.)

C. Macowani.—A species from Natal, closely related to *C. latifolium*, with large, roundish bulbs 9 to 10 ins. in diameter, and a neck 6 to 9 ins. long. The leaves are thin, bright green, strap-shaped, 2 to 3 ft. long and 3 to 4 ins. broad, while from ten to fifteen funnel-shaped, pinkish flowers are borne on a stout green peduncle 2 to 3 ft. high. (*Bot. Mag.* t. 6381.)

C. Moorei (*C. Makoyanum*; *C.*

Colensoi; *C. Mackeni*; *C. natalense*).—A fine species, native of Natal and Kaffraria, with very large ovoid and long-necked bulbs, remarkable for producing stolons or runners. The thin, bright green, strap-shaped leaves are 2 to 3 ft. long and 3 to 4 ins. broad, with entire margins. The large bell-shaped flowers, 6 ins. or more across, are soft pink in colour, from six to ten being borne on a green, stoutish peduncle 2 to 3 ft. high. (*Bot. Mag.* t. 6113; *Gard. Chron.* 1887, ii. fig. 101.)

There is a good deal of variation in this species, and there is one form called *album* (or *Schmidtii*), with pure white flowers (*Gartenfl.* t. 1072); and another called *variegatum*, having the leaves striped with yellow. *C. Worsleyi* is a hybrid between *C. scabrum* and *C. Moorei*.

CULTURE, ETC.—This is practically the same as recommended for *C. longifolium*, the only difference being that *C. Moorei* is somewhat more tender in its nature. The bulbs should therefore be planted in rich, well-drained loamy soil in warm, sunny and sheltered borders, and only in the most favoured part of the British Islands. Plenty of water is necessary in hot summers, and protection must be given in winter if necessary.

C. natans.—An aquatic species from Guinea, having submerged strap-shaped leaves 4 to 5 ft. long and 1½ to 2 ins. broad, and strongly waved. The stalkless flowers are borne on top of a scape about 1 ft. high, and are white, with a pale green cylindrical tube 6 ins. long. (*Bot. Mag.* t. 7862.)

C. nobile.—A fine species, having stout short-necked bulbs, wavy olive-green leaves, and flowers measuring about 7 ins. across. They are creamy

white suffused with purple-rose on the outer halves of the petals, the same colour being more conspicuous on the outer surface of the segments.



FIG. 102.—*Crinum nobile*. (L.)

C. pedunculatum (*C. taitense*; *C. canaliculatum*; *C. australe*; *C. exaltatum*).—A fine Australian species, having long-necked bulbs 4 ins. in diameter, and thin, bright green, strap-shaped leaves 3 to 4 ft. long and 4 to 5 ins. broad. From twenty to thirty greenish-white flowers are borne on a two-edged peduncle 2 to 3 ft. high, the segments being linear and spreading, and the filaments bright red. This is a somewhat variable and apparently widely distributed species, which would account for its several synonyms. (*Bot. Reg.* t. 52; *Red. Lil.* t. 408.) Fig. 103.

C. podophyllum.—A native of Old Calabar, closely related to *C. giganteum*.

teum, having roundish bulbs $1\frac{1}{2}$ to 2 ins. in diameter, and thinnish, oblanceolate-acute leaves about 1 ft. long, and $1\frac{1}{2}$ to 2 ins. broad at the middle. The green, slender, compressed peduncle is usually about 1 ft. high, but is occasionally absent or much shorter, and only carries two or three pure white flowers having a slender curved tube and oblong spoon-shaped segments (*Bot. Mag.* t. 6483). There is a finer form called *magnificum*.



FIG. 103.—*Crinum pendunculatum*. (A.)

C. Powellii (*C. Lesemannii*).—This is a fine hybrid between *C. longifolium* and *C. Moorei*, both natives of S. Africa. It has roundish, short-necked bulbs, and bright green, pointed, sword-shaped leaves 3 to 4 ft. long and 3 to 4 ins. broad. About eight large flowers are borne on a flattened grey-green peduncle about 2 ft. high, the oblong, lance-shaped, acute segments being tinted with red down

the centre. There is a pure white flowered variety called *album*, and a deeper coloured red one called *rubrum*.

C. Powellii and its varieties require the same treatment as *C. longifolium*.

C. pratense.—A native of the East Indian plains, with ovoid bulbs 4 to 5 ins. through, and narrow leaves $1\frac{1}{2}$ to 2 ft. long. Flowers white, with greenish tube 3 to 4 ins. long, and bright red filaments. The variety *lorifolium* has weak decumbent leaves 4 to 5 ft. long; *elegans* has long-necked bulbs (*Bot. Mag.* t. 2592); and *venustum* has as many as thirty flowers in an umbel.

C. purpurascens.—An aquatic species from the lakes and streams of Guinea and Fernando Po (west Tropical Africa). The short-necked, ovoid bulbs, about 2 ins. in diameter, produce numerous runners or stolons, and are furnished with very wavy leaves 1 to 3 ft. long, about 1 in. broad, and thin in texture. The slender peduncle is a foot or less high, with five to nine flowers, white tinged with red on the outside, and having bright red filaments. (*Bot. Mag.* t. 6525.)

C. rhodanthum.—A native of Bechuanaland, with strap-shaped leaves a foot long and $1\frac{1}{2}$ to 2 ins. wide, and several red flowers on the scape (*Gard. Chron.* 1900, xxviii. 142).

C. Samueli.—A species from Central Africa, with bulbs about 3 ins. through, leaves 4 ft. long and $2\frac{1}{2}$ ins. broad, rough on the edges, and odourless white flowers faintly flushed with pink (*Gard. Chron.* 1902, xxxii. 304).

C. Sanderianum (*C. ornatum*, Bury).—A native of Sierra Leone, nearly allied to *C. scabrum*. The roundish bulbs are 2 to 3 ins. in diameter, with necks 2 to 3 ins. long, and thin sword-like leaves, $1\frac{1}{2}$ to 2 ft.

long, 1 to 1½ ins. broad, tapering to a long point, and much crisped at the denticulate margin. From three to six stalkless flowers are borne on a peduncle 1 ft. high, the white segments being keeled with bright red.



FIG. 104.—*Crinum Sanderianum*. (3).

C. scabrum.—This species is widely spread in Tropical Africa from Guinea across to Abyssinia and Kordofan. It has large, ovoid, purple-brown, short-necked bulbs, and bright green strap-shaped leaves 2 to 3 ft. long, 1½ to 2 ins. broad, and rough on the edges. The stout peduncles are 1 to 2 ft. high, and carry an umbel of four to eight flowers, the oblong-acute segments of which are keeled with bright red. *C. Ruppelianum* seems to be a variety. (*Bot. Mag.* t. 2180.)

C. Schimperi.—An Abyssinian species with elongated bulbs, and strap-shaped grey-green leaves slightly roughish on the edges. About half a dozen white stalkless

flowers are borne on the peduncle. (*Bot. Mag.* t. 7417; *Gartenjl.* 1889, t. 1309.)

C. Van Tubergeni.—Under this name a stately *Crinum* has been described by Mr R. J. Lynch, and figured in the *Gardeners' Chronicle* for August 12, 1899, p. 133. It is a very distinct-looking plant about 3 ft. high, having leaves about 5 ft. long and 5 to 6 ins. wide. The white bell-shaped flowers are borne in a dense truss a foot or more in diameter. This plant has been grown for many years in Holland, but its history has been lost. It is thought to be a form of *C. longifolium*, but is quite distinct from that species horticulturally.

C. Vassei, from Mozambique, has ovoid bulbs 4 ins. thick, narrow strap-shaped leaves up to 2 ft. long, and white flowers, having a red stripe down the centre of the narrow segments (*Rev. Hort.* 1908, 132, f.).

C. Winbushi.—This is closely related to *C. Samueli*, but has smooth-edged leaves and slightly fragrant but more fleeting flowers (*Gard. Chron.* 1902, xxxii. 303).

C. yemense.—A species closely related to *C. abyssinicum*, from which it is distinguished by its larger and more numerous flowers, having broader segments. Many plants called *yemense* are only forms of *C. latifolium*.

C. yuccæflorum (*C. yuccæoides*; *C. Broussoneti*; *Amaryllis Broussoneti*; *A. spectabilis*; *A. ornata*, Aiton).—A native of Sierra Leone, whence it appears to have been introduced by Lord Petre in 1740, and was grown at Kew in 1785. It has small, round, purplish bulbs without any distinct neck, and linear leaves 1 to 1½ ft. long and about an inch broad. The slender peduncle about 1 ft. high bears one or two white flowers, with a greenish, curved perianth-tube,

the oblong-acute segments being banded with red on the back. (*Bot. Mag.* t. 2121; *Lodd. Bot. Cab.* t. 668; *Red. Lil.* t. 62; *And. Bot. Rep.* t. 390.)

C. zeylanicum (*C. Herbertianum*; *C. Wallichianum*; *Amaryllis zeylanica*).—This species is widely distributed in Tropical Africa and Tropical Asia, and seems to have been known since 1697. It has short-necked bulbs 5 to 6 ins. in diameter, and bright green strap-shaped leaves 2 to 3 ft. long, 3 to 4 ins. broad, and slightly scabrous on the edges. The stout, reddish peduncle, 2 to 3 ft. high, bears ten to twenty large sweet-scented flowers, the segments of which are broadly banded with bright red outside. The variety *reductum*, from Zanzibar, has leaves only 1 to 1½ ft. long, and about 2 ins. broad. (*Bot. Mag.* t. 1171, as *Amaryllis ornata*.)

CROCOSMA (*crocus*, saffron; *osme*, smell; in allusion to the odour when the dried flowers are immersed in warm water). Nat. Ord. Iridææ.

C. aurea (*Tritonia aurea*).—The only species in the genus is a beautiful garden plant from S. Africa, with fibrous-coated corms and narrow sword-like leaves about 1 ft. long. The bright orange-red blossoms are borne during the summer and autumn months on winged stems about 2 ft. high. The perianth has a cylindrical incurved, slender tube, and oblong segments. The variety *imperialis* has numerous beautiful fiery orange-red blossoms almost twice as large as those of the type, and borne on taller stems. The variety *maculata* has also large orange-red flowers, the three inner segments of the perianth having a red-brown blotch near the base. (*Bot. Mag.* tt. 61, 4335; *Fl. d. Serr.* t. 702; *Gard. Chron.* 1888, v. 4, fig. 80.)

CULTURE AND PROPAGATION.—This plant, better known in gardens as *Tritonia aurea*, is often cultivated in greenhouses. In the more favourable parts of the Kingdom, however, it can be grown in the open air, and makes a charming border flower, useful for cutting. A light, rich loamy soil with the addition of peat and leaf-mould suits it very well, and in favourable spots it spreads rapidly by means of creeping rhizomes. The plants may remain undisturbed for two or three seasons, merely covering them with a layer of leaves or litter during hard frosts. In colder localities, however, it is safer to lift the corms when the leaves have begun to wither—say about the middle of November—and store them in sand; or better still, pot them up, as they do not like being “dried off” too much. They may be replanted in the spring. The young offsets may be detached and grown by themselves until large enough for making clumps in the border. Seeds may be sown when ripe in cold frames, and grown for a year before putting outside.

CROCUS (a Chaldean name for saffron, used by Theophrastus about 370 B.C.). Nat. Ord. Iridææ.—This genus contains about 100 species of plants having fibrous-coated, fleshy corms, from which arise narrow, channelled leaves and erect, funnel-shaped flowers wrapped in one or two semi-transparent spathes, and remarkable for a long slender tube; for the three stamens inserted at the throat, and for the stigma being divided into three branches or stigmata.

Generally speaking, the greater number of species of Crocuses are unknown outside botanic gardens or some private collections where

special attention is paid to them. The numerous varieties of garden Crocus have all been derived from *C. vernus*, and most people are satisfied with the gorgeous display made by these in the early spring. There are, however, many other species worth cultivating, and as they are

species prolong the flowering period of the Crocuses proper from September till the following March and April. In the depth of winter the more tender kinds may be cultivated in pots or pans, and by placing them in the genial warmth of a greenhouse or conservatory, or even protected in a cold frame, they will brighten the dull days with their colour. To give some idea of the wealth of the genus Crocus, they may be conveniently divided into two groups, (1) Spring-flowering and (2) Autumn-flowering, as follows:—

I.—SPRING-FLOWERING CROCUSES.

<i>C. ærius.</i>	<i>C. hyemalis.</i>
<i>C. alatavicus.</i>	<i>C. Imperati.</i>
<i>C. ancycrensis.</i>	<i>C. Korolkowi.</i>
<i>C. aureus.</i>	<i>C. Malyi.</i>
<i>C. Balanœ.</i>	<i>C. minimus.</i>
<i>C. banaticus.</i>	<i>C. montenegrinus.</i>
<i>C. biflorus.</i>	<i>C. nevadensis.</i>
<i>C. Biliotti.</i>	<i>C. Olivieri.</i>
<i>C. Boissieri.</i>	<i>C. reticulatus.</i>
<i>C. candidus.</i>	<i>C. Sieberi.</i>
<i>C. carpetanus.</i>	<i>C. stellaris.</i>
<i>C. chrysanthus.</i>	<i>C. suaveolens.</i>
<i>C. corsicus.</i>	<i>C. Susianus.</i>
<i>C. Crewei.</i>	<i>C. Suterianus.</i>
<i>C. cyprius.</i>	<i>C. Tauri.</i>
<i>C. dalmaticus.</i>	<i>C. Tommasinianus.</i>
<i>C. Danfordiæ.</i>	<i>C. veluchensis.</i>
<i>C. etruscus.</i>	<i>C. vernus.</i>
<i>C. Fleischeri.</i>	<i>C. versicolor.</i>
<i>C. Gaillardoti.</i>	<i>C. vitellinus.</i>
<i>C. gargaricus.</i>	

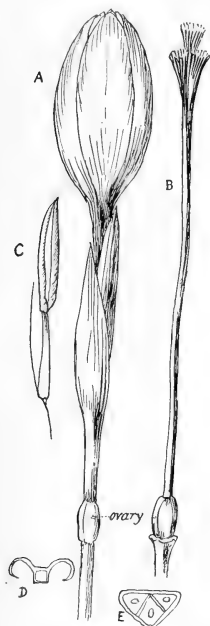


FIG. 105.—Crocus, showing A, flower; B, long style and stigmas; C, stamen; D, section of leaf; E, section of ovary.

mostly hardy, may be grown in the open air in the same way as the varieties of *C. vernus*. The fact that many of them flower in autumn instead of in the spring, is another reason why they should be more generally known, as these later

The species mentioned above may be planted in the open air from August to the end of October. The corms should be planted from 3 to 5 ins. deep, and about the same distance apart, and in hundreds or thousands instead of half-dozens—except, of course, in the case of very rare species. These would be safer grown in pots or pans, or in sheltered

and safe parts of the rock-garden where they can be watched and looked after easily. The commoner species may be planted in the formal flower-beds, in the borders and shrubberies beneath deciduous flowering trees and shrubs, in grassland, on lawns, or in the rockery, in all of which places they will make a charming and brilliant display early in the year.

II.—AUTUMN-FLOWERING CROCUSES.

<i>C. asturicus.</i>	<i>C. marathonisius.</i>
<i>C. cancellatus.</i>	<i>C. medius.</i>
<i>C. Boryi.</i>	<i>C. nudiflorus.</i>
<i>C. byzantinus.</i>	<i>C. ochroleucus.</i>
<i>C. Cambessedesi.</i>	<i>C. pulchellus.</i>
<i>C. caspius.</i>	<i>C. Salzmanni.</i>
<i>C. Clusi.</i>	<i>C. sativus.</i>
<i>C. hadriaticus.</i>	<i>C. Scharojani.</i>
<i>C. hermoneus.</i>	<i>C. serotinus.</i>
<i>C. iridiflorus.</i>	<i>C. speciosus.</i>
<i>C. Karduchorum.</i>	<i>C. Tourneforti.</i>
<i>C. lævigatus.</i>	<i>C. zonatus.</i>
<i>C. lazicus.</i>	<i>C. vallicola.</i>
<i>C. longiflorus.</i>	<i>C. Veneris.</i>

The Crocuses that flower in the autumn must not be confused with *Colchicum autumnale* (see p. 145), which is popularly known as the "Autumn Crocus"—although it has nothing whatever to do with the genus *Crocus*, and even belongs to a quite different family—the Liliacæ.

The species of true *Crocus* mentioned above are in most cases quite hardy, and when procurable in quantity should be planted in bold masses in the same way as the spring-flowering kinds. The period of planting, however, is much earlier, and the corms should be in the ground not later than the end of June or July, as some of the earlier kinds—e.g. *C. Scharojani*—come into blossom in August.

Once Crocuses of all kinds are

established, it is a good plan to leave them undisturbed for some years if possible. They will then produce a more gorgeous effect year after year. After the flowering period is over, and the dead foliage is cleared away, the ground may be covered with fibrous-rooted plants to fill up the remaining portion of the year.

PROPAGATION.—Crocuses as a rule are easily increased by separating



FIG. 106.—Crocus, corms with seed-pods. (½.)

the young corms from each other and planting each one singly. These young corms are the result of the season's growth, and are developed on top of the original corm, which yields up its store of nourishment for the production of flowers and leaves. This process goes on year after year, and if the plants are not lifted the new corms are always kept at a proper depth beneath the surface of the soil by means of the force exerted by the contractile roots (see p. 8).

When it is desired to raise Crocuses from seed, one should wait until the capsules are thoroughly ripe, and, with few exceptions, most Crocuses produce seed. In the early stages the seed-vessel is hidden beneath the soil, and it is not until after the

flowers wither that it is pushed above ground, to ripen in the sun and air by the lengthening stalk. When thoroughly ripe, the seeds should be sown in well-drained pots or pans in rich gritty soil. The seeds will sprout the following spring, and should not be disturbed for a couple of years. At the end of this period the young corms will be about as large as peas, and may be planted out in rows in an open but sheltered and sunny part of the garden. Here many will flower the third season, some in the fourth year, and others again in the fifth or even the sixth.

LIFTING CROCUSES.—If it is necessary to lift the plants from beds or borders, the best time to do so is when the leaves have withered. If the leaves are slow in ripening, the process may be accelerated by twisting them and tying in a bunch. The corms should then be carefully lifted with a fork, and cleaned and stored away in a cool, airy place until the planting season.

The following are some of the best Crocuses in cultivation:—

C. aërius.—A native of Asia Minor, with bright lilac flowers having a yellow throat, and appearing in spring when the leaves are only slightly developed (*Bot. Mag.* t. 6852, B.; *Maw, Crocus*, t. 58). The variety *major* is a fine form.

C. alatavicus.—This comes from the mountains of Siberia, and has grassy leaves a foot long, and in February small white flowers with a yellow throat, and freckled and feathered with purple on the outside (*Gartenfl.* t. 906; *Maw, Crocus*, t. 45).

The variety *porphyreus* has the three outer segments bright claret-purple, and three white inner segments. There is also a white-flowered form, coloured buff on the outside.

C. ancyrensis.—A spring-flowering species from Asia Minor, with fine orange-red flowers, having an orange or purple tube, some seedling forms being feathered and washed with brown (*Maw, Crocus*, t. 38).

C. asturicus.—A pretty Spanish autumnal Crocus with leaves about 1 ft. long, produced after the violet or purple flowers. These appear from September to November, and are 4 to 5 ins. long, with a violet-bearded throat. (*Bot. Mag.* sub t. 3998; *Maw, Crocus*, t. 7.) There are several pretty forms, the best being *azureus*, blue; *atropurpureus*, dark purple; *lilacinus*, lilac; *pallidus*, pale mauve; and *purpureus*, bright purple.

C. aureus (*C. lagenæflorus*; *C. mæsiacus*; etc.).—A beautiful old Crocus, native of S.E. Europe, with rich golden-yellow flowers, usually produced in February (*Bot. Mag.* tt. 652, 938, 1111, 1384, 2655, 2685, 2986; *Red. Lil.* t. 196; *Maw, Crocus*, t. 55).

From this species the infertile common or "Dutch Yellow" Crocus of gardens has descended, and also numerous varieties like *Aucheri*, deep orange; *lacteus* and *lacticolor*, milky white; *sulphureus* and *sulphureus pallidus*, sulphur or fine primrose-yellow; *luteus striatus*, with three distinct black stripes on the back of the outer segments; etc. Most of the forms of *C. aureus* never ripen seeds.

C. Balansæ.—A rare and pretty little Crocus, native of Western Asia Minor, and remarkable for its pear-shaped corms about 1 in. broad and leaves about 10 ins. long. Flowers in March, 2 to 2½ ins. long, orange-yellow, the outer surface feathered or tinted with brown or bronze. (*Maw, Crocus*, t. 51.)

C. banaticus (*C. veluchensis*).—A native of South Hungary, with leaves

about 15 ins. long. The beautiful flowers appear in February and March, the inner segments being rich bright purple, with deeper coloured markings near the apex and a white throat, and are paler than the outer ones, varying to white or variegated with purple and white. (*Maw, Crocus*, t. 24; *Bot. Mag.* t. 6197.) There are several good forms of this species, such as *albiflorus*, *concolor*, *niveus*, *victus*, and *versicolor*.

C. biflorus (*C. annulatus*).—This handsome species, known as the *Scotch* or *Cloth of Silver Crocus*, is found wild in many parts of Italy, and extending eastwards to the Caucasus. It has short, erect, narrow leaves with a distinct white midrib. The flowers appear in February and March, and vary in colour from white to a pale lavender, the outer segments being distinctly feathered with purple and yellow within. (*Bot. Mag.* t. 845; *Red. Lil.* t. 294; *Maw, Crocus*, t. 59.)

There are many forms:—*Argenteus*, snowy white, feathered with black, has conspicuous bright orange stigmas; *estriatus*, rosy-lilac washed with buff; *Adami*, from the Caucasus, pale purple, or feathered outside with deeper veins (*Bot. Mag.* t. 3868); *minor* is a free-flowering form with lilac inner segments, the outer ones being striped with purple; *Pestalozzæ* is a charming variety with small white and yellow flowers, and is a form of *nubigenus* from Asia Minor, the flowers of which are suffused and speckled with brown; *pusillus* is excellent for edgings and masses, and has an orange throat and white feathered outer segments; and the Hungarian *Weldeni* varies from pure white to mauve stained with blue (*Bot. Mag.* t. 6211). The variety *Leichtlini* is recognised by its white or pale purple sweet-scented flowers with

narrow lance-shaped segments. The variety *Alexandri* has the outer segments suffused or striped with purple on the outside, the inside being white (*Bot. Mag.* t. 7740).

C. Billotti.—A charming Crocus from Trebizond, having dark rich purple flowers with a deeper coloured blotch near the throat, from January to March (*Maw, Crocus*, t. 86, B.)

C. Boissieri.—A rare species from the Cilician Mts., having pure white flowers with ovate lance-shaped segments about 1½ ins. long (*Maw, Crocus*, t. 20).

C. Boryi.—A late autumn-flowering Crocus from the Grecian Archipelago, 3 to 4 ins. high, with creamy-white flowers about November, having an orange-yellow throat, and pale purple veins on the base of the petals (*Bot. Reg.* 1847, t. 16). The variety *marathonisus* has very large pure white flowers with less-branching stigmas level with the anthers (*Maw, Crocus*, t. 47).

C. byzantinus (*C. iridiflorus*).—A fine autumnal Crocus from the Banat and Transylvania, flowering in September and October. The three outer reflexed segments are a clear rich purple, in contrast to the three much smaller pale lilac inner segments. The stamens have lilac filaments and orange anthers, while the stigmata are purple. (*Bot. Mag.* t. 6141; *Bot. Reg.* 1847, t. 4; *Maw, Crocus*, t. 1.) The variety *albus* has white flowers.

C. Cambessedesi.—A native of the Balearic Isles, Majorca and Minorca, having pretty little whitish or wine-purple flowers, buff or pale yellow outside and striped with purple, and produced from late September to March (*Maw, Crocus*, t. 13; *Bot. Reg.* 1845, t. 37).

C. cancellatus.—A handsome autumnal Crocus, native of Asia Minor, with leaves about a foot

long. The flowers appear from September to December, and are 4 to 5 ins. long, with a yellow unbearded throat, and vary from white to pale purple, sometimes feathered with purple. (*Bot. Mag.* sub t. 3864; *Bot. Reg.* 1847, t. 16; *Maw, Crocus*, t. 31.)

The variety *cilicicus* has lilac flowers veined with purple. A form of it, called *lilacinus*, has larger soft lilac-striped blossoms. The variety *mazzaricus* is white, with a bright golden-orange throat. The corms of *C. cancellatus* are sold for food in the markets of Damascus.

C. candidus.—This spring-flowering species has globular white flowers, having the outer segments more or less conspicuously veined with purple-lilac (*Maw, Crocus*, t. 54). The variety *luteus* has deep yellow flowers veined and mottled with purple outside.

C. carpetanus.—A distinct species from Spain and Portugal, having cylindrical leaves about 8 ins. long. Flowers from February to April, with a white unbearded throat, and segments varying from delicate vinous lilac to white, darker on the margins, the outer surface suffused with bluish veins towards the base. (*Maw, Crocus*, t. 41.)

C. caspius.—A native of the Caspian shores, with beautiful flowers in the autumn, varying from white to rosy-pink and pale rosy-lilac in the variety *lilacina*. Stigmata not lobed. Rather tender, and is best grown in pots in frames or cool houses. (*Gard. Chron.* 1903, xxxiv. 443, f. 173; *Maw, Crocus*, t. 46.)

C. chrysanthus.—A native of S.E. Europe, with rich orange-yellow flowers from January to March, with yellow or rich scarlet stigmata (*Bot. Reg.* 1847, t. 4; *Maw, Crocus*, t. 62). There are several forms, including

albidus, white with a blue base; *Canary Bird*, rich canary-yellow, sweetly-scented; *fusco-lineatus*, clear yellow, striped with crimson-brown; *cærulescens*, bluish-tinted; and *fusco-tinctus*, clear yellow suffused with brown. Seedling forms show great variation in colour, and it is by no means difficult to confuse them with forms of *C. biflorus*.

C. Clusi.—An autumnal Crocus, native of Spain and Portugal. Flowers from September to December, 3 to 4 ins. long, with a white bearded throat, and pale purple unfeathered segments deeper in colour near the base. There is also a white-flowered form. (*Bot. Reg.* 1845, t. 47; *Maw, Crocus*, t. 10.)

C. corsicus (*C. insularis*).—A rare Corsican species. Flowers in April, 2 to 3 ins. long, with a white or lilac unbearded throat, and pale purple segments, feathered and striped with purple outside and tinged with buff. Stigmata bright scarlet. (*Maw, Crocus*, t. 21; *Bot. Reg.* xxix. t. 21.)

C. Crewei.—A distinct species from Asia Minor, closely related to *C. biflorus*, and distinguished by its almost black anthers and rich orange centre. The flowers appear in February, and are whitish, tinged outside with buff and lined with purple. (*Gard. Chron.* 1893, xliii. 278; *Maw, Crocus*, t. 60.)

C. cyprius, from the Cyprian Olympus (alt. 5000 ft.), produces its bright lilac flowers with a rich purple blotch at base, early in April (*Maw, Crocus*, t. 57.)

C. dalmaticus.—A Dalmatian Crocus, with pear-shaped corms and leaves 8 to 9 ins. long. Flowers in February and March (and often in the month of January), with a yellow unbearded throat and lilac segments, the outer ones shaded fawn, with a few purple veins at the base, or

delicately feathered with purple. (*Maw, Crocus*, t. 34.) A pretty form called *violaceus* has violet and blue flowers.

C. Danfordiæ.—A native of Asia Minor, having ciliated leaves a foot or more long, and pale sulphur-yellow flowers in February and March, the outer segments often being washed with brown (*Maw, Crocus*, t. 63).

C. etruscus.—An Italian Crocus with narrow linear leaves having a central white band. Flowers in March, 2 to 3 ins. long, the tube striped with lilac and the throat yellow. Segments bright lilac-purple inside, the three outer ones with five lilac or purple stripes down the back. (*Bot. Mag.* t. 6362; *Maw, Crocus*, t. 22.)

C. Fleischeri.—A handsome Crocus from Asia Minor, with a beautifully netted yellow corm and leaves about 1 ft. long. Flowers in early spring, with a pale yellow unbearded throat, and white linear lance-shaped segments, the outer ones being veined with rich purple. (*Maw, Crocus*, t. 66.)

C. Gaillardoti.—A little-known spring-flowering Crocus from N. Palestine and Syria, having pretty little white flowers washed outside with lilac in December and January (*Maw, Crocus*, t. 40).

C. gargaricus.—A native of Bithynia (Mt. Gargarus), having self-coloured yellow-orange flowers in early spring (*Bot. Reg.* 1847, t. 16, 1; *Maw, Crocus*, t. 39).

C. hadriaticus.—A distinct autumnal Crocus from the Grecian Archipelago, with leaves over 1 ft. long, ciliated on the margins and keel. Flowers about October, 3 to 4 ins. long, with a white or purple bearded throat, and ovate lance-shaped segments pure white or purple towards the base. (*Bot. Reg.* 1847, t. 16, 7-

9; *Maw, Crocus*, t. 30.) The variety *chrysobelenicus* has white flowers with a yellow throat feathered at the base with reddish lines (*Maw, Crocus*, t. 30, f. 3); and the variety *Saundersianus* has beautiful white flowers with a richly coloured violet base.

C. hermoneus.—This species grows wild on Mt. Hermon, at an altitude of 9000 ft. It has white flowers shaded and veined with pale lavender, a contrast to the yellow anthers and deep orange stigmata. (*Maw, Crocus*, t. 44.)

C. hyemalis.—A native of Palestine and Syria, and remarkable for producing its blossoms from November to January. The perianth is white veined with purple towards the base and washed with yellow in the throat. The tender variety *Foxi* has the outer segments of its fragrant flowers streaked and suffused with purple. (*Maw, Crocus*, t. 43, ff. 7, 8.)

C. Imperati.—A very fine Italian Crocus, having sweet-scented flowers from January to March, lilac-purple inside, the outer segments being marked with three more or less feathered, deep purple lines (*Bot. Reg.* t. 1993; *Maw, Crocus*, t. 14.) The variety *albidus* has white, faintly striped flowers, and yellow stigmata; *roseus* has flowers of a clear rose; and *purpureus*, white outside, purple inside (*Gartenfl.* t. 1280).

C. Karduchorum.—An Armenian Crocus, with slender grassy leaves 1 to 2 ins. long, those of the previous year persisting until the flowering period next autumn. The flowers have a long unbearded perianth-tube and vinous-lilac segments veined with delicate purple, the anthers and stigmata being creamy white. (*Maw, Crocus*, t. 5.)

C. Korolkowi.—A native of Central Asia, having large flattish corms, and bright yellow flowers tinged outside

with brown or purple, and borne in February and March (*Bot. Mag.* t. 6852, A.; *Maw, Crocus*, t. 56.)

C. lævigatus.—The flowers of this variable species from the Cyclades appear from October to spring, and vary from white to lilac, the outer segments being fawn coloured, veined and washed with purple (*Maw, Crocus*, t. 49.)

C. lazicus.—This species from the mountains of Laziston, in Asia Minor (8000 ft. alt.), has very small corms, and produces its orange-yellow flowers in August (*Maw, Crocus*, t. 12.)

C. longiflorus (*C. odoratus*).—A beautiful autumnal Crocus from S. Europe. The sweet-scented flowers appear in October and November, and are of a pale rosy-lilac, yellow towards the base, and veined with purple. (*Bot. Reg.* xxx. t. 3; *Maw, Crocus*, t. 28.) The variety *melitensis* is freely feathered with purple (*Bot. Reg.* 1844, t. 3, f. 5); and *Wilhelmi* is a less robust form, with paler flowers.

C. Malyi.—A pretty species from Mt. Vermaz, in Dalmatia. It has white flowers in March, the tube being yellow, and the orange throat suffused with vinous purple outside. (*Maw, Crocus*, t. 18.)

C. marathonisius. This is considered to be a variety of *C. Boryi*—which see.

C. medius.—A handsome autumnal Crocus from the Riviera region. The bright purple flowers appear in October and November, and are veined with deeper purple, the stigmata being bright scarlet. (*Bot. Reg.* 1843, t. 21; *ibid.* 1845, t. 37; *Maw, Crocus*, t. 27.) The variety *pallidus* has rosy-lilac blossoms. There is also a rare white-flowered form.

C. minimus.—A pretty little Corsican Crocus which produces its deep rich purple flowers in March and

April, the outer surface being suffused with buff and veined with purple (*Red. Lil.* t. 81; *Bot. Mag.* t. 6716; *Maw, Crocus*, t. 19.)

C. mœsiacus.—This is the name given by Mr Baker in his *Handbook of the Irideæ* to the Crocus much better known as *C. aureus*—which see.

C. montenegrinus.—A spring-flowering Crocus from Montenegro, with creamy-white unstriped blossoms, remarkable for having a stigma-like appendage at the tip of the filaments—probably a monstrosity (*Maw, Crocus*, t. 23.)

C. nevadensis (*C. algeriensis*; *C. atlanticus*).—This species from Spain and Algeria blooms in January, the segments being pale lilac or white, veined and feathered with purple (*Maw, Crocus*, t. 42.)

C. nudiflorus (*C. pyrenæus*).—A handsome autumnal Crocus, native of S.W. Europe, and at one time naturalised in some parts of England. The clear purple or violet flowers appear from September to October without the leaves, which do not appear till spring. There is a rare white-flowered form called *albus*. A peculiarity of this species is that the corms emit creeping shoots which develop independent corms. (*Maw, Crocus*, t. 6.)

C. ochroleucus.—This species from Asia Minor produces its creamy-white flowers tinged with orange at the base, from October to December (*Bot. Mag.* t. 5297; *Maw, Crocus*, t. 11.)

C. Olivieri.—A native of Greece, with bright orange flowers in March (*Bot. Mag.* t. 6031; *Maw, Crocus*, t. 53.)

C. pulchellus.—This pretty Turkish Crocus produces its large lavender-blue flowers freely from September to December, the petals being deeply veined, and the throat washed or

spotted with orange-yellow (*Bot. Reg.* xxx. t. 3).

There is a lovely white-flowered form, with white anthers.

C. reticulatus (*C. variegatus*).—A pretty Crocus from Central and S.E. Europe. The flowers appear in March, and vary from white to deep lilac, the outer segments being feathered with purple, while the anthers are orange and the stigmata scarlet. (*Lodd. Bot. Cab.* t. 1822; *Maw, Crocus*, t. 35.)

C. Salzmanni.—A vigorous autumnal Crocus from the S. of Spain and N. Africa, having flowers with a bearded yellow throat, and pale lilac or sometimes white segments, feathered with purple outside (*Bot. Mag.* t. 6000; *Maw, Crocus*, t. 9; *Bot. Reg.* 1847, t. 4).

C. sativus.—This is the "Saffron Crocus," once grown extensively at Saffron-Walden, in Essex. Its many forms are found from Italy eastwards to Kurdistan, and may be distinguished by the rather large, globular, depressed corms, and narrow, keeled and ciliated leaves. The flowers appear from October to December, and have a white or purple bearded throat and bright lilac segments, purple towards the throat and suffused throughout with purple veins. The scarlet drooping stigmata are occasionally fringed, and about 2 ins. long. The cultivated forms furnish the saffron of commerce, but they never produce seed. (*Bot. Mag.* t. 274; *Red. Lil.* t. 173; *Maw, Crocus*, t. 29.) Of the many forms, those most often seen are *Cartwrightianus*, lilac, and its white form *albus*; *Elvesi*, rosy-lilac; *Haussknechti*, white with yellow base, very free-flowering; *Pallasi*,

lilac, delicately veined, with a white-flowered sub-variety from Patras; *Taitia*, deep lilac; some of these seed freely.

C. Scharojani.—A handsome Crocus from the Western Caucasus, where it grows wild at an elevation of 7000 ft. The flowers appear in July and August, and are of a bright deep orange-yellow. The leaves appear after the flowers, and persist until the flowering period the following year. (*Gartenfl.* t. 578; *Maw, Crocus*, t. 3.)

C. serotinus.—A rare and rather difficult Crocus to grow. It is supposed to be a native of Spain, and produces its bright lilac or purple flowers about November. It requires protection in a cold frame or under a hand-glass. (*Salisb. Parad.* t. 30; *Bot. Mag.* t. 1267.)

C. Sieberi (*C. nivalis*; *C. sublimis*).



FIG. 107.—*Crocus Sieberi versicolor*. (3.)

—This species, from the Greek mountains and Archipelago, flowers in February and March. The roundish

perianth is bright lilac with a rich golden base, and a beardless orange throat, in the centre of which are the orange stamens and orange-scarlet stigmata. (*Bot. Mag.* tt. 1043, 6036; *Maw, Crocus*, t. 33.) The variety *versicolor* varies in colour from white to purple, with white and purple veins and feathering, and always a rich golden-yellow base. *Purpureus* has deep purple flowers; and there are several other variations.

C. speciosus (*C. multifidus*).—This handsome autumnal Crocus extends from Central Europe eastwards through the Crimea and Caucasus to Persia, and is perhaps the finest of all the autumnal species. The large flowers appear at the end of September and in October, and are of a beautiful bright lilac or bluish-purple, striped inside with deeper purple, and having bright orange conspicuously fringed stigmata in the centre. (*Bot. Mag.* t. 3861; *Bot. Reg.* xxv. t. 40; *Maw, Crocus*, t. 64.) The variety *transylvanicus* has flowers of a deeper purple-lilac than the type; *albus* is a rare white-flowered form; and *Aitchisoni* has larger and deeper coloured flowers than the type.

C. stellaris.—This Crocus of obscure origin has long been in cultivation, and has been considered a hybrid between *C. aureus* and *C. Susianus*, as it combines the characters of these species. The orange flowers are distinctly feathered with bronze outside. They appear in early March, and have never been known to mature seeds. (*Maw, Crocus*, t. 37.)

C. suaveolens.—This fine Italian species flowers in March. It has a perianth-tube 3 to 4 ins. long with a bright orange beardless throat, and narrow, lance-shaped, lilac segments, the outer surface being suffused with buff and lined with purple. (*Bot. Mag.* t. 3864; *Maw, Crocus*, t. 15.)

C. Susianus (*C. revolutus*).—A charming species known as the "Cloth of Gold Crocus." It comes from the Crimea and Caucasus, and produces its deep orange-yellow flowers in February, variously feathered with deep brown, occasionally entirely orange-yellow, or evenly suffused with brown. It has orange anthers and filaments, and orange-scarlet stigmata. (*Bot. Mag.* t. 652; *Red. Lil.* t. 293; *Maw, Crocus*, t. 36.)

C. Suterianus.—A little-known species from Asia Minor, with clear orange-yellow flowers about March; considered to be a variety of *C. Olivieri* (*Bot. Reg.* 1847, t. 7; *Maw, Crocus*, t. 57).

C. Tauri, from Cilicia, has pale unstriped purple flowers over an inch long (*Maw, Crocus*, t. 61).

C. Tommasinianus.—A pretty and prolific Crocus from Dalmatia and Servia, having pale sapphire lavender flowers in March, the segments being sometimes darker coloured at the tips (*Maw, Crocus*, t. 25). The variety *atropurpureus* has clear lilac flowers, and *pallidus* has soft lilac ones. There are also white and amethyst forms.

C. Tourneforti (*C. Orphanidis*).—A charming autumn-flowering Crocus from the Greek Archipelago, remarkable for its large corms, and clear lavender or rosy-lilac blossoms, with spreading petals veined with purple, and white anthers (*Maw, Crocus*, t. 47; *Bot. Mag.* t. 5776). Considered to be a variety of *C. Boryi* by Mr Baker.

C. vallicola.—A distinct Caucasian Crocus which produces its creamy-white or pale yellow flowers, veined with purple and blotched with yellow in the throat, in August and September (*Bot. Reg.* xxxiii. t. 16; *Maw, Crocus*, t. 2). The variety *lilacinus* has smaller and more heavily veined flowers than the type.

C. veluchensis.—A rare Grecian Crocus, near *C. vernus* and *C. banaticus*, from which it differs in having a diphyllous proper spathe and no basal spathe (*Bot. Reg.* 1847, t. 4; *Maw, Crocus*, t. 32).

C. Veneris.—An autumnal Crocus from Cretan and Cyprian mountains, closely related to *C. Boryi*. The white flowers sometimes feathered outside with purple, and having a yellow throat, appear in November (*Maw, Crocus*, t. 8).

C. vernus.—This is the well-known spring Crocus. It grows wild in the Pyrenees, Alps, and Carpathian mountains, where its blossoms appear as late as June and July. In the British Islands, however, they peep through the ground as early as February and March, and are various shades of lilac, violet, and white (but never or very rarely yellow), variously veined and striped with other colours. (*Red. Lil.* t. 266; *Maw, Crocus*, t. 26.)



FIG. 108.—*Crocus vernus obovatus*. (1.)

The garden forms which have arisen from this species within the past three hundred years or so vary in colour from pure white to grey, lilac, violet, and purple, many being beautifully veined and streaked with other colours. Some distinct forms are *albiflorus*, white; *George Maw*, pure white with a bright orange tip to the three outer segments; *leucorhynchus* (known as Pheasant's Feather), pale purple or soft lavender, with purple

veins and a dark purple blotch at the base; *siculus*, creamy white with a few purple veins; *obovatus*, with beautifully feathered veins (Fig. 108); and *leucostigma*, rich purple with white stigmata. For the varieties with fancy names, the reader is advised to consult a current bulb catalogue.

C. versicolor (*C. fragrans*).—This beautiful species from the Maritime Alps flowers in February and March, and varies from purple to white, more or less feathered and veined with purple on the outer surface of the inner as well as the outer segments (*Bot. Mag.* t. 1110). The variety *obscuratus* has deep lilac blossoms shaded and feathered with deep purple; *reflexus* is soft lilac with deeper veins; and *picturatus*, pure white, veined with rich crimson.

C. vitellinus (*C. syriacus*).—A handsome Syrian Crocus, having bright orange-yellow flowers with orange-scarlet stigmata, which appear from November to March (*Bot. Mag.* t. 6416; *Maw, Crocus*, t. 50). The variety *graveolens* has smaller orange-coloured flowers, flushed or striped with black, and remarkable for their strong and somewhat disagreeable odour.

C. zonatus.—A beautiful autumnal Crocus found wild on the mountains of S. Europe to Asia Minor. The flowers appear in September and October, and are rosy-lilac veined with purple, the bearded throat being bright yellow and the tube pale buff. (*Maw, Crocus*, t. 4.)

CURCULIGO (*curculio*, a weevil; in reference to the point or beak on the seeds). Nat. Ord. Amaryllidæ. —A genus containing about a dozen species of stove, perennial, herbaceous plants having short rhizomes, or thickish and more or less

tuberous or corm-like root-stocks from which arise lance-shaped, plaited leaves. The flowers are borne in spikes or racemes. The perianth is six-lobed, with almost equal spreading segments. Stamens six, attached to the base of the segments by short filaments. Ovary three-celled, often produced into a long beak-like point. Fruit more or less succulent, indehiscent.

CULTURE.—Being natives of the Tropics of Asia, Africa, America, and Australia, the Curculigos or Weevil Plants must be treated as hothouse subjects, requiring plenty of heat and moisture. They are chiefly valuable for their ornamental foliage, resembling some Palms or Aspidistras, and are not difficult to grow. The pots should not be too large, and should be well drained, so that the soil shall not become sour with repeated waterings. A compost of turfy peat and loam in equal proportions, with a good sprinkling of silver sand, suits the plants best. When established and in vigorous growth, plenty of water must be given, and copious syringing will also keep the foliage bright and clean.

The simplest way to increase the plants is by dividing the root-stocks or detaching the suckers and potting them up separately.

C. recurvata.—This East Indian plant is the best known in the genus. It has tuberous rhizomes from which arise masses of dark green, lance-shaped, plaited leaves on long stalks, and dense heads of yellow flowers on scapes shorter than the leaf-stalks. The variety *striata* has a central white band down the leaves, while the variety *variegata* is a handsome plant with stripes of clear white running down the recurved, plaited leaves, which are often $2\frac{1}{2}$ ft. long. (*Bot. Reg.* t. 770.)

CURCUMA (*Kurkum*, the Arabic form), **TURMERIC.** Nat. Ord. Scitamineæ.—A genus containing thirty or more species of hothouse herbaceous deciduous plants, natives of the Tropics of Asia, Africa, Australia, and the Pacific Isles. They have thickish rhizomes, rich in arrowroot, from which arise annual stems 1 to 10 ft. high, furnished with two rows of large, alternate, oval or lance-shaped leaves, with sheathing stalks. The flowers are borne in dense cone-like spikes with concave bracts. The calyx is tubular and three-toothed. The tube of the corolla is dilated above, five lobes being equal, the sixth, known as the "lip," being larger and spreading.

Curcumas are grown in the Tropics for the arrowroot some species yield from the root-stocks, and for the yellow colouring material called turmeric yielded by others, notably *C. longa*. They are easily grown in hothouses in a compost of two-thirds turfy peat to one-third turfy loam, and a sprinkling of coarse silver sand. Plenty of water must be given during active growth, but the root-stocks must be kept fairly dry during the dormant season. Propagation is easily effected by dividing the root-stocks when growth commences in spring.

As most of the species are similar in appearance, differing chiefly in height and colour of the flowers, it is unnecessary to describe each one in detail, especially as the plants are only likely to be found in botanical collections. The following species are best known:—

C. albiflora.—2 ft. Flowers white and yellow. Ceylon. (*Bot. Mag.* t. 5909.)

C. Amada.—1 to 2 ft. Flowers pale yellow. Bengal. Cultivated in India for arrowroot.

C. angustifolia.—3 ft. Flowers yellow. Himalayas.

C. australasica.—Flowers yellow. N.E. Australia. (*Bot. Mag.* t. 5620.)

C. Bakeriana.—Flowers large, orange-yellow. New Guinea.

C. cesia.—1 ft. Flowers yellow. Bengal.

C. elata.—3 to 6 ft. Flowers crimson. Burmah.

C. ferruginea.—1 ft. Flowers yellow. Bengal. A very fine species with voluminous tubercules.

C. latifolia.—12 ft. Flowers white outside, yellow within. Leaves over a yard long and a foot broad. E. Indies.

C. leucorhiza.—1 ft. Flowers red and yellow. E. Indies.

C. longa.—2 ft. Flowers yellowish. A handsome plant. The pointed cylindrical root-stocks or tubers are yellowish externally; they yield a deep yellow resinous powder called turmeric, at one time much used in the E. Indies in medicine, and also as a yellow dye. Mustard is said to be frequently adulterated with it, owing probably to its taste and ginger-like odour. (*Bot. Mag.* t. 269; *Bot. Reg.* t. 886; *Red. Lil.* t. 473.)

C. petiolata (*C. cordata*).—1 to 2 ft. Flowers yellow, white. Leaves heart-shaped at the base. Burmah. (*Bot. Mag.* tt. 4435, 5821.)

C. Roscoëana.—1 ft. Flowers scarlet. A fine species. E. Indies. (*Bot. Mag.* t. 4667.)

C. Zedoaria (*C. Zerumbet*).—3 ft. Flowers red, yellow. E. Indies. (*Bot. Mag.* t. 1546.)

CYANELLA (*kyanos*, blue). Nat. Ord. *Hæmodoracæ*.—A genus containing four or five species of S. African plants having small fibrous-coated corms, radical, or rarely cauline, lance-shaped or linear leaves. Flowers in loose racemes or solitary.

Perianth with six lobes, the three outer ones drooping. Stamens six, attached to the base of the lobes. Capsule ovoid, triquetrous, and three-celled.

These are pretty little plants, rather too tender for most parts of the Kingdom for growing in the open air. The little bulbs, however, may be planted in favoured parts in warm, sunny, and sheltered positions, in a light, rich, and very sandy soil. In bleaker localities a cool greenhouse or cold frame will be essential. To prevent the bulbs in the open getting lost or destroyed, it may be advisable to grow them in pots, to be plunged or buried in the soil. When offsets are produced, they may be utilised to increase the stock.

C. capensis (*C. cœrulea*).—A charming little plant about 1 ft. high, introduced to cultivation as long ago as 1768. The lance-shaped wavy leaves are smooth above, but hairy underneath on the main veins. About July and August, the violet-purple flowers are produced in forked spikes on the branching stems. (*Bot. Mag.* t. 568; *Red. Lil.* t. 373.)

C. lutea.—This species has yellow flowers borne on stems having one or two upright branches, and lance-shaped non-wavy leaves (*Bot. Mag.* t. 1252).

C. odoratissima.—This is probably only a form of *C. lutea*, but has deep rosy sweet-scented blossoms (*Bot. Reg.* t. 1111.)

Other species known, but rarely seen in cultivation, are *C. alba*, with white flowers, and *C. orchidiformis*, with blue flowers.

CYCLAMEN (*kyclos*, circular; referring either to the spirally twisted flower-stalk, or to the round tubers or leaves), **SOWBREAD**. Nat. Ord. *Primulacæ*.—A genus of distinct

and beautiful dwarf scapigerous herbs with large roundish, depressed, fleshy, corm-like tubers (Fig. 109). Leaves long-stalked, ovate heart-shaped or kidney-shaped, entire or sinuate-dentate. Scapes slender, one-flowered. Flowers nodding, white, rose, or purple, with the scape often spirally twisted after flowering, and pressing the seed-capsule into the ground. Calyx five-parted, with per-

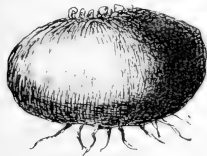


FIG. 109.—Cyclamen, tuber.

sistent ovate or ovate lance-shaped segments. Corolla hypogynous, with a small roundish tube thickened at the throat; lobes five, twisted, reflexed. Stamens five, attached to the corolla at the base of the tube. Ovary superior, ovoid. Capsule globose or ovoid, many-seeded.

With the exception of the beautiful *C. latifolium* (the culture of which is treated separately), all species of Cyclamen mentioned below are almost perfectly hardy in the British Islands. As may be seen from the synonyms, there is a good deal of confusion with the names, but those given in the author's *Practical Guide to Garden Plants* are retained here as being the most correct and accepted at the present time.

Hardy Cyclamen are particularly suitable for growing in rock-gardens, and on sloping banks where they will be sheltered from the sun by the shade of overhanging trees in summer, and from severe frosts in winter, by the boughs and leaves that have fallen from them in the

autumn. Positions resembling these should be chosen if possible; otherwise, an aspect between the north-east and north-west should be selected, and if trees are absent, the tubers should be protected during the winter season with a covering of dry leaves, litter, or bracken.

As the plants in a state of nature are generally found growing on sandy or chalky porous soil, with the tubers well out of the ground, it is essential in gardens to have a well-drained loamy soil to which leaf-mould, peat, and some limestone rubble or mortar rubbish may be added.

Generally speaking, the best time to plant hardy Cyclamen is from the end of June till November, according as to whether the plants flower in the spring or early summer, or in the autumn. A handful of sand may be placed beneath the tubers when planting, to secure perfect drainage; and the tops of the tubers should be slightly above the surface of the soil, so that water shall not settle in the crown. In early winter it is advisable to spread old leaves or old manure over and around the plants, not only as a protection against frosts, but also as a mulching to the soil, to replenish food for the roots.

Hardy Cyclamen ripen seed freely in many instances. In such cases they may be reproduced by sowing the seeds when thoroughly ripe in rich sandy soil in pots in a cold frame or warm greenhouse. In some vigorous cases seedlings appear naturally from self-sown seed near to the parent plants. Seedlings raised under glass are best grown on in small pots for a season or two until well established, before transferring them to the open air.

Another method of increasing hardy Cyclamen is by cutting the old tubers into pieces, each piece having

at least one "eye" or bud to it. The leaves with a small portion of the tuber attached may also be inserted (if worth while) in sandy loam and leaf-soil or peat, under bell-glasses, and kept moist and close until rooted.

Notwithstanding their acrid juices, Cyclamen tubers are greedily devoured by the wild boars in Sicily and the Mediterranean region—hence the name of "Sowbread."

The following hardy Cyclamen are more generally grown:—

C. africanum (*C. autumnale*; *C. robustum*).—A native of the sandy oak woods of Algeria and Tunis, and closely related to *C. neapolitanum*. Tubers 4 to 8 ins. through, blackish, flat, and irregular in shape. Leaves 6 to 8 ins. broad, long-stalked, ovate or sinuate, toothed on the margins, and beautifully marbled with white above and purple beneath. The sweet-scented flowers appear in October and November, and are of a pale rose or deep rose colour (rarely white), with a purple spot at the base of each auricled petal. The tubers should be planted not later than June. (*Bot. Mag.* t. 5758; *Fl. d. Serr.* viii. t. 841; *Gard.* 1886, t. 569.)

C. alpinum.—A dwarf plant closely related to *C. Coum*, and native of Mount Taurus in Asia Minor. The leaves are faintly marbled, and the flowers in the type are pink; but white-flowered forms exist.

C. Atkinsi (*C. hybridum*).—A hybrid between *C. Coum* and *C. ibericum*, and closely resembling the latter. The leaves, however, are larger and sometimes slightly marbled with white on the upper surface. The flowers appear in spring, and are of various shades, such as white, rose, lilac, red, and purple. (*Lem. Jard. Fl.* iii. t. 297; *Gard.* 1886, t. 569.)

C. cilicicum.—This pretty little

species, from the Cilician mountains and the pine forests of Asia Minor, grows about 4 ins. high. It has roundish entire leaves, purple beneath, and strongly-scented pale rose or white flowers blotched with purple at the base, from September to November.

C. Coum (*C. caucasicum*; *C. elegans*; *C. hyemale*; *C. vernale*; etc.).—A very variable species found in the Caucasus, Asia Minor, Greece, Turkey, etc., and cultivated for over three hundred years. It grows only about 3 ins. high, and has roundish and flattened tubers 1 to 2 ins. in diameter. The dark green leaves are never marbled, but are purple beneath, and are either slightly serrate or quite entire on the margins. The small, deep purple, rose-red, or white scentless flowers appear from December to March, at the same time as the leaves. (*Bot. Mag.* t. 4; *Lodd. Bot. Cab.* t. 108; *Gartenfl.* 1862, t. 370.) There is a form called *multipetalum*, having seven to eight petals instead of the normal five.

C. cyprium (*C. cyprinum*).—A native of Cyprus closely related to *C. neapolitanum*, from which it differs chiefly in having unlobed leaves, and longer and narrower petals. Tuber usually round. Flowers white, with a purple spot at the base of each auricled segment, appearing in autumn.

C. europæum (*C. æstivum*; *C. cordifolium*; *C. odoratum*; etc.), *Common European Sowbread*.—A native of the mountains of Central and S. Europe, with regular, roundish, depressed tubers and masses of dense, green, compact leaves, produced at the same time as the flowers, and ovate roundish in shape, deeply heart-shaped at the base, marbled with white above, deep purple beneath. Flowers from June to October,

purple-red, darker at the base, fragrant. There are several varieties, such as *album*, *Clusi*, *littorale*, *Peakinum*, and *colchicum*; the last from Asia Minor has large tubers, more regularly serrate leaves, and wider and blunter petals. *C. tauricum*, having large leaves marbled with silver grey, is probably only another form of this species. (*Bot. Reg.* t. 1013; *ibid.* 1846, t. 56.)

C. græcum. — A native of S.E. Europe and N. Persia, with large red tubers, often irregular in shape. Leaves usually not developed till after the flowers, roundish, heart-shaped, slightly and irregularly toothed, obscurely marbled above, green, or faintly tinged with purple beneath. Flowers in September and October, light or deep lilac, rarely white, with a purple blotch at the base of each petal, variable in size, and faintly scented. (*Rev. Hort.* 1855, t. 24.)

C. ibericum. — A native of the Caucasus, about 3 ins. high, with roundish tubers. Leaves contemporary with the flowers, roundish ovate, blunt, entire, or slightly waved on the margin, distinctly zoned with white. Flowers in February and March, bright red or purple in the type, varying from white to pale and deep rose, scentless, sometimes with a purple blotch at the base of the petals. (*Sw. Fl. Gard.* t. 9.)

C. latifolium (*C. persicum*).—The type of this fine species is found growing wild in Greece and Asia Minor, being very common in Palestine. From the gardener's point of view it is by far the finest member of the genus, and for nearly two hundred years he has been "improving" it under the name of *C. persicum*. The wild natural species has a roundish flattened tuber regular in outline. The leaves are ovate, irregularly

crenate or roundly toothed on the margins, the upper surface being distinctly marbled with white. The scentless flowers appear in March and April, the petals being white with a bright purple blotch at the base.

In cultivation innumerable variations have been evolved, and plants with larger tubers, more fleshy and luxuriant foliage, and very large flowers are now quite common. Particularly fine forms have special names given to them for the time being, but these are soon superseded by others of a superior type. The prevailing colours are pure white, rose, carmine, pink, crimson, purple, and salmon—all very charming.

CULTURE.—Although naturally a perennial, half-hardy and herbaceous in its nature, the Persian Cyclamen is usually raised from seeds annually. It is possible, however, to cultivate the same tubers for several years in succession, when as many as two hundred to three hundred fine blossoms can be secured from the crown of each. For the decoration of the greenhouse or conservatory during the winter and spring months, the Persian Cyclamen is a favourite plant. Not only are its blossoms, with half-twisted reflexed petals, charming in themselves, and last a long time in perfection, but the graceful tufts of beautifully-marbled leaves are highly ornamental.

At one time from fifteen to eighteen months elapsed from the sowing of the seed until the plants come into blossom. With improved strains it is now possible to obtain plants in flower within twelve months of sowing the seed, and most growers prefer this system to retaining the old tubers from year to year. Of course, those who grow for market have no alternative but to raise plants each year from

seed, and hundreds of thousands are so produced annually to supply the regular demand in all the big markets; and at Christmas-time especially a wonderful trade is done in the plants.

As a rule, two distinct sowings of seed are made—the first during October or early in November, to secure a display of blossom about twelve months later; and the other during January or February, to keep up a supply early the following year. Many growers, however, prefer to sow in July and August, and keep up a succession from the later germinating varieties. Pots or pans are used, care being taken to secure perfect drainage by placing some clean “crops” over the base, and covering it with a thin layer of moss or fibre extracted from the turfy loam that should be used. The best compost to use consists of about equal proportions of rich turfy loam and well-rotted leaf-mould, to which sufficient coarse silver sand is added to secure perfect ventilation and drainage. The pots or pans are filled to within three-quarters of an inch of the rim, the soil being pressed in firmly and made level on top. The hard grain-like seeds are then sown carefully about an inch apart over the surface, and are covered with a quarter of an inch of the same gritty compost that has been passed through a sieve. Some growers dibble the seeds in about a quarter of an inch deep after levelling the surface. When sowing is completed, the pots or pans should be gently watered with a fine-rosed can, after which they may be covered with a pane of glass, a sheet of paper, or have some sifted coco-nut fibre spread over the surface. Either operation is to check evaporation of moisture from the surface, which would other-

wise perhaps be inclined to develop a growth of fine moss. This, however, often depends on the water available for use.

TEMPERATURE.—The October and November sowings may be placed in a cool close frame with a minimum temperature of about 45° F. This will be sufficient to soften the seeds, and start them into germination. At the end of two or three weeks, the seed-pots should be transferred to the more genial warmth of a greenhouse with a temperature of about 55° F.

The sowings in January and February should be placed in a temperature of about 60° F. at once, covering the pots with glass, paper, or fibre, to check the escape of moisture.

The seeds of the Persian Cyclamen are notoriously erratic in their germination, some being much more sensitive to the surrounding heat and moisture than others, probably owing to having somewhat thinner coats than the others. However, if the seeds are sound, they all germinate in time, several weeks perhaps intervening between the appearance of the first and last seedling in the same pot or pan. When the young leaves push through the soil, the glass or paper coverings are removed. The seed-pots are then placed close up to the glass, so that the maximum amount of light may be secured, to keep the seedlings sturdy and “undrawn.” Careful attention must be given to the watering, never allowing the soil to become too dry, or the atmosphere to be lacking in some humidity. A sprinkling or syringing early in the afternoon, generally keeps the aerial conditions in proper condition. Ventilation also must be regulated, especially on all mild days, taking care, however, that

cold and cutting draughts are to be avoided.

PRICKING-OUT.—When the young plants are large enough to handle easily and the young tubers are beginning to swell, they may be transferred to small pots, called thimbles, an inch or two inches in diameter; or ten or twelve little plants may be pricked out into a 5-in. pot. The compost used should be similar to that for seed-sowing, namely, rich loam and leaf-mould in equal proportions with a fair sprinkling of coarse silver sand. The

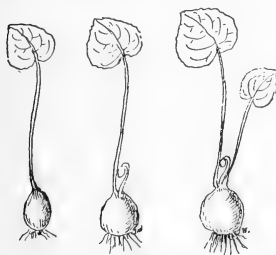


FIG. 110.—Cyclamen, seedlings.

seedlings must not be buried too deeply in the soil, the base of the leaf-stalks being flush with the surface. With careful attention to watering, ventilating, and shading from strong sunshine, the little plants grow freely, and when the pots are fairly well filled with the tender fleshy roots, it will be necessary to move the plants into 3-in. or 3½-in. pots. When these in due course are filled with roots and the plants are much larger, the last potting may take place. Most of the plants may be accommodated in 5-in. pots (or 48's), but several of the larger and more vigorous specimens may well be transferred to 6-in. pots (32's). For this final

potting, which will take place about the end of June, or in July, August, and even September, according to the state of the plants, rich loam and leaf-soil may be again used, with, however, not quite so much sand as in the earlier stages; and if a little well-decayed dry cow-manure can be mixed with the soil, so much the better. A little basic slag, a mere sprinkling over the heap of compost, and well mixed with it, will also be highly beneficial, owing to the lime and phosphates contained in it.

After each potting it will be necessary to shade the plants from strong sunshine until they have recovered from the effects of moving. When thoroughly recovered, more light and air are admissible, and coupled with judicious syringings and careful watering, the plants continue to thrive during the summer and autumn months. All this time the plants should be near to the glass, and the pots should stand on stages covered with moist pebbles, or finely powdered coke called "breze." Strong sunshine is not desirable, therefore a position facing north or north-east or north-west is the most desirable during the summer months. As each plant will occupy a space of at least a square foot or even 15 ins. to 18 ins. square, the necessary space must be allotted to each, as overcrowding would tend to interfere with assimilation by the foliage, and prevent the free and necessary circulation of fresh air. From six to eight weeks before the blossoms are expected, the plants may be watered two or three times weekly with weak liquid manure made from soot, old cow-manure, and a little guano steeped in a tank or tub. In late autumn it may also be necessary to place the plants on inverted pots on the stages, thus bringing them



FIG. 111.—Persian Cyclamen, modern forms. (2.)

nearer to the glass for more light, and keeping the leaf-stalks stout and sturdy. (Fig. 111.)

When the plants are in blossom, during the winter season, they will continue for weeks if the temperature is not too high—say from 45° F. at night to 55° during the day.

TREATMENT OF OLD PLANTS.—If it is desired to grow the same plants on for several seasons, the foliage is gradually allowed to die away after flowering, and the tubers are then rested in the old soil. The pots containing them are kept in a cold frame free from frost, or under a north wall covered up to the rims with ashes or coco-nut fibre. During the summer months very little growth is made, and the soil is kept just moist enough to prevent the plants from shrivelling. When new growths begin to appear on the crowns of the old tubers, it is then time to shake the plants out of the old soil and repot them into the compost of loam, leaf-soil, sand and cow-manure, as advised above. It is scarcely necessary to repot the second year, but in that case a top-dressing of fresh soil should be given. Pots a little larger may be used, and all the old soil should be removed. The watering, syringing, ventilating, and liquid manuring are then attended to in the same way as recommended for the plants raised from seeds annually.

PESTS.—The Persian Cyclamen, if grown in too dry an atmosphere, not only does not flourish, but is also subject to attacks of red spider on its foliage. A certain amount of moisture in the surrounding air is therefore the best natural antidote to this pest. Should greenfly or thrips attack the under-surface of the leaves, the plants should be "dipped" head downwards in a solution of soft-soapy water, quassia

chips, and tobacco juice. One pound of quassia chips boiled for an hour or two will be sufficient for ten gallons of water, to which about one pound of soft soap and a little tobacco juice may be added. The best insecticides, like XL All, abol, etc., may be used for the same purpose. The houses or frames in which the plants are grown may also be vaporised occasionally to kill these pests if they have become troublesome. Indeed, this is a better method than dipping, when the glass is in good condition.

C. ibanoticum.—A species found growing with *C. latifolium* and *C. ibericum* near Mt. Lebanon, at an altitude of 2000 to 3000 ft. Tubers often rough and scaly. Leaves heart-shaped, entire, slightly wavy on the margin, with a silvery white zone above, dark violet beneath. Flowers in April, large, sweetly-scented, bright or pale rose with deep carmine blotch at the base of each petal.

C. maritimum, from Asia Minor, has brownish-green leaves varying much in form and marking. The small pale rose flowers, with a deep carmine blotch at the base, appear about September. (*Gartenfl.* 1908, 791.)

The plant known as *C. pseudo-maritimum* differs from *C. maritimum* proper in having lance-shaped and acuminate calyx lobes instead of ovate rounded ones.

C. neapolitanum (*C. ficariifolium*; *C. hederifolium*; etc.).—A native of Southern Europe, with large flattened, depressed, and irregular tubers. Leaves heart-shaped ovate, 3 to 4 ins. broad, beautifully marbled with white above, purplish beneath. Flowers from August to October, rosy in the type, varying from red to white, slightly fragrant, spotted with purple at the base. There is a white-flowered form called *album*. (*Bot.*

Reg. tt. 24, 49; *Lodd. Bot. Cab.* t. 992; *Rev. Hort.* 1855, t. 2.)

C. pseud-ibericum has obovate dark green leaves mottled with silver above and deep violet beneath. The flowers are violet-red above and pure white with a blackish violet blotch below.

C. pseudo-græcum.—This Cretan species has been confused with *C. græcum*, from which, however, it differs in having longer stamen filaments, and three-angled elongated pointed anthers. The flowers are pale rose, almost white. (*Gartenfl.* 1906, 629.)

C. punicum.—This comes near *C. latifolium*, but the leaves have a more open sinus. The sweet-scented flowers are white or pale rose-red at the base, the petals being narrow and acute. (*Rev. Hort.* 1907, 328, f.)

C. repandum (*C. balearicum*; *C. hederæfolium*; *C. immaculatum*; *C. romanum*; etc.).—A native of S. Europe, plentiful in Central Italy and the Corsican mountains at elevations between 4000 to 6000 ft. Tuber small, roundish at first, depressed when old. Leaves ovate-deltoid, heart-shaped at the base with an open sinus, beautifully marbled with white above, purple beneath. Flowers from March to May, fragrant, rosy-white, spotted with purple at the base.

On good healthy tubers in rich soil and ideal situations a large number of flowers will be produced—two hundred to three hundred has been recorded.

CYPELLA (*kypellon*, a goblet; in allusion to the form of the flowers). Nat. Ord. Iridæ.—A genus closely related to *Marica* and *Tigridia*, containing eight species of small but pretty herbaceous plants, natives of Tropical and subtropical S. America, with tunicated bulbs and few linear,

plaited leaves. The perianth consists of six free segments, the three outer ones obovate and spreading, the three inner ones much narrower, erect, and recurved at the apex. The flowers in most cases are very fleeting, lasting only a few hours.

The Cypellas must be treated as half-hardy plants even in the most favoured parts of the Kingdom. If grown in the open air, the bulbs should be planted in warm, sunny, and sheltered borders in a soil composed of rich sandy loam and peat. A similar compost may be used when the plants are grown in well-drained pots in the greenhouse. During the winter season the plants are at rest, and require no water. The bulbs must be protected in the open air from frost by means of bracken, litter, etc., but it is generally safer to lift them and replant in spring. Propagation is effected by means of offsets.

C. Herberti (*Tigridia Herberti*).—A native of Buenos Ayres, about a foot high, with lance-shaped, tapering leaves, and flowers varying from light to deep chrome-yellow or vermilion, in July and August (*Bot. Mag.* t. 2599; *Lodd. Bot. Cab.* t. 1810).

C. peruviana.—This handsome species comes from the Andes of Peru, and has thin, papery, plaited leaves, and bright yellow flowers spotted with reddish-brown at the base. The two-lobed stigma is bright yellow, and petal-like in appearance. (*Bot. Mag.* t. 6213.)

C. plumbea (*Phalocallis plumbea*).—A remarkable Mexican plant, 3 ft. or more high, with sword-like, plaited leaves, and dull blue flowers tinged with yellow in the centre (*Bot. Mag.* t. 3710; *Fl. d. Serr.* tt. 395, 1466).

Other species are—**C. gracilis**, bright yellow tinged lilac; **C. gigantea**, blue

with a yellow base; *paludosa*, yellow spotted with purple-black; *linearis*, blue with a yellow spot; and *pusilla*, pale yellow.

CYPHIA (*kyphos*, arched; referring to the style and stigma). Nat. Ord. Campanulacæ. — A little-known genus, containing about twenty species of annual or perennial herbaceous plants with tuberous roots, and alternate, entire, toothed or pinnatifid leaves.

C. volubilis (*Lobelia volubilis*).—A native of S. Africa, with large tuberous roots, slender climbing stems, turning to the left, like the Hop, and bearing entire leaves. The pale blue, irregular, two-lipped flowers, like those of the Lobelia, appear in July and August.

This species may be grown in a cool greenhouse, in a mixture of loam, leaf-soil, and sand in equal proportions. When at rest in winter, watering is suspended; and propagation is effected by making cuttings of the young shoots in the same way as from Dahlias in spring (see p. 193).

CYRTANTHUS (*kyrtos*, curved; *anthos*, a flower). Nat. Ord. Amaryllidæ.—This genus is closely related to Vallota, and contains about twenty species of herbaceous plants, natives chiefly of S. Africa, having tunicated bulbs, narrow strap-shaped leaves, and funnel-shaped flowers borne on hollow scapes or peduncles.

These pretty bulbous plants are best grown in the cool or slightly heated greenhouse. They flourish in a compost of fibrous loam and leaf-soil in about equal proportions, with a good sprinkling of coarse silver sand. If grown several in a pot, they make a better display than if grown separately. During growth,

water must be given freely as required; but when the leaves are dying down in the deciduous kinds, less moisture is required. The evergreen species, like *C. obliquus* and *C. carneus*, require water all the year round, in accordance with the state of the soil. During the summer months the plants may be grown without the aid of artificial heat, but in winter a little genial warmth will be beneficial to the growing kinds. Propagation is effected by detaching the offsets from the old bulbs at the time of repotting.

C. angustifolius (*Crinum angustifolium*; *Amaryllis cylindracea*; *Monella angustifolia*; *Eusipho angustifolius*).—This species was introduced from S. Africa in 1774. It has ovoid bulbs, 1 to 2 ins. in diameter, bearing two to three linear leaves, 1 to 1½ ft. long. The bright red unscented flowers appear in late summer or autumn, from four to ten being borne in an umbel on top of a peduncle about 1 ft. high. (*Bot. Mag.* t. 271; *Lodd. Bot. Cab.* t. 368; *Red. Lil.* t. 388.)

There are several varieties, the best known being *grandiflorus*, with larger flowers (2½ to 3 ins. long) than the type; *ventricosus*, the flowers of which are dilated at the middle and contracted at the base; and *striatus*, with bright red flowers having yellow ribs (*Bot. Mag.* t. 2534).

C. carneus.—An evergreen species with ovoid bulbs, 2 to 3 ins. in diameter, and strap-shaped, blue-grey, twisted leaves, about 1½ ft. long. The bright red drooping flowers appear in autumn, being borne in umbels of eight to ten on a roundish scape a foot or more high (*Bot. Reg.* t. 1462).

C. collinus (*Monella glauca*; *M. collina*).—Bulbs ovoid, 1½ ins. in

diameter, with two or three linear leaves, 6 to 9 ins. long. Flowers bright red, $1\frac{1}{2}$ to 2 ins. long, six to ten in an umbel on a slender scape a foot high. (*Bot. Reg.* t. 162.)

C. helictus.—Closely related to *C. uniflorus*, having round bulbs about 1 in. in diameter, spirally twisted leaves about 6 ins. long, and small umbels of white tubular flowers, $1\frac{1}{2}$ to 2 ins. long, having a crimson stripe on each segment (*Gard. Chron.* July 1893, 69, f.).

C. Huttoni.—This species has ovoid bulbs, and strap-shaped leaves $\frac{1}{2}$ to $\frac{3}{4}$ in. broad, and about a foot long. From six to eight pale red, narrowly



FIG. 112.—*Cyrtanthus Huttoni*. (½.)

funnel-shaped flowers are borne in an umbel, on top of a stoutish scape about 1 ft. high. (*Bot. Mag.* t. 7488.)

C. hybridus.—A bigeneric garden hybrid between *Cyrtanthus sanguineus* and *Vallota purpurea*, and most resembling the latter in general appearance. The flowers are clear orange-scarlet or bright carmine, the

tube being curved in front and almost sharply dilated at the throat. (*Gard. Chron.* 1885, xxiv. 391.)

C. inæqualis.—This species has narrow leaves 1 ft. or more long, and is remarkable for the erect habit of the coral-red flowers, which are borne in umbels on top of scapes 1 ft. high, and for the overhanging upper segments of the perianth (*Gard. Chron.* 1905, xxxvii. f. 261).

C. lutescens (*Monella ochroleuca*).—A charming species with round bulbs 1 in. in diameter, having two to four green linear leaves about 1 ft. long. From two to three pale yellow flowers, about 2 ins. long, appear on a slender scape about 1 ft. high, the tube being slightly curved and very slender in the lower half. The variety *Cooperi* (*Bot. Mag.* t. 5374) is a finer plant with several flowers on a scape.

C. Mackeni.—A popular species with ovoid bulbs $1\frac{1}{2}$ ins. in diameter, and two to six linear leaves about 1 ft. long. The narrow funnel-shaped white flowers, about 2 ins. long, are borne in umbels of six to ten on a slender scape a foot long, during the winter and spring months. (*Gard. Chron.* 1869, 641, fig.; *Saund. Ref. Bot.* t. 355; *Gartenfl.* 1280, 3.)

C. Macowani.—This species grows wild at an elevation of 5000 ft. in the eastern provinces of Cape Colony. It has ovoid bulbs about 1 in. in diameter, and one to three linear leaves 6 to 12 ins. long. From six to eight bright scarlet, narrowly funnel-shaped flowers, about $1\frac{1}{2}$ ins. long, are borne on a scape about 1 ft. high. (*Gard. Chron.* 1875, 95; *Gartenfl.* t. 960.)

C. obliquus (*Crinum obliquum*; *Agapanthus Umbrella*).—This species has also been in cultivation since 1774, like *C. angustifolius*. It has large ovoid bulbs 3. to 4 ins. in diameter, and about a dozen strap-

shaped leaves $1\frac{1}{2}$ to 2 ft. long, arranged in two rows, and produced after the flowers. From ten to twelve bright red drooping flowers with a yellowish base, and 2 to 3 ins. long, are borne on a stoutish scape 1 to 2 ft. high, during May and June. (*And. Bot. Rep.* t. 265; *Bot. Reg.* t. 1133; *Red. Lil.* t. 381.)



FIG. 113.—*Cyrtanthus obliquus*. ($\frac{1}{2}$.)

C. O'Brieni.—A species intermediate between *C. angustifolius* and *C. Macowani*. The linear leaves appear with the flowers, which are bright scarlet in colour, $1\frac{1}{2}$ ins. long, about eight being borne in an umbel. (*Gard. Chron.* 1894, xv. 716.)

C. odorus.—A fine species with ovoid bulbs $1\frac{1}{2}$ to 2 ins. in diameter, two to three linear leaves about 1 ft. long, and somewhat cylindrical, bright red, scented flowers, 2 ins. long, in July and August (*Bot. Reg.* t. 503).

C. pallidus.—Bulb $1\frac{1}{2}$ ins. in diameter, with four to five linear

leaves, purplish scapes about 6 ins. high, and pale red, narrowly funnel-shaped flowers about $1\frac{1}{2}$ ins. long. (*Bot. Mag.* t. 2471.)

C. sanguineus (*Gastronema sanguineum*).—A very distinct and attractive species, with ovoid bulbs 2 ins. in diameter, bearing three to four bright green lance-shaped leaves about 1 ft. long, and remarkable for having stalks. The slender scape is 6 to 9 ins. high, and carries one to three bright red flowers 3 to $4\frac{1}{2}$ ins. long, somewhat cylindrical in shape in the lower half and openly funnel-shaped in the upper. (*Bot. Mag.* t. 5218.) The variety *glaucophyllus* has grey-green leaves and orange-red flowers.

C. spiralis.—A distinct species with ovoid bulbs $1\frac{1}{2}$ ins. in diameter, two

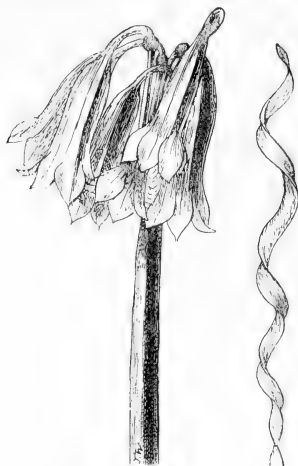


FIG. 114.—*Cyrtanthus spiralis* ($\frac{1}{2}$.)

to three linear blue-green leaves 6 to 9 ins. long, and spirally twisted. The blue-green slender scape, about 1 ft. long, carries from four to six bright

red scentless flowers $1\frac{1}{2}$ to 2 ins. long, about October and November. (*Bot. Reg.* t. 167.)

C. Tucki.—This grows wild with *C. Macowani* in S. Africa at an altitude of 5000 ft. It has ovoid bulbs $1\frac{1}{2}$ ins. through, and narrow leaves 1 to $1\frac{1}{2}$ ft. long. The bright

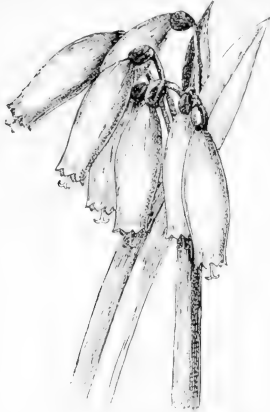


FIG. 115.—*Cyrtanthus Tucki*. (1.)

orange-scarlet flowers, ten to twelve in an umbel, droop from the summit of the fleshy blue-green scape, which is 12 to 18 ins. high, during July and August. (*Gard. Chron.* 1892, xii. 155, fig. 28.)

C. uniflorus (*Amaryllis clavata*; *A. humilis*; *Gastronema clavatum*).—This species has roundish bulbs about 1 in. in diameter, one to two linear leaves about 6 ins. long, and a slender scape 6 to 9 ins. high, bearing one to three more or less erect, funnel-shaped, white flowers $1\frac{1}{2}$ to 2 ins. long, with green or reddish-brown stripes (*Bot. Reg.* t. 168; *Bot. Mag.* t. 2291).

CYRTOSPERMA (*Kyrtos*, curved; *sperma*, seed). Nat. Ord. Aroideæ.—

A genus containing about twenty species of tuberous-rooted herbs from the Tropics of Asia, Africa, and America. The leaves are more or less arrow-shaped, with long stalks sheathing at the base. The spathes are ovate lance-shaped or oblong, enclosing a shorter cylindrical or globose spadix containing the flowers.

C. ferox.—A remarkable-looking species from Borneo, having arrow-shaped leaves with prickly stalks, and greenish-white spathes, also borne on prickly stalks (*Ill. Hort.* xxxix. t. 153).

C. Johnsoni (*Alocasia Johnstoni*).—A native of the Solomon Islands, having semi-erect, arrow-shaped peltate leaves, with terminal lobes about a foot long, the two basal ones somewhat longer; the entire blade being olive green, elegantly marked with deep pink veins. The stalks are furnished with whorls of stiffish prickles, and the deep green mottled stems are banded with pink.

The *Cyrtospermas* require the same cultural treatment as the *Alocasias*—which see.

DAHLIA (named after *André Dahl*, a Swedish botanist, and student of Linnæus). Nat. Ord. Compositæ.—This genus contains about a dozen species of rather coarse-growing herbaceous plants, having spindle-shaped tuberous roots, thick hollow stems, opposite leaves divided once, twice, or thrice, and large flower-heads borne on long stalks at the ends of the shoots and from the axils of the leaves. The natural species are all natives of Mexico, and are generally regarded as being only half-hardy in the British Islands.

The first Dahlia in Europe—apparently *D. variabilis*—seems to have been introduced to Spain, whence it found its way into England in 1789

through the then Marchioness of Bute; and afterwards by Lady Holland in 1804. The plants, however, were lost, and it was not till 1815 that the Dahlia was again brought to England from France.

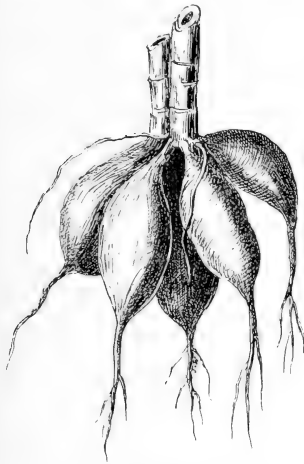


FIG. 116.—Dahlia, tuberous roots. ($\frac{1}{2}$.)

Before referring to the Garden Dahlias, it may be as well to give brief descriptions of the various species.

D. arborea (*D. anemonæflora*).—This species grows 9 to 15 ft. high, and has large long-stalked leaves divided twice-pinnately into oblong-elliptic, pointed leaflets, the leaf-stalks forming a kind of cushion at the base round the stem. The soft lilac flower-heads are about 4 ins. across, having lilac or yellow tubular florets in the centre. (*Maudsl. Bot.* 11, 88; *Gard. Chron.* 1883, xix, 80, f. 60.)

This species is too tender for the open air, except, perhaps, in the very mildest parts of the Kingdom. It

should therefore be grown in a cool greenhouse.

D. coccinea (*D. bidentifolia*; *Georgina Cervantesii*).—A species 3 to 4 ft. high, with roughish, pinnately divided leaves, and flower-heads having scarlet ray-florets, and yellow disc ones (*Bot. Mag.* t. 762).

This is one of the species from which the modern Garden Dahlias have been derived.

D. excelsa.—A tree-like species, growing 15 ft. high and upwards, having very thick stems, more or less woody towards the base, and furnished with twice-pinnately divided leaves, about $2\frac{1}{2}$ ft. long and about 2 ft. broad. The pale lilac-purple flower-heads are only about 4 ins. across. (*Gartenfl.* t. 861.)

This species is best grown in a cool greenhouse.

D. gracilis.—This species grows 4 to 5 ft. high, and is graceful and distinct in habit, the smooth leaves being twice-pinnately divided into oval leaflets coarsely toothed on the margins. The flower-heads are bright orange-scarlet, appearing in summer and autumn, and producing seeds freely in the British Islands. There are many varieties, varying in colour from pale chrome-yellow to deep crimson scarlet.

D. imperialis.—This remarkable species attains a height of 10 to 12 ft., being furnished with large handsome leaves. The drooping bell-shaped flower-heads appear about the end of September and October in large panicles, the ray-florets being white tinted with lilac and streaked with blood-red at the base. Owing to the lateness of blossoming, the flowers can only come to perfection in a greenhouse, where they will often ripen seeds freely. (*Bot. Mag.* t. 5183.)

D. Juarezii.—This species grows 3

ft. and more high and has brilliant scarlet flower-heads, the florets of which overlap and vary in length. It was introduced from Mexico in 1872, and when exhibited in London in September 1879 attracted little or no attention. As the parent of the renowned "Cactus" Dahlias, it has since that time made rapid strides in public favour, and has given rise to innumerable beautiful varieties.

D. Mercki (*D. glabrata*).—A beautiful species 2 to 4 ft. high, having pinnate or twice-pinnate leaves with toothed margins, and rather small white and yellow or lilac and yellow flower-heads. The variety *Decaisneana* has purple flower-heads with yellow centres. (*Bot. Mag.* t. 3878; *Rev. Hort.* 1864, p. 31.)

This species has given rise to many garden forms.

D. variabilis (*D. crocata*; *D. superflua*).—The typical wild species has branching stems, pinnately divided leaves with more or less "winged" leaf-stalks, and flower-heads varying in colour; the ray-florets, however, being generally scarlet, the disc ones yellow.

This species is regarded as the first one introduced from Mexico, not so much for its beauty as a decorative garden plant, but for its tuberous roots, which it was thought would rival the potato as an article of diet.

D. viridiflora.—This is a curiosity evolved by cultural selection. Its peculiarity consists in having the green bracts of the involucre increasing at the expense of the coloured ray-florets, the whole flower-head resembling a small green pompon rose.

D. Zimapani (*Cosmos diversifolius*).—This is commonly known as the "Black Dahlia." It grows 12 to 18 ins. high, its deep green leaves being

cut into five to seven entire or slightly toothed segments. The flower-heads are deep violet or almost blackish-purple in colour, and appear from July to October. The variety *atro-purpurea* is even deeper in colour.

GARDEN DAHLIAS.

During the past century wonderful changes have been wrought in the Dahlia. It adapted itself so readily to our climate and displayed such an early tendency to variation, that gardeners were not slow to take advantage of its peculiarities. Of the species enumerated above, only *D. coccinea*, *D. Mercki*, *D. variabilis*, and *D. Juarezi* appear to be involved in the creation of the modern Dahlia. Crossing and intercrossing has been carried on unceasingly for many years, with the result that there are now innumerable varieties suitable for garden decoration. These are divided into several more or less distinctive groups, amongst which may be mentioned:—

1. **Single Dahlias**.—Although at one time greatly neglected, owing to the development of "double" forms, the single Dahlias now find many admirers, owing to their graceful habit, quantity and beauty of blossom, and easiness of culture. Special varieties can always be kept pure and distinct by propagation of the shoots or division of the tuberous roots; or large numbers of new forms may be raised easily from seeds each year.

Closely related to these are what are known as "Tom Thumb" Dahlias, so called owing to their dwarf stature. They have not gained in popularity, and are rarely grown.

2. **Pompon, Bouquet, or Bedding Dahlias**.—This is a free-flowering class, having perfectly shaped and symmetrical "double" flower-heads, usually borne well above the foliage,

the plants having a compact habit of growth.

3. **Show Dahlias.**—These include (i.) all self-coloured; (ii.) all shaded flowers; and (iii.) all flowers having petals of a pale ground colour, edged with deeper pink, rose, mauve, purple, crimson, maroon, etc. The flower-heads are usually very large and double, and symmetrical in outline.

4. **Fancy Dahlias.**—These are simply large, rounded, Show Dahlias having two or more petals, the colour at the tip of the petal being *much paler* than the ground colour. Striped flowers, no matter what the ground colour may be, are always regarded as Fancy Dahlias. Amateurs frequently confuse "Fancy" Dahlias with "Show" Dahlias.

5. **Cactus Dahlias.**—Springing originally from *D. Juarezi* (see above), these varieties have simply taken plant-lovers by storm of late years, owing to their beautiful forms, magnificent colours, and the shape, variation, and regularity of their radiating petals, which are more or less pointed and twisted. The range of colour is probably greater in the Cactus Dahlias than in any other section, almost every shade being represented except blue. Whites, reds, scarlets, crimsons, purples, yellows, pinks, mauves, orange, salmon, rose, apricot, etc., etc., are to be found almost pure, or in conjunction with innumerable intermediate shades.

6. **Pæony-flowered Dahlias.**—This is a modern section, remarkable for the great size of the flower-heads, these often being as much as 9 ins. across. They are semi-double in character, the individual florets being broad and wavy, the centre being composed largely of yellow tubular florets. The flower-stalks are long and strong, and carry the blooms well above the foliage. At first there was a tendency

amongst these Pæony-flowered Dahlias to become rather "floppy"-looking and drooping, but the more recent creations incline one to the opinion that this undesirable tendency will be overcome in the course of time.

7. **Giant-flowered Dahlias.**—This is another modern group remarkable for the great size of their double flower-heads, the florets of which are wide, flattish, or reflexed. There are not many forms of a fixed character at present, perhaps one of the best being *Souvenir de G. Douzon*, which has an immense reddish-scarlet bloom. Others are *Jeanne Charmet*, lilac-pink shading to pure white in the centre; *Le Colosse*, huge, red; *Mdlle H. Charvet*, pure white; *Madame van den Dael*, silvery pink; *Perle de la Tête d'or*, large, white; *Yellow Colosse*, bright yellow; etc.

As hundreds of new forms are raised by specialists every year, and as many of the older favourites drop out of cultivation owing to the introduction of new ones, it would be mere waste of space giving a list of varieties in each of the sections here, as they would soon be out-of-date. The best and simplest plan for the Dahlia-lover is to consult the lists of nurserymen every spring, and make a selection from them. Another good plan is to visit the Dahlia-growers in August and September to see the plants growing naturally. In this way it will be easy to note the varieties that throw their flowers well above the foliage, and thus give a more brilliant aspect to the garden than those shy-blooming varieties that hide their blossoms amongst the leaves.

CULTURE.—Perhaps there is no exotic so easily grown as the Dahlia—that is, leaving out such species as *D. arborea*, *D. excelsa*, *D. imperialis*, which can only be brought to perfec-

tion as a rule in a greenhouse; even then such species will never be more than interesting relatives of the more popular garden varieties.

The chief value of the garden Dahlia consists in its bold appearance, and the great showiness of its blossoms during the late summer and autumn months in the open air. Dahlias will grow well in any good garden soil that has been deeply dug and enriched with plenty of well-decayed manure. The best results, however, are secured in a heavy loamy soil that has been treated in the same way. As it is generally unsafe to put the plants out till the end of May or early in June, according to the season and locality, the soil may be prepared a few weeks in advance for their reception. The distance apart should be regulated by the natural size of the different varieties. Generally speaking, from 4 to 6 ft. should be allowed every way between plant and plant when Dahlias are grown in formal beds, and even more space may be given with advantage. Indeed, nothing is gained by overcrowding—except weak, "leggy" plants, which, owing to the lack of air and light, are unable to produce blossoms of average size and substance. Almost any aspect will do for Dahlias so long as it is open and free from the shade of overhanging trees; but an aspect facing between the south-east and south-west is generally warmer, brighter, and more sheltered, and gives the best results.

Staking.—Prior to planting, it is advisable to drive a stout stake into the hole, the stake being long enough to allow 5 or 6 ft. to stand out of the ground. The young plants, if raised from seeds or cuttings, or the old tubers and shoots, are then placed in position, the fine crumbled soil being carefully worked in around the roots, and trodden down firmly but gently.

Tying.—As growth advances, the main stem is tied to the stake from time to time. The best branches or side-shoots are retained, and, being brittle, should be looped up to the central stake when necessary, to prevent the wind from breaking them down. In addition to the central stake, it is also a good plan to place four smaller ones on the outside so that main stems may be tied to them to render the whole plant steady against the wind. All other weak shoots likely to overcrowd the centre should be pinched out at an early stage of their growth. In this way the plants will have an abundance of air and light—the two things so essential to enable the leaves to assimilate the carbonic acid gas from the atmosphere.

Mulching and Feeding.—As Dahlias are gross feeders and great evaporators of water, they require an abundance of moisture at the root. A soil that is naturally heavy, but well-worked and manured, will not require so much watering as one that is light and sandy in its nature. The grower must take these points into consideration if he requires to secure exceptionally fine blossoms. It will always be advantageous, especially in hot dry summers, to keep the surface soil well stirred frequently with the hoe. This will check the evaporation of moisture from the root region, and will consequently save a good deal of watering. Further benefit may be secured by placing a thin layer of old manure or even a layer of lawn-grass clippings over the stirred soil.

EXHIBITION BLOOMS.—As almost every amateur who takes an interest in Dahlias likes to test his cultural skill, he pays special attention to the following details. In addition to planting in good rich soil, properly prepared and manured, plenty of space,

thinning out the superfluous shoots, the frequent use of the hoe, and mulching with manure, he also feeds his plants when coming into blossom with weak liquid manure two or three times a week, especially in hot dry seasons. Then he does not allow a plant to develop all its buds. Only the best of these are retained, the others being pinched out so as not to absorb food that will then be available for the others. When the flowers are opening they may possibly be too early for a particular exhibition. It will then be necessary to shade them in some way, to retard the opening of the florets. This is done either by erecting a canvas screen over the plants, or individual flower-heads may be protected by placing over them some of the "Acme" canvas shadders that are movable up and down a stake to any required height. They not only shade the blooms from the sun, but will also protect them from wind and heavy rains.

Flowers for exhibition should never be cut at midday—but always either very early in the morning, or, better still, about an hour before twilight the day before they are required.

So far as artificial or chemical manures are concerned, one of the best to use is basic slag. A sprinkling of this slow-acting manure over the soil at the time of planting will yield up its phosphates just about the time the buds begin to appear, and when a little stimulant is appreciated.

PROPAGATION.—Dahlias are easily increased in three ways—(1) from seeds, (2) from cuttings, and (3) by dividing the root-stocks.

Seeds should be saved, when thoroughly ripe, only from the very best varieties in any particular section. They should be sown

thinly about February or March, in pots, pans, or boxes of light, sandy, rich soil, in a greenhouse with a temperature of 60° to 70° F. They soon germinate, and when the seed-

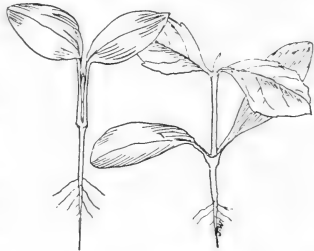


FIG. 117.—Dahlia, seedlings.

lings are about 2 ins. high, each one should be placed in a 3-in. pot in a similar compost. If grown on close to the glass, and with plenty of air and light and a much lower temperature, they will be ready for planting in the open air about the end of May or early in June, as already stated. It may be as well to mention that special varieties cannot be expected to come true to character if raised from seed. Such must be propagated by means of cuttings or division.

To secure a supply of good cuttings, the old tuberous roots with pieces of old stems attached should be taken from their winter quarters about February or March, and placed in a temperature of 60° to 70° F. They should be slightly covered with rich gritty soil, or placed in coco-nut fibre or leaf-mould close to glass, and sprinkled every day. In this way stout, sturdy shoots soon appear from the base of the old stems just about their junction with the old tubers. When the shoots are about 3 ins. long they should be severed with a sharp knife just beneath a

joint, and inserted in a compost of rich gritty soil. They root in a few days, and when well established are placed singly into 3-in. pots, and grown on with plenty of air and light until planting-out time. If necessary, cuttings of the side-shoots may be taken from the plants in summer and rooted in the same way.



FIG. 118.—Dahlia, cutting.

Perhaps the simplest method of propagating Dahlias is to take the bunch of old tuberous roots and divide one from the other with a sharp knife so that each shall have a piece of the old stem attached. This may be done in March and April, protecting the divided portions from frost in a cold frame, but giving as much light and air as possible on all mild days. Or the divided pieces may be potted up separately, and placed in warmth in a greenhouse.

Dahlias may be grafted under glass in winter by inserting a shoot

in a slit of a tuberous root, but it is very rarely this method is adopted.

Lifting and Storing in Winter.—When the first frosts appear in autumn, the tender shoots of the Dahlia are cut down. The tuberous roots should then be lifted, cleaned, and dried, and about 6 ins. of the old stalks should be left attached, as it is from the base of these that shoots will sprout the following spring. Special varieties should be carefully labelled, and when all is clean and tidy the roots may be stored away in a dry, cool, airy but frost-proof cellar, buried in dry sand, soil, or coco-nut fibre until wanted in spring. In a humid atmosphere the dormant tubers are liable to rot, and should therefore be overhauled occasionally.

Insect Pests.—In gardens that are not deeply cultivated or otherwise neglected, slugs are almost sure to be present, and do much mischief to the young shoots of all plants, including Dahlias. Their depredations are best kept under by frequent use of the hoe, and by strewing freshly slaked lime or soot around the plants two or three mornings in succession. When Dahlias are in blossom, earwigs often play havoc with them. These pests are also best kept down and destroyed by frequently stirring the soil, otherwise traps must be set to catch them. Small pots with a little hay, moss, or paper may be placed upside down on the stakes, and should be examined every morning for the earwigs that will nest in them. Hollow stems of Elder, Broad Bean, Hemlock, or Knot Weed (*Polygonum*) may also be used as traps hung on the shoots.

DATURA (from its Arabic name, *Tatorali*), THORN APPLE. Nat. Ord. Solanaceæ.—There are many species

of Thorn Apple, all more or less remarkable for their narcotic juices. Some are annuals and some perennials in character.

D. meteloides (or *D. Wrighti*), the only one we need mention in this work, although frequently treated as an annual from seeds, is really a perennial plant, with blackish tuberculous roots, grey-green leaves, and sweet-scented, long-tubed flowers of a bluish-violet or whitish colour. It is a native of California, and makes a handsome bushy plant 2 to 3 ft. high. When grown in a greenhouse, it is evergreen in character. If grown in the open air, it requires the same treatment as the Dahlias, the roots being taken up and stored in dry sand and soil. A rich loamy soil, either in pots or in the open air, is the most suitable compost for the plants.

DAUBENYA (named after *Dr Daubeny*, late professor of botany at Oxford University). Nat. Ord. Liliaceæ.—This genus is unknown outside botanic gardens. It is closely related to *Massonia*, and contains only three species of South African bulbous plants, bearing dense and compressed umbels of yellow, orange, or scarlet tubular blossoms, having six irregular segments. The only species that have been in cultivation, but now appear to be lost, are *D. aurea*, with yellow flowers (*Bot. Reg.* t. 1813); and *D. fulva*, with dull reddish-yellow flowers (*Bot. Reg.* 1839, t. 53). They require rich sandy loam, and may be grown in pots or pans in a greenhouse or frame, or on a warm, sheltered south border in the open air.

DELPHINIUM (*delphin*, a dolphin; supposed resemblance of the spur to a dolphin's head), LARKSPUR. Nat. Ord. Ranunculaceæ.—There are

about forty species of Larkspur, the following having tuberous or fleshy root-stocks:—

D. cardinale.—This Californian plant, 3 to 4 ft. high, has long fleshy roots, smooth and somewhat fleshy deeply-lobed leaves, and spikes of bright scarlet flowers with yellow petals produced in August (*Bot. Mag.* t. 4887).

D. nudicaule.—This is also a native of California. It has fleshy tuberous roots, fleshy three- to five-lobed leaves on stems 1 to 2 ft. high, and erect spikes of orange-scarlet flowers from May to August. (*Bot. Mag.* t. 5819.)

These two bright-flowered Larkspurs are practically hardy in most parts of the Kingdom, although it would be wise to protect the root-stocks in severe winters. They flourish in good garden soil in sunny situations, and are easily increased by division and from seeds.

DICENTRA (*dis*, twice; *centron*, a spur; referring to the shape of the flower). Nat. Ord. Fumariaceæ.—A genus having several species of ornamental hardy herbaceous plants, some with thickened or tuberous root-stocks. They are easily distinguished by their more or less arching racemes of lyre-shaped flowers, having two scale-like sepals, four connivent saccate or spurred petals, and six stamens in two distinct bundles. The plants are also well known under the old name of *DIELYTRA*, and also popularly as the "Lyre Flower," "Bleeding Heart," "Ladies' Locket," "Chinaman's Breeches," etc.

D. spectabilis.—This is the finest member of the genus, native of Siberia and Japan, 1 to 2 ft. high, with gracefully cut leaves, and drooping rosy-crimson flowers arranged in horizontal racemes. There is also a white-flowered variety.

This species is perfectly hardy, and makes beautifully bold and gorgeous clumps in a rich soil during the early summer months. It is also frequently put into pots in autumn and gently forced into flower in February and March in a warm greenhouse, in the same way as Solomon's Seal, etc. Plants may be increased by dividing the thickish fleshy root-stocks with a strong knife.

Other species of *Dicentra* are—*D. canadensis*, white (*Bot. Mag.* t. 3031); *D. chrysantha*, yellow; *D. cucullaria*, white and yellow; *D. formosa*, bright red (*Bot. Mag.* t. 1335); *D. eximia*, reddish-purple (*Bot. Reg.* t. 50); *D. thalictrifolia*, yellow and red.

DICHOPOGON (*dicha*, double; *pogon*, a beard; in reference to the two appendices of the anthers). Nat. Ord. Liliaceæ.—A genus containing two species of Australian plants having short rhizomes, often producing tubercles on the fibrous roots. The only species of note is *D. strictus*, from E. Australia and Tasmania, the radical, linear, grass-like, sheathing leaves of which are about 18 ins. long. The flowers are purplish in colour, about 2 ins. across, with six spreading segments, and are borne about November in clusters. (*Bot. Mag.* t. 6746.) *D. undulatus*, figured in *Gartenfl.* ii. t. 37, is the same as *D. strictus*. This plant requires to be grown in rich gritty soil in a cool greenhouse.

DIERAMA (the Greek name for *funnel*, in reference to the shape of the flowers). Nat. Ord. Iridææ.—A genus with two or three species of plants with fibrous-coated bulbs, long, narrow, sword-shaped leaves, and flowers in terminal panicles. Perianth funnel-shaped, with six nearly equal erect or spreading

lobes. Stamens attached at the base of the tube. Ovary three-celled, becoming a membranous, many-seeded capsule when ripe.

D. pendula is very similar to *D. pulcherrima*, but produces soft rosy-white flowers, with deeper coloured veins (*Bot. Reg.* t. 1360).

D. pulcherrima (*Sparaxis pulcherrima*).—A beautiful South African perennial 3 to 6 ft. high, with sword-



FIG. 119.—*Dierama pulcherrima*. (½.)

shaped leaves, and tough slender flower-stems which bear numerous funnel-shaped flowers gracefully drooping from thread-like stalks. The blossoms are usually blood-red in colour, but there are forms with white and pale red tints, some being prettily striped. The flowering period is usually from August to September and October, so that the blooms are sometimes injured by frost. (*Bot. Mag.* t. 5555.)

This species flourishes in warm sandy loam, and should be planted in sheltered positions, as it is not hardy in the bleaker parts of the Kingdom. When grown in bold masses, the blood-red blossoms conspicuously swaying in the breeze look particularly bright. The bulbs should be planted about 3 ins. deep on raised beds of well-drained soil between November and January, after the leaves have withered. During severe weather, the roots should be protected with a covering of straw, litter, or bracken; but in spring, when growth commences, as much light and air as possible should be given.

DIOSCOREA (after *Dioscorides*, whose book on medicinal herbs "was the foundation of almost all botanical knowledge"), YAM. Nat. Ord. Dioscoreaceæ.—This genus consists of hot-house plants, having large tuberous roots, climbing or trailing stems, and large heart-shaped or angular leaves, which in most species are ornamental in character. Unlike most members of the monocotyledonous group, the leaves also are reticulated instead of parallelly veined. The small whitish or yellow flowers are of no garden beauty, the perianth consisting of six small distinct segments. From an economic point of view, the West Indian Yam (*D. sativa*) is perhaps the best known and the most useful. It has alternate, heart-shaped, roundish leaves ending in a point, and borne on smooth, round, slender stems. *D. Batatas*, the Chinese Yam, has heart-shaped, pointed, deep glossy green leaves on green or purplish stems 6 to 9 ft. long. The long club-like roots are used like potatoes, after being boiled, roasted, or otherwise cooked. *D. Decaisneana*, another Chinese Yam, is a variety of *D.*

Batatas, having pale green, heart-shaped leaves, deeply lobed at the base, and regularly narrowed to the apex. The tuberous roots, however, are much smaller than those of *D. Batatas*, and do not penetrate so deeply into the soil.

Amongst species of Yam with beautiful foliage, mention may be made of the following:—

D. Anætochilus, from S. America, has deep olive-green leaves beautifully marbled with gold, with a central band of the same colour.

D. argyrea, from Colombia, has green heart-shaped leaves about 5 ins. across, with seven main veins bordered with conspicuous irregular patches of silvery grey.

D. bulbifera, introduced from the East Indies in 1692, was at one time strongly recommended as a substitute for the potato. The leaves are large and heart-shaped, and the small greenish blossoms are borne in gracefully drooping racemes.

D. caucasica.—A graceful Caucasian climber, having the lower leaves in whorls of three to five, the upper ones being almost opposite. It is very like the Black Bryony (*Tamus communis*) in appearance. (*Gard. Chron.* 1894, xv. 778.)

D. crinita, from Natal, has long-stalked leaves, divided into five elliptic lance-shaped leaflets, each ending in a long thread-like point (*Bot. Mag.* t. 6804).

D. discolor.—A native of Tropical America, having large heart-shaped leaves, elegantly marbled with two or three shades of green on the upper surface, the under-surface being rich purple-crimson.

D. Fargesii, from W. China, has edible tubers (*Rev. Hort.* 1896, 540).

D. hybrida.—This plant is supposed to be a hybrid between the Chinese Yam (*D. Batatas*) and the British

Black Bryony (*Tamus communis*). It is half-hardy and climbing in character, has large flattish roots, and narrow heart-shaped leaves. (*Rev. Hort.* 1882, p. 379.)

D. illustrata.—A Brazilian species with satiny green leaves about 6 ins. long, and having two bluntish lobes at the base. The under-surface is purple, while the upper is transversely marked by distinct white parallel lines between the nerves, and an irregular band of silvery-grey runs down the midrib, irregular patches of silver-grey being also near the main veins. (*Gard. Chron.* 1873, p. 1730.)

D. multicolor.—A native of the Rio Negro, in Brazil, with heart-shaped leaves 3 to 5 ins. long. The under-surface is pale lurid purple, the upper surface being rich green, beautifully spotted and blotched with grey, especially near the principal veins. (*Ill. Hort.* 1871, 53.) There are several varieties of this species, the most noteworthy being—*chryso-phylla*, with olive-brown leaves variegated with yellow; *Eldorado*, leaves satiny-green, with silver-grey band and irregular blotches; *melano-leuca*, leaves ornamental, deep green, with a central silver band, and silver blotches along the veins; *metallica*, leaves bronzy, with a coppery central band.

D. nobilis.—A Brazilian species, with velvety bronzy leaves variegated with yellow.

D. pyrenaica.—A smooth herbaceous plant from the Pyrenees, growing only 3 or 4 ins. high, and having tuberous roots about as large as a nut. The leaves oval, heart-shaped, deeply lobed at the base, and with sharp-pointed tips, are borne on slender, flexuose, branching stems. This plant is probably quite hardy.

D. racemosa.—A native of Central

America, about 8 ft. high, with oval heart-shaped leaves.

D. retusa.—A native of S. Africa, with alternate digitate leaves divided into five- to seven-stalked leaflets.

D. vittata is an ornamental plant with large heart-shaped leaves flushed with claret-purple beneath, or variegated with red and white on both sides (*Bot. Mag.* t. 6409).

Most of the species mentioned above, except *D. pyrenaica*, flourish in a rich loamy soil, with plenty of well-decayed manure. The American species require warmth and moisture, especially during active growth in the spring and summer months. In autumn and winter the plants require a cooler atmosphere, and practically no water when dormant. Propagation is usually effected by dividing the tuberous roots after growth has ceased in autumn, or before it commences in spring.

DIPCADI. Nat. Ord. Liliacæ.—A genus containing about twenty species of bulbous plants, closely related to Galtonia, having tunicated bulbs, radical, more or less linear thickish leaves, and loose racemes of cylindrical, shortly-stalked flowers. There are only a few species in cultivation, confined for the most part to botanical collections. They are not hardy, except perhaps in the very mildest parts of the Kingdom, consequently they require the protection of a greenhouse or frame in winter in most places. The blossoms appear during the summer months from July to August and September, and are mostly greenish in colour. A rich sandy and well-drained soil suits them best, and propagation is effected by detaching the offsets from the older bulbs in spring.

The following species may be noted:—**D. Balfouri**, from Socotra,

has greenish-yellow flowers in September, on scapes 2 to 3 ft. high; **D. glaucum**, from the Cape, has greenish flowers on scapes 2 to 3 ft. high (*Bot. Reg.* t. 156); **D. longifolium**, from Mozambique, has purple and blue flowers in August, on scapes about 2 ft. high (*Bot. Reg.* t. 974); **D. serotinum** (formerly known as **SCILLA** and **UROPETALON**), from Spain, has greenish-brown flowers in July, on scapes 9 ins. high, and is one of the hardiest species (*Bot. Mag.* t. 859); **D. umbonatum**, from S. Africa, has yellowish flowers (*Ref. Bot.* t. 17); **D. Welwitschi**, from Angola (*Bot. Reg.* t. 16), and **D. viride**, from S. Africa, both have green flowers (*Red. Lil.* t. 203).

DIPLADENIA (*diploos*, a double; *aden*, a gland; referring to the two gland-like processes on the ovary). Nat. Ord. Apocynaceæ.—This genus contains several species of ornamental stove climbing plants, those mentioned below being the only ones with thickened roots.

D. illustris.—A handsome Brazilian plant, having woody root-stocks, annual climbing stems, leathery, ovate leaves, and large rosy-red flowers. There is a variety called *glabra* (*Bot. Mag.* t. 7156).

D. nobilis (*Echites nobilis*).—A beautiful Brazilian climber, with fleshy tuberous roots and small, oval, opposite, leathery, deep green leaves. The large tubular or bell-shaped flowers, 2 to 3 ins. across, usually appear from July to October, in clusters at the ends of the young shoots, and are of a beautiful rosy-purple changing to orange-red. (*Pact. Mag.* xvi. p. 4.)

These plants require hothouse treatment. They like a compost of turfy peat and fibrous loam with a good sprinkling of silver sand, and

may be grown in well-drained pots, or planted in a border. Plenty of water should be given during growth, and the foliage should be kept clean and fresh by syringing two or three times a day. When the flowers are over, the stems may be cut back, and a lower temperature and less water will then suit the plants better. Indeed, very little water is required in winter months when the tuberous roots are at rest. In spring, about March, the plants may be repotted. If it is desired to increase the stock, this is best done by taking cuttings about 2 to 3 ins. long with a thin piece of the tubers attached, and inserting them in pots of sandy soil in spring.

DISPORUM (*dis*, double; *poros*, a pore). Nat. Ord. Liliaceæ.—A genus containing about a dozen species of hardy or half-hardy herbaceous plants having creeping, spreading, or erect stems from underground rhizomes. Leaves alternate, ovate or lance-shaped, sessile or shortly stalked. Flowers narrowly bell-shaped, solitary, or in clusters at the ends of the shoots.

These plants require a rich peaty and well-drained soil with a little loam, in warm, sheltered, and somewhat shaded positions. They may be raised from seeds sown in spring under glass, or by dividing the roots. The plants are not very well-known outside botanical collections.

The following may be noted:—

D. Hookeri.—1 to 2 ft. high, from California, has greenish flowers about $\frac{1}{2}$ in. long, and ovate or deeply heart-shaped leaves with roughish margins and nerves.

D. lanuginosum (*Uvularia lanuginosa*), from S. Carolina, grows about 1 ft. high; has yellow-green flowers in May and June, and ovate, lance-

shaped, net-veined leaves, downy on the under-surface but smooth above (*Bot. Mag.* t. 1490).

D. Leschenaultianum.—A native of the mountains of S. India and Ceylon, grows 1 to 2 ft. high, and produces white bell-shaped flowers in spring. The leaves vary from elliptic lance-shaped to roundish and pointed. (*Bot. Mag.* t. 6935.)

This species requires greenhouse treatment.

D. Menziesi.—A native of California, 1 to 3 ft. high, with greenish flowers and oval lance-shaped leaves rounded at the base, pointed at the apex, and more or less woolly or pubescent.

D. pullum (*D. fulvum*; *Uvularia chinensis*).—A singular-looking Chinese and Indian plant about 1½ ft. high, with angular zigzag stems, ovate lance-shaped pointed leaves, and brownish flowers in September and October (*Bot. Mag.* t. 916). There is a smaller yellow-flowered variety called *parviflorum*.

DOLICHOS (*dolikos*, long; referring to the long shoots). Nat. Ord. Leguminosæ. — This genus contains over twenty species of more or less climbing plants, with three foliolate leaves, and clusters of pea-like flowers.

D. simplicifolius.—This species from Tropical Africa differs from most of its tribe in having a woody, tuberous root-stock, from which arise annually herbaceous, erect stems about 1 ft. long, bearing simple lance-shaped leaves about 6 ins. long, in the axils of which clusters of pink pea-shaped flowers are produced (*Bot. Mag.* t. 7315).

This species is of botanical interest. It should be grown in sandy loam in a warm greenhouse or stove. The same may be said of another species, *pseudopachyrrhizus*, which has a large

tuberous root-stock, climbing stems, three-foliolate leaves, and violet-blue flowers in racemes 6 to 18 ins. long.

DORONICUM (from *doronigi*, the Arabian name), LEOPARD'S BANE. Nat. Ord. Compositæ.—A genus containing about a dozen species of hardy plants, some of which have swollen, tuber-like stems produced at the ends of creeping roots. All the species are more or less hairy, and the flower-heads are borne on tall erect stalks.



FIG. 120.—Doronicum, root-stock. (½)

D. pardalianches.—A British and European plant 1½ to 3 ft. high, with heart-shaped, toothed leaves, the upper ones gradually becoming stalkless and stem-clasping. The yellow flower-heads appear in May and June, often several on a branching stem.

D. plantagineum.—This is a native of S. Europe, and has a tuberous and creeping root-stock; grows 1½ to 3 ft. high, the lower leaves being ovate, stalked, and unevenly toothed, the upper ones more or less lance-shaped, entire, and stalkless. The large solitary flower-heads are bright golden-yellow, and appear in great profusion in April and May. The variety *excelesum* (or *Harpur Creve*) is a splendid border plant, often

about 5 ft. high, and with flower-heads 3 to 4 ins. across.

The *Doronicums* make splendid border plants if given plenty of space to develop. As a rule, however, they are planted too closely together, or become choked with other vegetation. As they produce creeping and tuberous root-stocks freely, they spread with great freedom and will cover a large area in a few years if allowed to do so. It is better to give each plant at least a square yard or so to itself, and then it will display its beauty to the best advantage. Any ordinary garden soil will suit the plants, which are easily increased in autumn by dividing the root-stocks.

DORSTENIA (after *T. Dorsten*, a German botanist). Nat. Ord. Urticaceæ. — A genus containing about fifty species of hothouse plants, remarkable for the very curious inflorescence. The small greenish flowers are seated on a flattish receptacle, somewhat resembling the fruit of a fig cut open.

The *Dorstenias* are chiefly of botanical interest, and are easily grown in a house with plenty of heat and moisture in a rich sandy loam. They may be increased by seeds or division. The following species have more or less tuberous root-stocks :—

D. Manni.—A native of W. Tropical Africa, with elliptic or oboval leaves lobed at the base, obscurely lobed, and deep green above (*Bot. Mag.* t. 5908).

D. tubicina.—A very rare and curious species from the Trinity Islands, about 3 ins. high, having spindle-shaped, aromatic root-stocks, oblong heart-shaped leaves, veined and toothed on the margins (*Bot. Mag.* t. 2804).

D. Walleri.—A species from Nyassaland, closely related to *D. Manni*. It

has a tuberous root-stock, perennial stems about a foot high, and ovate fleshy leaves 2 to 5 ins. long. The green star-shaped inflorescence is nearly 1 in. across, with five tails about 2 ins. long. (*Gard. Chron.* 1893, xiv. 128.)

DRACONTIUM (*dracon*, a dragon; referring to the serpent-like spots and streaks). Nat. Ord. Aroideæ.—This genus contains about a dozen species, all natives of Tropical America, of large-growing, tuberous-rooted herbs remarkable for producing large, solitary, long-stalked leaves, the blade of which is deeply divided into numerous lobes and segments.

The genus **ECHIDNIUM** (*echidnion*, a young viper) is now merged in *Dracontium*, the best-known species of which is *E. Regelianum*, which comes from Brazil, and grows 1½ to 3 ft. high. The leaves are three-parted, bright green, and the spathes are purple-brown, (*Gartenfl.* t. 503.)

The *Dracontiums* are similar in appearance to the *Amorphophalli*, and require the same cultural treatment, namely, plenty of heat and moisture during growth, and a compost of fibrous loam, well-decayed manure, and leaf-mould. When at rest practically no water is given, for fear of rotting the thick fleshy root-stocks. These are divided in spring if it is desired to increase the plants. It is very rarely these curious but interesting plants are grown outside botanical collections. The following species may be noted :—

D. albostipes.—This grows about 3 ft. high, the solitary leaf being divided into three main parts, the divisions of which are winged and bear irregularly forked leaflets of a bright green colour. The stout leaf-stalk is roughish at the base, and tapers upwards. It is greyish-white

distinctly marked with irregular blotches and bands of dark brown.

D. annulatum.—This grows about 3 ft. high, the three-parted leaf having bright green leaflets. The stalk is of a dull brown colour, marked with pale brown and whitish-brown irregular rings.

D. asperum (*D. elatum*; *Amorphophallus nivosus*; *Sauromatum asperum*).—A Brazilian species 5 to 6 ft. high, the leaf-stalk being about an inch thick at the base, gradually tapering upwards, and marked with wavy bands or blotches of purple, mottled with white. The leaf-blade is divided into three or five main portions, often spreading horizontally for 3 to 4 ft. The flowers consist of an erect, purple-brown, boat-shaped spathe enclosing a cylindrical spadix about 2 ins. long. (*Gard. Chron.* 1870, 344; *Ill. Hort.* 1865, t. 424; *Ref. Bot.* 282.)

D. Carderi.—A Colombian species, about 3 ft. high, with flesh-coloured leaf-stalks freely banded with irregular blotchy rings of umber brown. The leaf-blade is three-parted, the divisions being often twice forked, with oblong segments and an irregularly-winged rachis. (*Bot. Mag.* t. 6523.)

D. fœcundum.—A native of British Guiana, about 6 ft. high, the roundish tubers bearing a profusion of pointed bulbils above the surface of the soil. The three-parted leaf appears after the flower, and has a diameter of about 4 ft., each division bearing several pairs of drooping leaflets. The erect spathes appear in spring, and are about 5 ins. long, dull brown outside, wine-purple within.

D. gigas (*Godwinia gigas*).—This remarkable plant was introduced from Nicaragua in 1869, and has often attracted considerable attention at Kew. It grows about 10 ft. high,

the roughish fleshy leaf-stalk, as thick as a man's wrist, being pale or creamy yellow, elegantly and irregularly barred and striped with dark purple. The large leaf-blade is trichotomously divided and again much subdivided



FIG. 121.—*Dracontium gigas*. ($\frac{1}{2}$.)

into smaller, confluent, and deeply cut leaflets. The spathe varies from 2 to 4 ft. long, and is usually of a deep plum purple passing into pale yellow at the base, while strong nerves traverse the surface from base to apex. (*Bot. Mag.* t. 6048.)

DRACUNCULUS (diminutive of *draco*, from *dracon*, a dragon; the leaf-stalks being marked like the skin of a snake). Nat. Ord. Aroidææ. —The best-known species of this genus is *D. vulgaris*, the Dragon Plant. This is still more generally known in gardens under the name of *Arum Dracunculus*, and is so described in this work (see p. 92).

DRIMIA (*drimys*, acrid; referring to the inflammatory juice of the bulbs). Nat. Ord. Liliaceæ.—A genus containing about a score of species of bulbous, Scilla-like plants, natives of Southern and Tropical Africa. The bell-shaped flowers are borne on simple scapes in racemes well above the narrow lance-shaped or strap-shaped leaves.

These little plants are not well known outside botanic gardens. They are best grown in pots or pans in a greenhouse, and like a mixture of sandy loam and leaf-mould or peat. When in growth, water must be given when necessary; but in winter when the bulbs are dormant no water is required. Propagation is effected by detaching the offsets from the old bulbs when repotting in spring.

The following are the best-known species:—*D. ciliaris*, 1½ ft., purple, white; *D. anomala* (*Ref. Bot. t. 178*); *D. elata*, 2 ft., green, red (*Bot. Mag. t. 822*); *D. haworthioides*, 6 ins., white, green; *D. longipedunculata*, green, purple; *D. media*, white; *D. purpurascens*, purple; *D. pusilla*, green; *D. robusta*, 2 ft., green; and *villosa*, green (*Bot. Reg. t. 1346*).

DRIMIOPSIS (from *Drimia*, and *opsis*, resemblance, owing to likeness to that genus). Nat. Ord. Liliaceæ.—A genus closely related to *Scilla*, *Eucomis*, *Hyacinth*, and *Chionodoxa*, containing half a dozen species, natives of Southern and Tropical Africa. They have rather small tunicated bulbs, usually with two or rarely three to four oblong leaves, sometimes distinctly stalked and often spotted. The small flowers are borne in spikes or dense racemes. The following are the only species of any note:—

D. Kirkii.—A curious-looking plant from Zanzibar. It has white-coated,

round bulbs, about 1½ ins. in diameter, and lance-shaped leaves about 1 ft. long, the pale green upper surface being irregularly blotched with dark green. The white flowers, each about ½ in. long, appear in July and August, on a scape 9 to 12 ins. high, the upper blossoms being crowded. (*Bot. Mag. t. 6276*.)

D. maculata.—Introduced from Natal in 1851—twenty years before *D. Kirkii*. This is a more ornamental plant, with heart-shaped, ovate-acute, fleshy leaves, the bright green upper surface being blotched with deeper green. The flowers, at first milky white, but changing to greenish-white with age, are borne on scapes 9 to 12 ins. high. (*Ref. Bot. iii. 191*.)

These plants may be grown easily in a warm and well-ventilated greenhouse in the same way as the *Drimias*.

Other species occasionally met with in botanic gardens are *D. botryoides* and *D. perfoliata*, both natives of Zanzibar, with greenish-white flowers on scapes about 6 ins. high; and *D. minor*, a native of Natal, with pink blossoms (*Ref. Bot. t. 192*).

EICHHORNIA (after *J. A. F. Eichhorn*, a learned Prussian). Nat. Ord. Pontederiaceæ.—A genus of curious-looking and interesting aquatic herbs closely related to **PONTEDERIA**, natives of S. America and Tropical Africa. The thickish stems or rhizomes float on the water, chiefly through the agency of the short leaf-stalks, which are more or less inflated and full of air. They are not difficult to grow, provided they are placed in pots or tubs of rich soil and immersed in water with a temperature of 75° to 85° F. They are easily propagated by cutting the root-stocks into pieces each containing a bud.

E. azurea.—A Brazilian aquatic, with thickish green, smooth and flexuose stems about an inch thick. The leaves are from 3 to 8 ins. across, roundish, heart-shaped, or rhomboidal,



FIG. 122.—*Eichhornia azurea*. (½.)

the blade being more or less twisted. The clear, pale blue, funnel-shaped blossoms appear during the summer months, and are scattered or in pairs along a stout hairy rachis or main stem. (*Bot. Mag.* t. 6487.)

E. speciosa (*Pontederia crassipes*) is similar, but has no thickish root-stocks, and produces fine spikes of blue flowers (*Bot. Mag.* t. 2932).

ELISENA (after *Princess Elise*, sister of Napoleon the Great). Nat. Ord. Amaryllideæ.—A genus closely related to *Hymenocallis*, containing three species of Peruvian plants with tunicated bulbs, strap-shaped leaves,

and broadly funnel-shaped flowers having long linear segments.

The species mentioned below are all natives of the Andes of Peru and Ecuador, and require to be grown in a warm greenhouse. They flourish in a compost of loam and sand in about equal proportions, with a little well-decayed cow-manure or leaf-soil added. The simplest method of increase is by offsets from the old bulbs. Seeds, however, if obtainable, may be sown in sandy loam and peat, or a little leaf-soil.

E. longipetala.—This is the best-known species, having being introduced about 1837. It grows at an altitude of 6000 to 8000 ft. on the Andes of Peru and Ecuador, and has long-necked bulbs $1\frac{1}{2}$ to 2 ins. in diameter, from which arise about six strap-shaped, pale green leaves about $1\frac{1}{2}$ ft. long and $1\frac{1}{2}$ ins. broad. About May and June, from five to ten white flowers, each with a funnel-shaped staminal cup and linear segments about 4 ins. long, are borne in a nearly sessile umbel on top of a two-edged scape 2 to 3 ft. high. (*Bot. Mag.* t. 3873; *Ref. Bot.* t. 264.) This species crossed with *Hymenocallis* (*Ismene*) *calathina* has produced a bigeneric hybrid (*Gard. Chron.* 1905, xxxvii. 344; xxxviii. 322).

E. ringens.—This species has round bulbs about $1\frac{1}{2}$ ins. through, narrow strap-shaped leaves about $1\frac{1}{2}$ ft. long, and about half a dozen flowers on a two-edged scape. The flowers are much smaller than in *E. longipetala*. (*Fl. Peruv.* iii. 53, t. 283.)

E. sublimis.—This is closely related to *E. ringens*, but has a longer staminal cup and longer segments.

ERANTHEMUM (*eran, eras*, to love; *antheon*, a flower; referring to the beautiful flowers). Nat. Ord. Acanthaceæ.—There are many beautiful

stove and greenhouse perennials belonging to this genus, but the only one having tuberculous roots is—

E. tuberculatum.—This species was introduced from New Caledonia about 1863. It is a beautiful bushy plant with slender stems, small, oval, opposite leaves, and pure white flowers about 3 ins. across. The corolla is five-lobed, with a long tube. (*Bot. Mag.* t. 5405.)

This species flourishes in a stove house in a compost of sandy loam and leaf-soil. It likes plenty of water when in full growth, and frequent syringings or sprinklings overhead before the flowers appear in summer. It is easily propagated by cuttings of the young half-ripened shoots a couple of inches long, inserted in sandy soil in a close frame or under a bell-glass, and kept shaded from strong sunshine till established.

ERANTHIS (*er*, spring; *anthos*, a flower; referring to its early flowering), WINTER ACONITE. Nat. Ord. Ranunculaceæ.—A small genus of dwarf-growing perennials having tuberous roots, palmately cut leaves, and solitary yellow flowers, composed of five to eight petal-like sepals. The real petals are small, each with a claw. The stamens and carpels are numerous.

E. hyemalis.—This is the best known of the Winter Aconites. It



FIG. 123.—*Eranthis hyemalis*, tubers.

is a native of W. Europe, and grows only a few inches high. The blackish

irregular tubers, about the size of a small filbert, send up roundish leaves

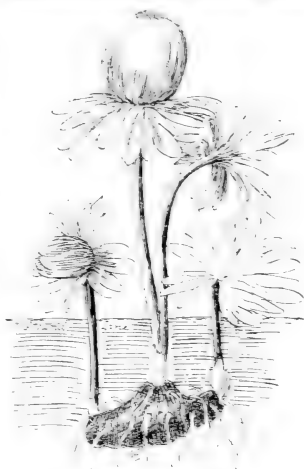


FIG. 124.—*Eranthis hyemalis*.

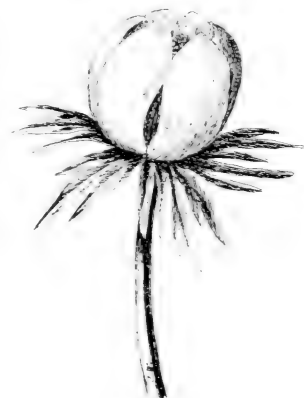


FIG. 125.—*Eranthis cilicica*.

which are deeply and irregularly lobed. The bright glistening yellow

flowers, seated on bright green divided involucre, appear in great profusion early in the New Year, and continue well into March.

E. cilicica is closely related, but has more finely divided leaves; and *E. sibirica* is distinguished by having only five oval sepals.

CULTURE.—The Winter Aconites flourish in any good and well-drained garden soil, *E. hyemalis* being practically naturalised. To secure a fine effect the tubers should be planted thickly—about 3 or 4 ins. apart in early autumn, and about 3 or 4 ins. deep. The most suitable positions are beneath early-flowering deciduous trees and shrubs, such as Forsythias, Almonds, Plums, Spiræas, Lilacs, Flowering Currants, etc., or on banks or borders, where their bright colour will be appreciated early in the year. Indeed, the Winter Aconites might be used with greater freedom in shrubberies of all kinds with such early-flowering bulbs as Snowdrops, Scillas, Chionodoxas, Crocuses, etc. About April and May the plants die down, and rest during the summer months, growth recommencing in early autumn. The plants may then be increased if necessary by dividing the tuberous roots and replanting. When the seeds in the follicles are thoroughly ripe they may be sown in rich sandy soil, but they usually remain dormant until the following spring. Even then growth only lasts for a few weeks, the resulting tubercle being only about the size of a pin's head. At the end of three or four years it becomes large enough to flower.

EREMOSTACHYS (*eremos*, deserted, solitary; *stachys*, a spike; referring to the flowers being sparsely arranged on the spikes). Nat. Ord. Labiatae.—

The only species worth noting here is—

E. laciniata (*Phlomis laciniata*).—A pretty hardy perennial 4 to 6 ft. high, with thick fleshy roots and tufts of thick downy leaves each 6 ins. or more long, pinnately cut into oblong lance-shaped or linear segments, with deeply jagged margins. The rosy- or bronzy-purple flowers appear from June to August, the upper lobe being yellow and hairy. From eight to twelve whorls, each having from ten to twenty flowers, are borne on each spike. The variety known as *iberica* or *flava* has less hairy yellow flowers.

This plant flourishes in light rich soil, but being a native of S.E. Europe, it should have a warm, sunny, and sheltered position. It looks well in bold masses in the border, or in beds on the grass, planted about 3 ft. apart. Propagation is effected by sowing seeds when ripe, or in spring, or by cuttings of the young shoots in spring. It takes from two to three years for seedlings to arrive at the flowering stage.

EREMURUS (*eremos*, solitary; *oura*, a tail; referring to the long, tail-like spike of flowers). Nat. Ord. Liliaceae.—A genus of noble and ornamental herbaceous plants having short rhizomes and clusters of slender or thick fleshy roots. The long linear leaves spring from the root-stocks, and the white, reddish, or yellow bell-shaped or rotate flowers are borne on tall, sometimes very high, simple leafless scapes, each blossom being solitary in the axil of the often scarious bracts. The segments are free, or very slightly united at the base, one- to five-nerved. Stamens six, hypogynous, often longer than the segments, and usually protandrous.

The Eremuri are among the finest

and most stately plants for the choice herbaceous border. They are mostly natives of Central and S. Asia, being found in the Himalayas, Persia, Turkestan, and parts of Siberia. It is questionable whether they are perfectly hardy in the bleaker parts of the United Kingdom. In such localities it would be wise in severe winters to give them some protection with a little straw, leaves, or litter, to keep their roots free from cold, wet, drenching rains.

They flourish in warm, sunny situations facing south, and make splendid masses in deep rich sandy loam, well-drained and manured. The soil should be trenched to a depth of two or three feet, and if inclined to be heavy, some mortar rubble and grit should be mixed with it. About September or early in October is the best time for planting. Great care should be exercised in filling the soil in among the roots, as these are very brittle and easily injured. The plants should have ample space to develop fully, and once planted are best left alone for a few years without being disturbed. The soil should receive annual dressings or mulchings of well-decayed cow or stable manure, and during active growth, especially in hot summers, copious waterings will be beneficial. In the early spring the plants shoot up often through the frosty soil, and the young and tender tips are then apt to become injured. A little sprinkling of clean straw, or better still a hand-light placed over the crowns at night, will give the necessary protection. As slugs devour the young growths, they should be kept in check by strewing slaked lime or soot around the plants frequently.

In hot summers Eremuri ripen seeds freely. The seeds should be sown in pots or pans under glass as soon as

thoroughly ripe. The young seedlings should be pricked out into nice fine sandy loam and leaf-mould, and for the first year or two until they have attained a good size, they are best grown in cold frames during the winter months; after this they may be planted in the open border. The plants may also be increased by carefully dividing the root-stocks, but as some kinds do not flower for two or three seasons after planting, it is not wise to disturb the plants too often.

The following kinds are grown:—

E. Aitchisoni.—A fine species from the hills of Afghanistan, where it flourishes at an altitude of about 12,000 ft. It has rosettes of broad leaves 2 to 3 ft. long, and produces dense spikes of pale red flowers in June and July, on stout stems 3 to 5 ft. high.

E. aurantiacus.—This fine species is closely related to *E. Bungei*, and also comes from Afghanistan, where it is found growing in rough, stony soil at an elevation of 7000 to 9000 ft. It has narrow linear leaves about 1 ft. long and $\frac{1}{2}$ in. broad. The bright orange-yellow blossoms with reflexed segments are borne in April and May on stalks 2 to 3 ft. high. (*Gartenfl.* t. 1168, fig. 6; *Bot. Mag.* t. 7113.)

E. bucharicus.—This species from Bokhara is not yet well known. It has triangular grey-green leaves, the margins of which are furnished with downward-pointing teeth. The flower-stem is about 3 ft. high, and bears a long and rather loose raceme of white flowers, each about an inch across, the segments having a brownish-red line down the centre. (*Gartenfl.* t. 1315, fig. 1.)

E. Bungei.—A beautiful Persian species with smooth grey-green leaves about 1 ft. long and $\frac{1}{4}$ in. broad, slightly ciliated on the edges. The stoutish flower-stems appear in June

and July, and are 1 to 6 ft. high, the upper portion being covered with bright yellow flowers each about 1 in. across, the reflexed segments being distinctly keeled with green behind. There are several seedling variations of this species now in cultivation. (*Gartenfl.* t. 1168, fig. A.) The variety *præcox*, from Baluchistan, produces its looser spikes of smaller flowers earlier than the type; and *citrinus* has larger citron-yellow flowers (*Rev. Hort.* 1907, 366).

E. chinensis.—This species, probably not yet in cultivation, is closely related to *E. Olgaë*, but is a native of China, having been found at W. Szechuan and the Tibetan frontier. It has stout, fleshy, spindle-shaped roots and very narrow and thin flaccid keeled leaves. The whole plant is about 2 ft. high, and the flowers are about the size of those of *E. Olgaë* with narrower segments. The colour is not mentioned. (*Gard. Chron.* 30th March 1907, 199.)

E. himalaicus.—This is a charming and most imposing, and at the same time one of the hardiest species from the Himalayas, where it grows at an elevation of 7000 to 10,000 ft. It has smooth, strap-shaped, acute leaves about 1 ft. long, and produces its erect spikes of beautiful white flowers, each well over an inch across, in May and June, on the upper portion of a stout stem, which sometimes attains a height of about 8 ft. (*Gard. Chron.* 1881, xvi. p. 49; *Bot. Mag.* t. 7076.)

E. himrob.—This is a grand hybrid between *E. himalaicus* and *E. robustus*, and differs from the latter parent chiefly in its silvery rose colouring.

E. isbellinus is a hybrid between the yellow-flowered *E. Bungei* and the pinkish- or lilac-purple *E. Olgaë*.

E. Kaufmannianus.—This species

from Turkestan is a fine addition to the yellow-flowered kinds, and has moreover the additional charm of being fragrant.

E. Korolkowi.—This rare and handsome species, from Central Asia, grows from 3 to 4 ft. high, and has large spikes of bright rose flowers.

E. Michelianus is the name given to a supposed hybrid between *E. Bungei* and *E. Warei* (*Gard. Chron.* 1906, xl. 83).

E. Olgaë.—A pretty and distinct species from Turkestan, resembling *E. Bungei* in appearance, with narrow leaves 1 to 2 ft. long, and flower-stems about 8 ft. high, the upper half being densely covered with pinkish-white or pale lilac-purple sweet-scented flowers over 1 in. across, opening in May and June (*Gartenfl.* t. 1048).

E. robustus.—A vigorous free-growing and deep-rooting species,



FIG. 126.—*Eremurus robustus*, root-stock. (3.)

native of Turkestan, at an elevation of about 10,000 ft. The leaves often measure 3 ft. long and 3 ins. broad, while the flower-stem reaches a height of 6 to 10 ft., the upper 3 or 4 feet being a tapering spike of pale pink or rosy flowers, each about 2 ins. across, and expanding in May and June. (*Bot. Mag.* t. 6726; *Gartenfl.* t. 769.) The variety *Elvesianus* is a much stronger and finer plant than the type, and bears immense spikes of

rosy-pink flowers at the same season, but the blossoms last longer. There is a beautiful white-flowered form, quite as vigorous and free-flowering as the others.

E. spectabilis (*E. caucasicus*).—This variable species from Siberia, the Caucasus, etc., has been in cultivation since about the year 1800. It has tufts of narrow, grey-green, strap-shaped leaves, and its pale sulphur-yellow flowers tinted with orange, appear in May and June on stout stalks 2 to 4 ft. high. (*Bot. Mag.* t. 4870.) A hybrid called *vedrariensis* has been raised between *E. spectabilis* and *E. robustus* (*Rev. Hort.* 1907, 229 f.).

E. Tubergeni.—Another grand hybrid between the yellow *E. Bungei* and the white *E. himalaicus*, and intermediate in appearance between the two. The flowers are pale yellow.

E. turkestanicus.—A native of Turkestan, 2 to 4 ft. high, with broadly linear pointed leaves and reddish-brown flowers, the segments of which are edged with white (*Gartenfl.* t. 997).

E. Warei.—This is probably a natural hybrid between *E. Bungei* and *E. Olga*. It has very tall spikes (8 ft.), the actual inflorescence being a yard long, and studded with hundreds of coppery-red blossoms tinted with bronze. It comes from Central Asia. (*Gard. Chron.* 1900, xxvii. 409.)

ERIOSPERMUM (*erion*, wool; *spermos*, a seed; in reference to the woolly seeds). Nat. Ord. Liliaceæ.—A genus containing over two dozen species of plants, natives of Tropical and Southern Africa, and closely related to *Eremurus*, and formerly confused with *Bulbine*. They are bulbous plants requiring the protection of a warm greenhouse during the

winter months, but would probably flourish in the open air from June to September. They are easily grown in a compost of sandy loam and peat or leaf-soil, and may be increased by offsets.

The following species are met with in botanic gardens:—

E. Bellendeni (*E. latifolium*).—This has roundish pointed leaves, cucullate at the base, and produces its light blue starry blossoms from June to August, on stalks about 1 ft. high (*Bot. Mag.* t. 1382).

E. brevipes, from Algoa Bay, grows about 1½ ft. high, and has white flowers tinted with green.

E. folioliferum has green and yellow flowers (*Bot. Rep.* t. 521).

E. Mackeni (*Bulbine Mackeni*), from Natal, has rather fleshy, ovate-oblong, bluntish leaves, and bright golden-yellow flowers in July (*Bot. Mag.* t. 5955). **E. latifolium** has light blue flowers (*Bot. Mag.* t. 1382; *Jacq. Ic.* t. 420); **E. parvifolium**, dark blue flowers (*Jacq. Ic.* t. 422); and **E. pubescens**, white and green flowers (*Bot. Mag.* t. 578).

ERYTHRONIUM (*erythros*, red; referring to the colour of the leaves and flower of first species), DOG'S-TOOTH VIOLET. Nat. Ord. Liliaceæ.—A genus of pretty plants with tunicated bulbs which produce new ones each year either at the base within the old coats or at the end of long offshoots, or along a rhizome, sometimes in succession for several years. The leaves on the stems are unequal, one being usually narrower and more tapering than the other. The mottling varies greatly even in the same species, and may sometimes be absent altogether. The flowers are nodding or drooping, solitary, or two or more in a loose raceme.

For three hundred years and more

the common European and Asiatic Dog's-tooth Violet (*E. dens-canis*) has been cultivated in British gardens, and it still ranks as one of the best for early spring-flowering purposes. Of late years several other species have been introduced from the United States, and have proved excellent additions to our spring-flowering bulbous plants, being suitable either for the ordinary flower - border, for nooks in the rockery, for grassland, or for naturalising amongst shrubberies, etc.

Like bulbous plants in general, most of the Erythrונים like a gritty soil well enriched with leaf-mould or old manure, and detest heavy cold ground charged with too much moisture, although they like damp situations. The best time for planting is between September and the end of November, the cylindrical or oblong bulbs being covered with about twice their own depth of soil. Once planted they may be allowed to remain for several years in the same place, where in many cases they will increase and multiply without trouble. An annual mulching or top-dressing of well-rotted manure in autumn or winter will supply fresh food to the roots, and keep the plants in good flowering condition. Apart from open-air culture, the Dog's-tooth Violets are charming plants for pot cultivation, and may be grown with ease in a cold greenhouse during the winter and early spring months with other plants like Crocuses, Scillas, Chionodoxas, etc., etc.

The following species are now grown :—

E. albidum.—A native of damp places in the states of New York, Pennsylvania, etc., having oblong lance-shaped leaves, slightly mottled with silvery green. The white flowers, with lance-shaped reflexed segments, appear in April and May, one on each

stalk. The variety *bracteatum* has somewhat larger leaves, and differs, moreover, in having yellow flowers. It inhabits the mountain regions instead of the pastures. The variety *coloratum* has deeper coloured flowers than the type.

E. americanum.—This species grows in the damp open woodland of the Eastern United States and Canada. It has stolon-bearing corms like *E. albidum*, and larger leaves mottled with greenish-purple. The solitary flowers appear in April and May, and are of a bright golden-yellow often tinged with purple, and finely dotted within at the base. (*Bot. Mag.* t. 1113; *Red. Lil.* t. 194.)

E. californicum.—This is the name given in *Flora and Sylva*, November 1905, p. 254, to the plant hitherto known as *E. giganteum*, from which it differs chiefly in having more than one flower on a stalk, and in having larger and more prominent filaments, auricles, and seed-pods. It is found at an elevation of 6000 to 10,000 ft. in California, and is one of the finest and most showy species. The leaves are mottled with dull purple, and the large creamy-white flowers 3 ins. across are suffused with orange or yellow at the base, and from one to six are borne on a tall scape. (*Bot. Mag.* t. 5714.)

E. citrinum.—A native of the Deer Creek Mountain in S. Oregon, having obovate lance-shaped leaves richly mottled in brown. The stems usually bear three lemon-yellow flowers, but often more, the broadly lance-shaped segments about 1 in. long being strongly recurved, orange at the base above the auricles, and sometimes suffused with pink at the tips.

E. dens-canis.—This is the common Dog's-tooth Violet, found wild chiefly in Central and S. Europe, although forms of it extend across Asia to

Japan. It has ovoid-cylindrical corms resembling a dog's tooth, and ovate or oblong, lance-shaped, glaucous green leaves marbled with dull purple. The peduncles appear in February and March, each from 4 to 6 ins. high, bearing a solitary flower of a beautiful rose or violet-purple (rarely white), with brown dots at the base of the recurved segments. Besides the rare white forms there are others, called *purpureum*, *roseum*, and *violaceum*, according to the shades of colour. The Siberian form, *sibirica*, has purple



FIG. 127.—*Erythronium dens-canis*. ($\frac{1}{2}$)

flowers, and is a more vigorous plant than the type, while the Japanese form, *japonicum*, has violet-purple flowers. (*Bot. Mag.* t. 5; *Red. Lil.* t. 194; *Gard.* 1896, t. 573.)

E. giganteum.—The species hitherto known under this name is now called *E. californicum*. The true *E. giganteum* is a native of "Oregon, Washington, and Southern British

Columbia, growing in heavy lands along streams and damp spots in woods." It has obovate lance-shaped leaves mottled in light brown and white. The tall stout scape rarely carries more than one flower, which has pure white petals tinted with green, and with or without a reddish band above the auricled base. The variety *præcox* has creamy-white flowers and richly mottled leaves.

E. grandiflorum.—A pretty species 6 ins. or more high, native of the mountains of Idaho, Washington, etc.,



FIG. 128.—*Erythronium grandiflorum*. ($\frac{2}{3}$)

with erect oblanceolate unmottled leaves, and bright golden-yellow flowers about 3 ins. across, with crimson stamens, borne in March and April, usually two on a stem (*Bot. Reg.* t. 1786).

The variety *albiflorum* has white flowers tinged with green. The variety *parviflorum* is the same as the plant grown as *Nuttallianum*, and being more common than the type

has usually been called *grandiflorum*. It is a native of the Blue Mountains of Oregon, and the Cascade Mountains of Washington, besides Colorado, Utah, etc. It first flowered in England about 1835 or 1836. The form called *Murrayi* seems to be rare, and is said to have mottled leaves.

E. Hartwegi.—A fine Californian species with small corms and obovate lance-shaped green leaves distinctly



FIG. 123.—*Erythronium Hartwegi*. (2.)

marbled with dull purple. The large creamy-white or pale yellow flowers, tinted with orange at base, are from $2\frac{1}{2}$ to 3 ins. across, and appear in March and April, on stalks 4 to 8 ins. high.

E. Hendersoni.—A handsome species from the Oregon Mountains, having dull green oblong lance-shaped leaves faintly mottled with purple brown. The light purple-rose flowers with reflexed segments appear in March and April, from one to three or more

drooping on a scape 4 to 6 ins. high, the centre being darker coloured with a yellow ring. (*Bot. Mag.* t. 7017.)



FIG. 130.—*Erythronium Hendersoni*. (3.)

E. Howelli.—A rare Oregon species with obovate lance-shaped leaves mottled with purple, and pale yellow flowers having an orange-coloured base which turns pink or rose with age. There are no auricles at the base of the inner petals.

E. Johnsoni.—A sturdy-growing species from the Columbia River, with large, clear rosy-pink flowers, having a rich yellow zone at the base. It is considered to be a geographical form of *E. revolutum* by Mr Carl Purdy (*Garden*, 1896).

E. mesochoreum.—A native of the grassy prairies and wooded slopes from Iowa to Kansas. It resembles *E. albidum*, but has unmottled and narrower leaves, and the segments of the whitish flowers are not recurved.

E. montanum.—A native of the Oregon and Washington mountains,

having faintly mottled leaves cordate at the base, and one to two large creamy or pure white flowers on a stalk, the base of the segments being orange often fading to pink. This flowers later than the other species, from July to September.



FIG. 131.—*Erythronium Johnsoni*. (1.)

E. Nuttallianum.—This is often confused with forms of *E. grandiflorum*. The true type has golden-yellow flowers, and the stamens have bright scarlet anthers.

E. propullans.—A native of Minnesota, having small ovoid corms, and oblong lance-shaped slightly mottled leaves 2 to 4 ins. long. The peduncle is only 2 to 3 ins. high, bearing a solitary rose-purple flower with a yellow centre.

E. purpurascens.—A Californian species from an altitude of 4000 ft., with corms 1 to 2 ins. long, and narrow, lance-shaped, obovate, wavy leaves tinted with brown. This species sometimes bears as many as

eight flowers on a single stem. They are pale yellow tinged with purple, and deep orange-yellow at the base of the segments. A variety called *multiflorum* is said to bear as many as fifteen bright lilac flowers with a yellow centre on a single stem.



FIG. 132.—*Erythronium Smithi*, corm and section. (1.)

E. revolutum.—A distinct and beautiful Californian species, having



FIG. 133.—*Erythronium robustum*. (1.)

large deep green leaves mottled with brown and white. From one to two

flowers, each about 2 ins. across, and varying in colour from pink to deep rosy-purple, are borne on stout stems well above the leaves. The variety *Watsoni* (or *albiflorum*) has large, somewhat bell-shaped, creamy-white flowers with an orange centre; while there is another form with pure white flowers on stems about 18 ins. high. The variety *Bolanderi* (or *Smithi*) differs from the type in seldom turning purple. A garden form called "*Pink Beauty*" has flowers of a delicate shade of pink.

E. robustum.—An ornamental species 6 to 8 ins. high, having wavy leaves varying from lance-shaped to ovate, and not marbled, and having bright yellow flowers with reflexed petals, the protruding cinnabar anthers being attached to white filaments. The blossoms appear in April. Fig. 133.

EUCHARIS (*eucharis*, agreeable; referring to the scent of the flowers). Nat. Ord. Amaryllidææ.—A genus containing about a dozen species of noble-looking bulbous plants, all natives of Colombia (New Grenada). They are characterised by having tunicated bulbs, oblong bright green stalked leaves, and large pure white flowers borne in irregular umbels on top of a stout fleshy scape. The perianth-tube is cylindrical, with a dilated throat more or less curved, while the six segments are more or less spreading, the three inner ones being somewhat wider than the three outer. There are six stamens, remarkable for having the lower half of the filaments dilated into a flat appendage, and united to each other to form a kind of short corona or "trumpet," as in *Narcissus*.

Eucharis flourish in a stove or warm greenhouse temperature, say from 65° to 70° F. in winter to 80° or

more in summer. The bulbs vary in size according to the species, from 1½ ins. to 3 ins. in diameter, and may be grown in pots or planted in borders under glass. Several bulbs may be placed in one pot, allowing 2 or 3 ins. between each, or a single bulb may be allotted to one pot having a diameter of 2 or 3 ins. more than the bulb. I have found a compost of heavy loam, with a good sprinkling of leaf-mould, old cow-manure, and silver sand excellent, the pots in every case being well-drained with a good layer of crocks at the bottom. The best time for potting is in early spring, when the bulbs begin to send forth fresh growths. This is also a good time to increase the stock by separating the offsets from the older bulbs and potting them up singly into 5-in. or 6-in. pots according to size. In potting, the top or crown of the bulbs should be an inch or so beneath the top of the soil, this being pressed down firmly all round.

When growth commences, watering must be given as required, larger supplies being necessary during vigorous growth than when the plants are in blossom or going to rest. To secure particularly good results weak liquid manure may be given two or three times a week when the flower-stems are pushing up from the bulbs. Cow-manure, soot, and a little guano mixed up in a bag and sunk in a tub or tank will yield an excellent stimulant. I have also used sheep droppings in the same way and have been satisfied with the results; and doubtless any other natural manure would be equally efficacious if used judiciously, and not too strong or too fresh.

A moist atmosphere is one of the essentials for successful *Eucharis* culture, especially during rapid growth. The syringe should be used in the morning and afternoon, and the stages

and floors should be "damped down" regularly to maintain the humidity. Great light in summer is not essential—indeed it is likely to give the leaves a yellowish tint. The blinds should therefore be pulled down during the hottest part of the day, unless the plants are growing where they are naturally in a somewhat shaded position, such as beneath stages, or when grown beneath tall Palms or other plants.

Of the species mentioned below, the finest and most valuable undoubtedly is *E. grandiflora* (almost as well known under the name of *E. amazonica*). It is a great favourite with growers for market, and its beautiful flowers always realise good prices for florists' work. When grown for market several bulbs are planted in large pots 12 to 18 ins. in diameter, in which they remain for several years. They are top-dressed annually with rich compost, and are given liquid manure when necessary. The fact that the blooms are cut when properly developed for market induces the plants to flower more frequently than when the flowers are allowed to fade and absorb more nourishment from the bulbs in the effort to develop seeds. Once the flowering period is over less water is required, and a lower temperature and a drier atmosphere will be appreciated until growth commences again. It is a mistake to dry the bulbs off—that is, to withhold water to such an extent as to cause the leaves to wither and fall. The plants are best kept in an ever-green condition if possible, arranging the temperature, watering, etc., according to the season and activity of growth.

The following species are known:—

E. Bakeriana.—This species may be described as a small edition of *E. grandiflora*. It was introduced in

1890 from Colombia, and has broadly oval leaves, and pure white flowers, the corona of which is like that of *E. candida*. (*Bot. Mag.* t. 7144; *Gard. Chron.* 1890, i, fig. 61.)

E. burfordiensis.—An interesting hybrid between *E. Stevensi* or *E. Sanderi* and *E. Mastersi*. The bell-shaped flowers are pure white, tinted with green at the base, and are about 3 ins. across. (*Gard. Chron.* 1899,



FIG. 134.—*Eucharis burfordiensis*. (3.)

xxvi. 232, 247, f. 84; *Gard. Mag.* Sept. 1899.)

E. candida.—This has been in cultivation since 1851. It has stolon-bearing bulbs about 2 ins. in diameter, and long-stalked, bright green, broadly elliptic leaves. From six to ten drooping pure white flowers, each about 3 ins. across, are borne on a scape 1 to 2 ft. high. (*Fl. d. Serr.* t. 788.) Fig. 135.

E. Gortoni.—The sketch represents a flower and bud of a plant shown with this name in London in August 1895. The blossoms were pure white, and remarkable for the large cup. The

plant seems to have dropped out of cultivation. The flowers somewhat resemble those of *Pancreatium trianthum* in shape.

E. grandiflora (*E. amazonica*).— Introduced from the Andes of



FIG. 155.—*Eucharis candida*. (L.)

Colombia in 1854, this species has ever since been a great favourite. It has roundish bulbs 2 to 3 ins. in diameter, and broadly ovate, pointed leaves, somewhat wavy and plaited. About half a dozen pure white flowers, each 4 to 5 ins. across, droop from the top of a scape $1\frac{1}{2}$ to 2 ft. high. The corona or "staminal cup" is composed of the six squarely dilated stamens or filaments. (*Fl. d. Serr.* tt. 957, 1216, 1217; *Bot. Mag.* t. 4971; *Garden*, 1858, ii. 691.)

The variety *Moorei* has somewhat smaller flowers than the type, and is recognised by the bright yellow lines on the outside of the corona extending downwards from the filaments.

Under the name of *Cliveucharis pulchra*, a supposed bigeneric hybrid between this species and a *Clivia* is described in the *Gard. Chron.* 1891, ix. 798.

E. Lehmanni.—A little-known species from Popayan, Colombia, having oblong elliptic leaves and small white flowers about $1\frac{1}{2}$ ins. across, and having a corona with twelve deeply cut teeth or divisions. It produces seeds freely. (*Gartenfl.* 1889, 1399, fig. 1.)

E. Lowi.—This is supposed to be a natural hybrid between *E. Sanderi* and *E. grandiflora*, and is a native of the U.S. of Colombia. The flowers are large pure white, with somewhat incurved segments. (*Gard. Chron.* 1893, xiii. 455, 538, f. 78.)

E. Mastersi.—A distinct species with bulbs $1\frac{1}{2}$ to 2 ins. in diameter, bright green oblong leaves, rounded at the base, and a couple of almost stalkless white flowers about 2 to 3 ins. across, on a scape about 1 ft. high (*Bot. Mag.* t. 6831; *Gard.*

Chron. Sept. 1899, 241, f.).

E. Sanderi.—A charming species with ovoid bulbs $1\frac{1}{2}$ to 2 ins. in diameter, and bright green oblong leaves cordate at the base. Less than half a dozen pure white flowers, 3 ins. across, with broadly ovate segments, are borne on scapes over a foot high. (*Bot. Mag.* t. 6676.)

The variety *multiflora* (*Bot. Mag.* t. 6831) has smaller white flowers striped with green.

E. Stevensi.—A hybrid between *E. Sanderi* and *E. candida* (*Gard. Chron.* Sept. 1899, 243 f.) Another between *E. Sanderi* and *grandiflora* has been called *Elmetana* (*Gard. Chron.* Nov. 1899, 344, f. 115).



FIG. 136.—*Eucharis Gorteni*. (1.)



FIG. 137.—*Eucharis grandiflora*. (1.)



FIG. 138.—*Eucharis Lowii*. (1.)



FIG. 139.—*Eucharis Sanderi*. (1.)

E. subedentata (*Calliphurria subedentata*).—A distinct plant with ovoid bulbs $1\frac{1}{2}$ ins. in diameter, and bright green oblong acute leaves deltoid at the base. Flowers white, six to eight on a slender scape a foot or more high. The stamen filaments are lance-shaped and occasionally toothed at the base. (*Bot. Mag.* t. 6829; *Ill. Hort.* n.s. 415.)

EUCOMIS (*eucomis*, beautiful-haired, referring to the tufted crown of flower-spike). Nat. Ord. Liliaceæ.—A small genus of S. African plants often with large tunicated bulbs, oblong wavy leaves, and stoutish erect scapes, bearing a dense raceme of waxy-looking flowers surmounted by a tuft or rosette of leaf-like bracts. Segments of perianth, six, spreading, nearly equal, each with a stamen attached at base. Ovary sessile, tapering into a columnar or conical style.

Although not well-known outside botanic gardens, these bulbs are worthy of more general cultivation. Except in the northern parts of England perhaps, and most parts of Scotland, they may be regarded as fairly hardy, and quite so in the southern counties. Grown several together, they look effective in foliage and blossom. They like a rich, gritty, and well-drained soil of a loamy nature, and the bulbs should be planted deeply so as to leave about 6 ins. of soil above the tops. Warm, sunny situations are best in the border or rockery. The growths appear later in spring than most other bulbous plants, and this is an advantage, as the spring frosts are likely to be evaded. When doing well, the plants should not be disturbed for some years, but it will be necessary to give a good top-dressing of well-rotted manure each year,

preferably in spring, when the shoots have appeared above the soil. The plants are easily increased by offsets from the old bulbs in spring.

If seeds ripen, they may be sown in rich gritty soil in pots under glass. The seedlings will require careful attention for the first two or three years, and when about five years old the bulbs may reach flowering size.

E. amaryllidifolia.—A distinct species, having ovoid bulbs, fleshy, suberect, strap-like leaves, channelled on the upper surface towards the base, and devoid of spots on both surfaces. The green blossoms are borne in dense cylindrical spikes on stems about 1 ft. high.

E. bicolor.—A handsome vigorous species from Natal, with round fleshy-rooted bulbs, and oblong, unspotted, deep green leaves, somewhat wavy on the margins. The pale greenish-yellow flowers appear in August in dense racemes, and are rendered conspicuous and even handsome by means of the distinct purple edge to the oblong segments. (*Bot. Mag.* t. 6816.)

E. Jacquinii.—This name has been given to the plant figured as *E. nana* in Jacquin's *Hort. Schönbrunn*, i. t. 92. It differs from the true *E. nana* in having shorter and broader leaves, and in the absence of purple from the flower-spikes (*Gard. Chron.* 1903, xxxiv.).

E. nana.—This grows about 9 ins. high, having broadly lance-shaped acute leaves, and rather club-shaped scapes of brownish-green flowers (*Bot. Mag.* t. 1495). The variety *purpureo-caulis* has purple flower-stems.

E. punctata.—A fine species with large oblong lance-shaped, channelled leaves, gracefully spreading and recurved, of a bright shining green, densely spotted with purple beneath. The creamy-white or yellowish, star-shaped, sweet-scented flowers appear

from July to September in dense cylindrical trusses, on stout scapes $1\frac{1}{2}$ to 2 ft. high, heavily spotted with purple, and having a tuft of red-edged bracts on top. The yellow-anthered stamens are opposite the segments, and the deep violet ovary in the centre of the flowers is very conspicuous and distinctly attractive. In the variety *striata* (*Bot. Mag.* t. 1539) the purple blotches on the leaves and flower-stems partake more of the character of stripes. (*Bot. Mag.* t. 913; *Red. Lil.* t. 208.)



FIG. 140.—*Eucomis punctata*. (4.)

E. robusta.—This strong-growing species has narrow pointed leaves about 2 ft. long, and green bell-shaped flowers, tinged with brown, borne in dense racemes on sturdy scapes (*Gard. Chron.* 1894, xvi. 562).

E. undulata (*Bot. Mag.* t. 1083), with ovate oblong wavy green leaves and greenish-yellow flowers; **E. regia** (*Red. Lil.* t. 175), with

white or rose-tinted fragrant flowers; **E. pallidiflora**, with leaves over 2 ft. long and 4 to 5 ins. broad, and greenish-white flowers 1 in. across; and **E. zambesiaca**, from E. Tropical Africa, requiring greenhouse treatment, are other species not so well known.

EUCROSIA (*eu*, beautiful; *krossos*, a fringe; in allusion to the elegant fringe forming the stamens). Nat. Ord. Amaryllidæ.—This genus contains one species—

E. bicolor.—A native of the Andes of Ecuador, whence it was introduced in 1817. It has ovoid brown-coated bulbs about 1 in. through, and thin, lance-shaped, stalked leaves, the blades being about 6 ins. long and 1 to 2 ins. broad. The funnel-shaped flowers, about an inch long, are orange-yellow, the segments being veined or keeled with green. The stamens are much longer than the perianth-tube, and protrude conspicuously; and the style is much longer. (*Bot. Reg.* t. 207; *Bot. Mag.* t. 2490; *Hook. Exot. Fl.* t. 209.)

This species may be regarded as a curious and somewhat ornamental greenhouse plant. It will grow freely in a compost of rich sandy peat, and requires fair supplies of water during active growth. The blossoms appear in loose umbels on a stalk about a foot high about April and May. The plants rest in winter, and may be increased by offsets in spring when growth is commencing.

EURYCLE (*eurys*, broad; *klas*, a branch; referring to the broad leaves or branch-like foot-stalks). Nat. Ord. Amaryllidæ.—This genus contains two species of pretty plants with tunicated bulbs, broad stalked leaves with curving veins, and white flowers produced in umbels. Perianth-tube

cylindrical; segments subequal, oblong lance-shaped. Stamens six, with filaments bordered in the lower half, and more or less united into a distinct cup.

These bulbs require to be grown in a warm greenhouse or stove with a temperature of 65° to 75° F., or even a few degrees more; but they will stand a lower temperature in winter when at rest. They are best grown in pots or pans in a compost of sandy loam, leaf-mould, and a little well-rotted cow-manure. During active growth they require plenty of water, and may be treated generally in the same way as the Eucharises. The simplest method of propagation is by offsets from the older bulbs.

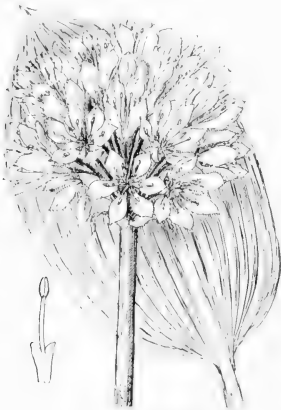


FIG. 141.—*Euryclès sylvestris*. (A.)

E. Cunninghami.—A native of Queensland and New South Wales, whence it was introduced in 1824. The bulbs are about 1½ ins. through, and the thin leaves are oblong-acute, the blade being from 4 to 9 ins. long. From ten to fifteen funnel-shaped white flowers are borne on a slender

scape about a foot high. (*Bot. Reg.* t. 1506; *Bot. Mag.* t. 3999.)

E. sylvestris (*E. australis*; *E. amboinensis*; *Pancratium amboinense*; *P. australasicum*; *P. nervifolium*; *Crinum nervosum*; *Amaryllis rotundifolia*).—This remarkable plant is found wild in the Malayan Peninsula and the Philippines to N. Australia, and judging by its synonyms, appears to have given the botanists much trouble. The bulbs are 3 to 4 ins. through, and the leaves with rounded heart-shaped pointed blades are from 6 to 12 ins. broad, with twelve to fifteen strong veins on each side of the midrib, and furnished with a long stalk dilated at the base. From twenty to thirty white flowers are borne in a dense umbel on the top of a round scape 1 to 1½ ft. high. The filaments are remarkable for their appendages, ¼ to ⅓ in. long, united only at the very base. (*Bot. Mag.* t. 1419; *Red. Lil.* t. 384; *Bot. Reg.* t. 715.)

EUSTEPHIA (*eu*, beautiful; *stephos*, a crown; referring to the arrangement of the stamens). Nat. Ord. Amaryllideæ.—The only species known is—

E. coccinea (*E. Macleanica*; *Phædranassa rubro-viridis*).—A native of the Andes of Peru with ovoid bulbs about 1 in. through. The bright green linear leaves, a foot or more long, appear after the blossoms. These appear in spring, six to eight more or less drooping from the top of a slender two-edged scape about a foot high. The perianth-tube is short and bell-shaped, the bluntish oblanceolate segments being bright red tipped with green.

This plant is rarely seen, but it has been in cultivation several times. It requires to be grown in a greenhouse, in a compost of rich sandy

loam. Increased by offsets before growth starts in spring.

FERRARIA (after *Ferrara*, an Italian botanist). Nat. Ord. Irideæ.—A genus containing about half a dozen species of interesting dwarf-growing herbs with irregular corms, narrow sword-like leaves, and cup-shaped flowers with six spreading segments, which have wavy edges and are often narrowed at the base. The three filaments of the stamens are united into a tube, and the three petal-like, fringed stigmas surmount the narrow ovary.

These little plants are closely related to the Tigridias or Tiger Flowers, and are natives of S. Africa. They require greenhouse treatment in most parts of the Kingdom, and should be grown in pots of rich sandy loam and peat or leaf-soil. They generally flower about April indoors, but later outside. In autumn the leaves wither, a sign that the bulbs are going to rest, and require to be kept dry until growth starts again in spring. In milder parts of the Kingdom Ferrarias may be grown on a warm border, the bulbs being planted from 4 to 6 ins. deep as a protection against frost. The bulbs should be protected from cold winter rains with old lights, as they possibly rot in the wet soil; otherwise it is safer to lift them in autumn and store until the weather is mild enough for planting the following spring.

F. antherosa (*F. Ferrariola*; *F. viridiflora*).—This species, introduced from the Cape in 1800, has linear, equitant, ensiform leaves, and solitary flowers, greenish outside, and variegated with yellow and green with lines and dots of violet (*Bot. Mag.* t. 751; *Bot. Rep.* t. 285; *Red. Lil.* t. 484).

F. undulata (*F. punctata*; *Moræa*

undulata).—This is the best-known species, and has been in cultivation since 1775. It has equitant sword-like leaves, and branching flower-stems, sometimes about 1 ft. high. The flowers are of a peculiar greenish-brown or dull plum colour, the spreading segments being very wavy and crisped on the margins, while the surface is spotted and blotched with purple. (*Bot. Mag.* t. 144; *Red. Lil.* t. 28.)

Other species that have been in cultivation at one time or another, but now appear to be very rare, are—**F. atrata**, dark purple (*Bot. Cab.* t. 1356); **F. divaricata**, purple-brown (*Sw. Brit. Fl. Gard.* t. 192); **F. obtusifolia**, purple-brown (*Sw. Brit. Fl. Gard.* t. 148); **F. Welwitschi**, bright yellow; and **F. uncinata**, greenish-brown (*Sw. Brit. Fl. Gard.* t. 161.)

FOCKEA. Nat. Ord. Asclepiadææ.—A small genus of South African perennials, having large fleshy root-stocks, thin, twining stems, opposite leaves, and axillary cymes of small flowers. The root-stocks are said to be boiled and eaten by the natives.

F. capensis has irregular, brown, warty-skinned tubers, sometimes weighing 50 lbs. or more. A plant has been cultivated in the Imperial Gardens at Schönbrunn, near Vienna, over one hundred years. (*Gard. Chron.* 1910, ii. 387, f.)

Other species are **F. angustifolia**, **F. undulata**, and **F. glabra**. All the species are mere vegetable curiosities of exceedingly slow growth.

FREESIA (derivation unknown; probably after some botanist named *Frees*). Nat. Ord. Irideæ.—A genus containing one or two species of South African plants closely related to the *Ixias* and *Lapeyrousias*, having

bulbs or corms with fibrous coats, flat, narrow, rigid leaves, and tubular bell-shaped flowers borne on slender wiry stems, often 2 ft. high in well-cultivated specimens.

F. refracta (*Gladiolus refractus*; *Tritonia refracta*).—Introduced in 1815 from S. Africa, this species and its varieties are greater favourites in



FIG. 142.—*Freesia refracta*. (5.)

gardens than ever. The typical species has ovoid corms, having thickish fibrous or netted coats, and produce five to six narrow leaves. The roundish, slender, flexuose stems, 1 to 1½ ft. high, bear several yellowish-white, tubular, sweet-scented flowers, sometimes striped or tinted with pale violet, and usually spotted with orange at the base of the segments.

(*Red. Lil.* t. 415; *Bot. Reg.* t. 135; *Jacq. Ic.* t. 241.)

There are several varieties, the best known being *alba*, having fine white flowers without the yellow blotches seen in the type; *Armstrongi*, introduced to Kew in 1898 from Port Elizabeth by Mr W. Armstrong, after whom it was named by Mr W. Watson, in the *Gardeners' Chronicle*. It has branching scapes, about 20 ins. high, and white flowers splashed with orange at the base and heavily bordered with rich rose; *Leichtlini*, with large pale citron-yellow flowers blotched with yellow ochre (*Gartenfl.* t. 808); *odorata* (formerly called *Tritonia odorata*), with bright yellow flowers (*Bot. Cab.* t. 1820); *Tubergeni*, soft carmine rose, a large-flowered hybrid between *F. refracta alba* and *F. Armstrongi*.

In addition to these, which may be regarded as natural varieties, many charming forms have been raised from seed during recent years. Judging by the range of colour indicated above, it is not surprising that some remarkably fine white, yellow, orange, and apricot-coloured forms have been raised. Mr F. Herbert Chapman, of Rye, Sussex, has done excellent work in this direction. His variety, called *Chapmanni*, is a handsome yellow hybrid blotched with rich orange on the lower segment of the perianth, and at the back of the tube. Another of his hybrids, *albo-citrina*, is a fine seedling from *refracta alba*, quite distinct, with a shade of green in the sweet-scented bell-shaped blossoms.

In America also great work has been done of late years amongst the Freesias, and one variety in particular, called *Purity*, is grown in hundreds of thousands by nurserymen, or "florists" as they are called in the United States.

CULTIVATION.—Freesias, owing to their gracefulness, beauty, and fragrance, are popular not only with amateurs, but are also extensively grown in the Channel Islands and in America by market-gardeners for their blossoms. In private gardens it is easier to cultivate the plants in pots, the 5-in. or 6-in. sizes being chiefly used. The bulbs should be obtained as early in August as possible, and the pots in which they are to be placed should be well drained with a layer of crocks over the bottom. Although Freesias will grow in any light rich soil, that which appears to suit them best is a compost of two or three parts fibrous loam, one part leaf-soil, and one part peat, with a little silver sand or grit. Some growers add a little well-decayed cow-manure, but sometimes the plants are a failure when this is the case. Others use no manure from the cow or horse, and obtain excellent results from loam, peat, leaf-soil, and sand. The bulbs should be placed about $1\frac{1}{2}$ to 3 ins. from each other in the pots (three to five bulbs to a 5-in. pot), and should be covered with about an inch of compost. This should be pressed down fairly firm with the fingers, and afterwards gently watered to settle it. The bulbs thus potted should be placed in a cold frame on a moist bed of ashes or cinders, or even out of doors in a sheltered corner, and covered with coco-nut fibre or fine ashes. When growth has well started and the leaves are 3 to 4 ins. above the soil, a few slender twigs or sticks should be inserted round the rims of the pots to keep the foliage from toppling over. Suckers should be carefully pulled out, so that all the energy may be thrown into the main growths. Some judgment is required in watering, care being taken not to give too much on the one hand, or

too little on the other. The quantity given will depend largely upon the activity or otherwise of the growth. On the approach of frost, say about the end of September or early October, the plants must be taken from the cold frame in which they were started and transferred to a greenhouse with a temperature of 50° to 60° F. All the bulbs need not be brought in at once, and where a succession of blossom is required in winter and spring, it will be necessary to have batches in several stages of development. As the flowers wither they should be cut off (unless seed is required), and by gradually lessening the supply of water to the roots the leaves begin to fade and the bulbs may be left resting in the pots until the following August or September. If placed on a shelf in bright sunshine, giving water as required, the bulbs ripen slowly, but will be fit for growing another season.

FREESIAS FROM SEEDS.—The Freesia is one of the few bulbous plants that is not only easily raised from seed but comes into blossom well within a year after the seeds are sown. Seedling varieties are now becoming popular. It must, however, be remembered, that one cannot guarantee any particular variety coming "true" from seed, and many inferior forms may also be anticipated. Where any special variety is required it can only be kept true by propagating it from offsets from the older bulbs.

To raise Freesias from seed, a rich sandy compost should be prepared by passing some fibrous loam, leaf-mould and sand in about equal proportions through a sieve. This compost should be placed in well-drained 5-in. or 6-in. pots, up to within about $1\frac{1}{2}$ ins. of the rim. From five to six seeds should be placed on the surface in each pot,

and afterwards covered with about in. of gritty mould ; or several seeds may be sown in the same way, afterwards thinning the seedlings out, to leave only five or six plants in each pot according to size.

The best times for sowing Freesia seeds is from January to March and April and again in August ; but they may be sown at other seasons if more convenient. It is safer to place the seed-pots in a greenhouse, and in a temperature of 60° to 65° or even 70° F. germination takes place in five or six weeks. Watering is attended to carefully, and plenty of air and light are given, although the tender seedlings must be shaded from strong sunshine. If it becomes necessary to repot Freesia seedlings, care should be taken to handle the roots gently, as they are extremely brittle and easily injured. During the summer months the seedlings may be stood out of doors in an open, partially shaded and sheltered spot. On the approach of frost, however, they must be transferred to the greenhouse with a temperature of 55° to 65° F. and placed on a shelf near the glass.

FRITILLARIA (*fritillas*, a chess-board ; referring to the chequered flowers of some species), **FRITILLARY**. Nat. Ord. Liliacæ.—A large genus of bulbous plants having simple leafy stems topped with nodding or drooping tubular or bell-shaped flowers. Perianth with six segments nearly equal, each with a nectar-bearing cavity at the base inside. Stamens six, either hypogynous or adhering slightly to base of the segments.

All the Fritillarias are natives of the north temperate zone, and may therefore be regarded as mostly hardy in the British Islands. Many species are not particularly showy or con-

spicuous in blossom, but they are all very interesting from the botanical standpoint. Some are rather dwarf (not more than 6 or 9 ins. high), most are between 1 and 2 ft. high, while the Common Crown Imperial is the tallest of all, often attaining a height of 4 ft. They all flourish in ordinary good garden soil, especially if it has been deeply dug, enriched with well-decayed manure, and of a sandy nature. The commoner kinds of Fritillary may be grown in bold clumps in the flower-border or rock-garden, while others are more suitable for the rock-garden or for naturalising in the grass, like the Snake's Head Fritillary (*F. Meleagris*).

Fritillarias are most easily increased by means of offsets early in autumn when the bulbs are being disturbed for replanting. When seeds ripen they may be sown in a rich and gritty compost of loam, leaf-soil, and sand ; and after the first year they may be moved annually to give a little more space, and at the end of four, five, or six years they will attain the flowering size.

The following species are worthy of note :—

F. acmopetala.—1 ft. high. Flowers bell-shaped, purple and greenish. Spring. Asia Minor. (*Bot. Mag. t. 6321.*)

F. alba.—1 ft. high. Flowers white. May. N. America.

F. armena.—A pretty species, 6 ins. high. Flowers bell-shaped, softish yellow or dull purple. Armenia. The variety *fusco-lutea* has coppery brown blossoms with a bright yellow interior. (*Bot. Mag. t. 6365.*)

F. askabadensis.—A noble-looking Fritillary 3 to 4 ft. high, with whorls of glossy green, lance-shaped, pointed leaves 6 ins. long by 2 ins. broad, and trusses of soft greenish-yellow bell-shaped flowers drooping from the

tops of the stems in March and April. Grows freely in ordinary soil, and should be planted in bold groups. Native of Central Asia. (*Bot. Mag.* t. 7850; *Flora and Sylva*, July 1903.)



FIG. 143.—*Fritillaria askabadensis*. (3)

F. aurea.—A Cilician species with rather glaucous stems about 6 ins. high, and linear fleshy, somewhat glaucous leaves 2 to 3 ins. long. The bright yellow, solitary, drooping, bell-shaped flowers about 1 in. deep appear in spring, and are sometimes spotted or chequered with brown. (*Gartenfl.* t. 840; *Gard.* 1892, t. 867; *Bot. Mag.* t. 7374.)

F. Bornmülleri.—A species related to *F. aurea*, having yellow flowers (*Gard.* 1896, xlix. 282).

F. bucharica.—A native of Buchar, 1 to 1½ ft. high, with flexuose stems, oval or lance-shaped leaves, and white flowers tinted with green or purple at the base (*Gartenfl.* t. 1171; *Bot. Mag.* t. 7080).

F. camtschatensis (*Lilium nigrum*), BLACK LILY.—A distinct species



FIG. 144.—*Fritillaria aurea*. (5.)



FIG. 145.—*Fritillaria chitralensis*. (3.)

from Kamtschatka, Siberia, etc., about 9 ins. high, with lance-shaped leaves, the lower ones being whorled, the upper ones opposite or solitary. The bell-shaped drooping flowers appear in May and June, and are deep blackish-red, becoming paler towards the base, the segments being spotted with deep purple.

This grows best in moist peat and sandy loam, and requires sheltered nooks in the rockery. The bulbs are eaten by the natives in a wild state. (*Gartenfl.* t. 173.)

F. chitralensis.—A rare species from the Chitral, 6 to 18 ins. high, with lance-shaped greyish leaves and yellow-green bell-shaped flowers distinctly veined with a deeper green.

F. citrina.—A pretty species with drooping bell-shaped flowers borne in pairs in April and May; greenish-yellow with a glaucous bloom on the segments.



FIG. 146.—*Fritillaria citrina*. (3.)

F. contorta.—A species with a bulb like that of *F. Meleagris*, and with stalkless fleshy narrow leaves about 6 ins. long. Flowers white, drooping, about 2 ins. long, tinged with green at the base. The perianth is remarkable for having the segments united except in the upper third, in that respect resembling the perianth of

the genus *Sandersonia*. (*Gard. Chron.* 1886, xxv. 681.)

F. dasyphylla.—A native of Asia Minor, about 6 ins. high, having thickish fleshy leaves, and drooping open funnel-shaped purple flowers with a yellow interior (*Bot. Mag.* t. 6321).

F. delphinensis.—A pretty species from the Alps of Dauphiny, 6 to 12 ins. high, having linear or oblanceolate leaves, and solitary, vinous-purple, yellow spotted, drooping flowers. The variety *Burneti* has plum-coloured flowers about 2 ins. deep, chequered with greenish-yellow; *Moggridgei* is a very handsome variety from the Maritime Alps, where it flourishes at an elevation of 5000 to 7000 ft. It has large cylindrical yellow flowers, drooping like bells, and chequered or tessellated inside with brownish-crimson.



FIG. 147.—*Fritillaria discolor*. (1.)

F. discolor.—This plant grows about a foot high, and has broad lance-

shaped fleshy leaves and several bright yellow flowers tinted with green on top of the stems. It is a native of Turkestan, and is figured in *Flora and Sylva*, Nov. 1905.

F. Elwesi.—A distinct-looking species having drooping bell-shaped flowers in April and May, green washed with purple at the base and margins of the inner segments. The interior is green striped with purple.



FIG. 148.—*Fritillaria Elwesi*. (½.)

F. græca.—A species closely related to *F. tulipifolia*, native of Greece, about 6 ins. high, having lance-shaped or elliptic leaves, and drooping bell-shaped flowers of a pale brown or fawn colour slightly chequered, and with a green stripe down the keel of the segments (*Bot. Mag.* t. 5052).

F. hericaulis.—This species from Asia Minor is closely related to *F. armena*, and grows from 4 to 6 ins. high. The more or less lance-shaped leaves are sessile, and the solitary flowers are deep purple.

F. imperialis (*Crown Imperial*).—A vigorous and well-known plant 2 to 4 ft. high, native of Persia, with broad, bright, shining green wavy leaves, and a dense cluster of large drooping bell-shaped flowers at the

top of the stem which is surmounted by a tuft of leaves. The flowers appear in April, and are about the size of ordinary Tulips, and vary in colour from bright yellow to crimson. This variation has given rise to many names of forms; hence we find *Aurora*, bronzy orange; *lutea*, yellow; *rubra* and *rubra maxima*, red; *aureo-marginata*, having the leaves edged with yellow; *Orange Crown*, orange-red; *sulphurine*, orange; *Slagvaard*, large deep red flowers on flattened or fasciated stems;



FIG. 149.—*Fritillaria imperialis*. (½.)

sulphurina, large sulphur yellow. There is also a form with double red flowers. (*Bot. Mag.* tt. 194, 1215; *Red. Lil.* t. 131.)

The Crown Imperials like a deep rich loamy soil, and are suitable for the margins of shrubberies, flower-borders, etc. They look very handsome in bloom, but emit such a strong odour when cut that they are known in some parts by the appropriate but uncomplimentary name

of "Stink Lilies." They are easily increased by means of offsets. several garden varieties with fancy names.



FIG. 150.—*Fritillaria imperialis*, seed-pods. ($\frac{1}{2}$.)

F. involucrata.—A species from the Maritime Alps about 1 ft. high, having whorls of narrow lance-shaped leaves and wine-purple flowers slightly tessellated.

F. Karelini (*Rhinopetalum Karelini*).—An Asiatic species about 6 ins. high, with broad stem-clasping leaves, and terminal racemes of nodding bell-shaped flowers about 1 in. deep, produced late in autumn or in spring according to the time of planting. The blossoms are pale purple with deeper purple spots and veins, and a greenish-yellow nectary-hollow at the base of each segment. (*Bot. Mag.* t. 6406.)

F. lanceolata.—A native of N.W. America, 1 to 1½ ft. high, with lance-shaped leaves in whorls, and sombre wine-purple coloured flowers.

F. latifolia.—A variable Caucasian Fritillary about 1 ft. high, with drooping flowers varying in colour through various shades of purple, black, lilac, and yellow. There are



FIG. 151.—*Fritillaria lanceolata*.

The best known is *F. lutea*, 6 to 12 ins. high, with alternate linear lance-shaped leaves, and solitary drooping yellow flowers more or less tinged with purple, produced in April and May (*Bot. Mag.* tt. 1207, 1538; *Belg. Hort.* i. 49; *Red. Lil.* i. 57).

F. macrandra.—A native of the Island of Syra, with oblong lance-shaped fleshy leaves, and purple flowers covered with a glaucous bloom outside, but yellow and blotched with green within.

F. Meleagris (*Snake's Head*).—This distinct and pretty species grows wild in parts of England in moist meadows. It is 12 to 18 ins. high, with flat linear leaves 6 to 8 ins. long, and usually solitary drooping flowers 1½ ins. deep in April and May,

and beautifully chequered with light or dark purple on a yellowish-white ground. There are white, rosy, and purplish forms, and also one with double flowers. *Nigra*, *major*, *pallida*, *flavida*, are other names relating to colour or size.



FIG. 152.—*Fritillaria Meleagris alba*. (L.)

The Snake's Head Fritillary is excellent for naturalising in grass—its natural place. In the garden it should be planted in places that do not require moving until the leaves begin to fade. The plants may also be grown in the rockery and flower-border. In Christchurch meadows at Oxford, which are often flooded by the overflowing of the Cherwell, some thousands of Snake's Head Fritillaries appear year after year, and have a wonderful effect when in blossom. (*Practical Guide to Garden Plants*.)

F. meleagroides (*F. minor*).—From the Altai Mountains, grows about 6 to 9 ins. high, and produces its deep purple flowers in April (*Bot. Mag.* t. 3280).

F. nobilis (*F. Kotschyana affinis*).—This pretty dwarf species from America resembles *aurea* in size and shape, but the flowers are dark crimson outside, and lighter with yellow markings inside (*Bot. Mag.* t. 7500).

F. obliqua.—A little-known Caucasian species about 1 ft. high, with top-shaped flowers of a purple and brownish tint (*Bot. Mag.* t. 857).

F. oranensis (*F. Munbyi*).—A distinct Algerian species, having



FIG. 153.—*Fritillaria oranensis*. (L.)

broadly bell-shaped flowers, purple-brown or yellowish-green, drooping in pairs, in March and April.

F. pallidiflora.—A beautiful and distinct Siberian species about 9 ins. high, having large blue-green leaves and two to three yellow Tulip-shaped flowers nodding from the end of the stem, and beautifully chequered with rose or purple within (*Gartenfl.* t. 209).

F. Perryi.—A pretty hybrid,

between *F. recurva* and *F. lanceolata*, with flowers more or less resembling those of *F. recurva*.

F. persica.—A distinct and curious Persian species about 3 ft. high, with slightly scented deep violet-blue flowers. The variety *minor* has smaller flowers and protruding stamens. (*Bot. Mag.* tt. 962, 1537.)



FIG. 154.—*Fritillaria persica*. (A.)

F. pluriflora.—A distinct-looking species 6 to 12 ins. high, having narrow lance-shaped leaves and rosy-lilac bell-shaped flowers washed with purple inside.

F. pudica.—A handsome little species, 4 to 6 ins. high, native of the Rocky Mountains. It has erect linear glaucous leaves, and produces one or two bright yellow drooping flowers about 1 in. deep in April and May. In the variety *lutescens*, the outer segments of the perianth are striped with yellowish-green; and the variety *nigra* has very deep coloured flowers.

F. pyrenaica.—A Pyrenean species about 1½ ft. high, with spreading bell-shaped flowers, green washed with purple, and chequered with deep purple-brown on a yellowish ground (*Bot. Mag.* t. 664). *F. canaliculata*, from Kurdistan, with linear glaucous leaves and purple flowers, is closely related to this species.



FIG. 155.—*Fritillaria pluriflora*. (A.)

F. recurva.—A distinct Californian species with slender purplish stems about 2 ft. high, remarkable for its bright orange-scarlet flowers with reflexed segments, the inner surface being yellow and blotched with purple. The flowers appear in April and May, sometimes as many as nine on one stem. (*Bot. Mag.* t. 6264.)

This species is rather tender, and requires protection with leaves, straw, etc., in winter. Warm sunny spots and rich sandy loam appear to suit it best.

F. Sewerowi (*Korolkowia Sewerowi*).—A curious species about 8

FIG. 156.—*Fritillaria pudica*.

ins. high, native of Turkestan. It has round stems and oblong glaucous leaves. The drooping flowers are borne in March and April, and are of a lurid or plum-purple outside, with a glaucous hue, and greenish-yellow within, veined with deeper veins. The variety *bicolor* has pale olive-green flowers having a brownish crescent-

FIG. 158.—*Fritillaria recurva*.FIG. 157.—*Fritillaria pyrenaica*. (½)

shaped blotch at the base of each segment (*Bot. Mag.* t. 6371; *Gartenfl.* t. 760). The variety *discolor* is a fine one, figured in *Flora and Sylva*, November 1905.

F. tenella (*F. montana*).—A native of the Maritime Alps, having narrow oblong leaves and yellowish flowers distinctly chequered with purple (*Bot. Mag.* t. 952). *F. Orsiniana*, figured in the *Wiener Illustrirte Garten Zeitung*, 1901, 127, t. 1, is very closely allied to this, if not actually identical.

F. Thunbergi.—A Chinese and Japanese species closely related to *F. verticillata*. It has narrow lance-shaped leaves ending in a tendril or curl. The drooping broadly bell-shaped flowers are produced in the axils of the leaves, and are creamy-yellow striped with green.



FIG. 159.—*Fritillaria Thunbergi*. (½.)

F. tulipifolia.—An elegant little Caucasian Fritillary with more or less elliptic concave leaves, and violet-blue flowers, with a glaucous bloom on the outer surface (*Bot. Mag.* t. 5969).

F. Tuntasia.—A species 8 to 10 ins. high, with grey-green leaves and intensely dark maroon bell-shaped flowers about 1 in. across. Native of Greece.

F. verticillata (*F. leucantha*).—A distinct-looking species from the Altai Mountains, with pale green or slightly glaucous leaves arranged so close on the stem as to give the appearance

of being in whorls or circles. The flowers appear in May, and are white, tinged with green at the base, and spotted with purple on the inner surface. (*Bot. Mag.* t. 3083.)

F. Walujewi.—A native of Turkestan, about 1 ft. high, with linear leaves tapering into a tendril, and large solitary silvery-grey flowers washed with purple-brown, blood-red within and spotted with white (*Gartenfl.* t. 993).



FIG. 160.—*Fritillaria Walujewi*. (½.)

F. Whittalli.—This is a distinct species, having blue-green leaves and large tubular flowers drooping in pairs, green in colour, and more or less distinctly chequered with purple (*Gard. Chron.* 1893, xiii. 506).

F. zagrica.—A species from the Kashand Mountains in Persia, closely related to *F. armena* and *F. tulipifolia*. Flowers dark purple, unchequered, with a thick "bloom"

outside. (*Gard. Chron.* 1893, xiii. 568.)



FIG. 161.—*Fritillaria Whitfallii*. (3.)

FUNKIA (after *H. Funk*, a German botanist), PLANTAIN LILY. Nat. Ord. Liliaceæ.—A genus of ornamental hardy plants with a short thick tuberous root-stock and clusters of thickish roots. Leaves large, radical, stalked, oblong lance-shaped, ovate or cordate, with distinct parallel curved veins and resembling those of the Common Plantain. Flowers funnel-shaped, showy, white or blue, more or less drooping, on tall naked scapes, each one with a large bract at the base.

All the Plantain Lilies—as the Funkias are called—owing to the general resemblance of the leaves to those of the larger common British Plantain weed, are natives of Japan. Apart from the blossoms, the leaves themselves are very ornamental, and are borne in such luxuriant tufted masses that they never fail to attract. The species are hardy in practically most parts of the Kingdom, and flourish in any good garden soil that has been deeply dug, well-manured, and of a somewhat gritty nature. The plants are useful for the ordinary flower-border, for the rock-garden,

and for planting in bold masses by the sides of lakes, pools, or streams. They are excellent plants for shady or semi-shady places, and look well amongst hardy Ferns.

The plants are best moved in spring, but once established should not be disturbed for several years. They can be kept in good flowering condition by an annual mulching of well-rotted manure over the crowns in early spring or late autumn. New stock is easily obtained by dividing



FIG. 162.—*Funkia*, seedling.

the root-stocks in spring, leaving a few buds to each portion. Funkias are also easily raised from seeds sown in gritty soil in spring. The sketch (Fig. 162) shows a seedling, but a reference to p. 41 indicates a curious case when more than one plant may arise from one seed.

Slugs are very fond of the young growths in spring, and a watchful eye should be kept on them. Lime or soot should be freely used to check them.

F. Fortunei.—A beautiful Japanese species about 18 ins. high, with heart-shaped ovate, pale blue-green leaves, having ten to twelve curved veins on each side of the midrib. The pale lilac funnel-shaped flowers, about 1½ ins. long, appear in July. There is

a rare form in which the leaves are ornamented with a thin yellow midrib, and another called *robusta*, remarkable for its greater height and vigour.

F. grandiflora (*F. japonica*).—A handsome species 12 to 18 ins. high, with long-stalked ovate heart-shaped leaves 8 to 9 ins. long, and trusses of pure white sweet-scented flowers from July to September, each one being about 4 ins. long (*Fl. d. Serr.* t. 158; *Gard. Chron.* n.s. x. 629).

F. lancifolia.—A distinct plant having tufts of green lance-shaped wavy leaves 4 to 5 ins. long, narrowed gradually towards each end. The white or lilac-tinted flowers, 1 to 1½ ins. long, appear in August on slender scapes 8 to 9 ins. high, scarcely overtopping the foliage. (*Bot. Mag.* t. 3663.)

The variety *albo-marginata* is distinguished by the silvery-white edges of the leaves (*Bot. Mag.* t. 3657); and *undulata* by its irregularly frilled and wavy leaves; its variegated form has foliage heavily streaked and blotched with white.

F. longipes.—This is closely related to *F. lancifolia*, but has broader leaves with the blade decurrent along the petiole (*Gard.* 1903, lxiv. 297).

F. ovata (*Hemerocallis cœrulea*).—A fine free-growing species with long-stalked ovate leaves 5 to 9 ins. long, and racemes of bluish-lilac or white flowers, produced from May to July, on scapes 12 to 18 ins. high, overtopping the foliage (*Bot. Rep.* t. 6; *Bot. Mag.* t. 894; *Red. Lil.* t. 106). The variety *albo-marginata* has the leaves broadly edged with creamy-white; while *aureo-marginata* has large golden-coloured leaves in spring and summer only, changing gradually to green in autumn.

F. Sieboldiana.—An elegant Plantain Lily with long-stalked, broadly

heart-shaped ovate leaves, 10 to 12 ins. long and 7 to 8 ins. broad, readily recognised by their beautiful blue-green tint. The white flowers 2 to 2½ ins. long, more or less suffused with pale lilac, appear in summer in one-sided racemes well above the foliage. (*Bot. Mag.* t. 3663; *Bot. Reg.* 1839, t. 50; *Lodd. Bot. Cab.* t. 1869.)

The variegated forms *cucullata variegata*, and *medio-picta* with a white midrib, are both charming plants, but somewhat less hardy than the type, and therefore require more sheltered spots or cold frames in winter.

F. subcordata (*Hemerocallis alba*; *H. japonica*; *H. plantaginea*).—A fine species with heart-shaped ovate pale green leaves 6 to 9 ins. long, 3 to 5 ins. broad, on stalks 6 to 8 ins. long. The pure white flowers, about 4 ins. long, appear in August on scapes 1½ to 2 ft. high. (*And. Bot. Rep.* t. 194; *Bot. Mag.* t. 1433; *Red. Lil.* t. 3.)

Other forms are—*sinensis*, *spathulata*, *univittata*, and *viridis*.

GAGEA (after *Sir Thos. Gage*, botanist). Nat. Ord. Liliaceæ.—A genus containing about twenty-five species of small hardy bulbous plants, having narrow leaves and yellow flowers in racemes or clusters, the six perianth segments more or less spreading. The Gageas are of no great garden value, the only one being *G. lutea*, a native of British copses and pastures. It is called the "Yellow Star of Bethlehem," owing to its yellow flowers, which are striped with green behind, and are borne from March to May on a scape scarcely 6 ins. high. The bulbs are small and round, and the leaves very narrow.

This species flourishes in any good garden soil in semi-shady places, and is easily increased by means of offsets.

GALANTHUS (*gala*, milk; *anthos*, a flower), SNOWDROP. Nat. Ord. Amaryllidæ.—A genus containing several species of well-known hardy bulbous plants, with small strap-shaped leaves and drooping flowers, the three outer segments of which are larger, oblong, spoon-shaped, and quite distinct in shape from the three smaller inner ones; these are obovate, notched in the centre, and usually with a green crescent-shaped blotch.

Snowdrops are universal favourites, but many people are astonished to learn that there are several species besides our common British one, *G. nivalis*. Coming into blossom from October to Christmas-time in mild winters and continuing well into March, Snowdrops naturally attract attention, as they look so chaste and charming in the midst of general desolation. The tunicated bulbs are comparatively small, rarely exceeding an inch in length, and should be planted as early in the autumn as possible, say early in September, and should be covered with about two or three times their own depth of soil. To secure fine effects it is useless planting two or three bulbs. Hundreds, or at least dozens, even in small gardens, should be planted either in the ordinary flower-border or in the rock-garden, the shrubbery, grassy banks, slopes, or lawns, either by themselves or in conjunction with Crocuses, Scillas, Chionodoxas, Christmas Roses, or Winter Aconites (*Eranthis*). Beneath deciduous trees and shrubs they look charming, and also when planted in thousands in well-mown grassland.

Most Snowdrops flourish in good and well-drained garden soil, and once planted may be left to look after themselves for years. An annual top-dressing of well-decayed manure in autumn will be of great benefit

in keeping the soil in a fertile condition.

Some kinds, however, especially those that flower before Christmas, in October, and November, and often *G. Elwesi* and *G. latifolius*, are apt to die out, being probably overcome by the attacks of the Snowdrop fungus (*Botrytis galanthina*).

The following kinds of Snowdrops are known and cultivated:—

G. Alleni.—A native of Asia Minor, and probably a natural hybrid between *G. latifolius* and *G. caucasicus*, which are from the same region. The flowers, however, are about twice as large as those of *G. latifolius*, and the broad, arching, blue-green leaves are also larger.

G. byzantinus has rather large bulbs and broad leaves, somewhat like those of *G. plicatus*. The flowers have green inner segments, as in *G. Elwesi*, and often appear in January. (*Gard. Chron.* 1893, xiii. 226.)

G. caucasicus.—This is a Caucasian form of our Common Snowdrop, from which it differs in having broader leaves, finally 8 to 9 ins. long and $\frac{3}{4}$ in. broad, and flowers much later. The form known as *virescens* has the outer segments of the flower flushed with green. This form includes *Redoutei*, *major*, *caspius*, and *grandis*.

G. cilicicus resembles *G. Fosteri*, but flowers rather earlier and has taller flower-stems. It is a somewhat difficult plant to keep.

G. Elwesi.—A native of Asia Minor, from an altitude of 2000 to 5000 ft., with very glaucous channelled leaves and oblong roundish flowers in February; the three inner segments are dark green on the lower half and also around the sinus (*Bot. Mag.* t. 6166).

The variety *globosus* has fine roundish flowers, with very broad outer segments, and *robustus* has a large bulb and thick glaucous leaves.

The variety *Cassaba* often grows a foot high, and is a fine form; and *Whittalli* is a still finer form, with broad blue-green leaves and large globular flowers.

G. Imperati (*G. Clusi*).—A distinct Italian form of *G. nivalis*, but the



FIG. 163.—*Galanthus Elwesi*. (2.)

G. Fosteri.—Herr Max Leichtlin has called this the "King of Snowdrops." The markings on the inner segments are like those of *G. Elwesi*, but the leaves are broader and blunter than in that species. There are forms called "Spot" and "Leopard."

G. græcus.—This comes very near *G. Elwesi*, but the flowers are smaller, with narrower outer segments, and the apical lobes of the inner segments not spreading or crisped. It blooms in April.

G. Ikariae.—This distinct Snowdrop from the Island of Ikaria, off the coast of Asia Minor, has broad glossy green recurving leaves, and snow-white blossoms, the inner segments of which are heavily tipped with green.

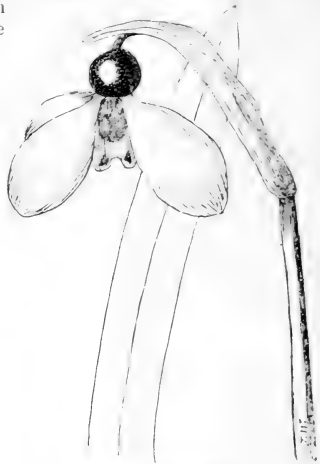


FIG. 164.—*Galanthus Fosteri*. (3.)

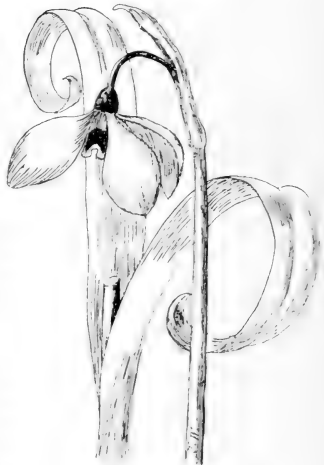


FIG. 165.—*Galanthus Ikariae*. (5.)

leaves are broader and the flowers larger. The forms called *Atkinsi* and *Melvillei* are improvements in size and vigour. There is also a double-flowered form worth growing.

G. latifolius.—A distinct Caucasian Snowdrop flowering in its native home in May, but in British gardens in February and March. The bright green strap-shaped leaves are $\frac{3}{4}$ to 1 in. broad, and the small white flowers have a delicate beauty, the three inner segments having a green blotch round the sinus both inside and out. (*Gartenfl.* 1863, t. 578; *Gard. Chron.* 1879, fig. 32; 1881, 404, fig. 80.)

G. Perryi is the name given to a form intermediate between this species and *G. caucasicus*.

G. nivalis.—This is the well-known Common Snowdrop found in various parts of the British Islands and throughout Europe. It has a small roundish or ovoid bulb, $\frac{1}{2}$ to 1 in. thick, from which spring two linear blue-green leaves 6 to 9 ins. long when fully developed. The white solitary drooping flowers appear from January to March on a flattened scape 3 to 12 ins. long, the three inner segments having a green patch round the notch or sinus.

There are many forms, among which may be mentioned *corcyrensis* (or *præcox*) from Corfu, which flowers in December; *formosus*, *gracilis*, *maculatus*; *lutescens*, which has a yellowish ovary and the inner segments tipped with yellow instead of green; *octobrensis* from the Albanian mountains, a rather delicate variety flowering in October; *G. Rachelæ* is similar but has slightly larger flowers and broader leaves, and flowers later; *grandiflorus* (or *maximus*) is a large form, the leaves of which are recurved at the edges and very glaucous beneath; *poculiformis* is remarkable for having the inner segments plain white

without green blotches, and almost as long as the outer ones; *reflexus*, with much smaller flowers than the type, the inner segments being reflexed at the apex; and *Scharloki*, which has two long spathe valves and sometimes two flowers on a stalk, and a green spot at the tip of each outer segment. There is also a double-flowered form of the Common Snowdrop.

G. Olgæ.—A very rare Grecian Snowdrop, having channelled glaucous leaves 6 to 8 ins. long and $\frac{1}{4}$ in. broad when fully developed. It flowers in September and October, and is therefore earlier than the *octobrensis* form of *G. nivalis*. The inner perianth segments are frequently without the green blotches usual in Snowdrops.

G. plicatus.—This has large bulbs and very glaucous leaves, quite 1 ft. long and 1 in. broad when fully developed. They are channelled down the face and reflexed at the edges. The flowers appear rather later than the other forms, and are $\frac{3}{4}$ to 1 in. long, the inner segments being green in the upper half with a white edge. There are several forms, including *maximus*, *præcox*, and *Omega*, all from the Caucasus region. (*Bot. Mag.* t. 2162; *Bot. Reg.* t. 545.)

GALAXIA (*gala*, *galaktos*, *galaktido*, abounding in milk; referring to the milky juice). Nat. Ord. Irideæ.—A small genus of pretty plants with tunicated corms, natives of S. Africa. The funnel-shaped flowers are small, lilac or yellow in colour, and fleeting in character.

The species mentioned below should be grown in a cool greenhouse, but may possibly be fairly hardy in the most favoured parts of the Kingdom, at least during the summer months.

Grown in pots, the bulbs should be planted in a mixture of sandy peat and fibrous loam in equal proportions. They usually flower in summer about July and August, and during the winter season the bulbs remain dormant. Propagation is effected by offsets in spring.

G. graminea.—Introduced from the Cape in 1799. Almost a stemless plant with oblong or linear convolute leaves 1 to 2 ins. long, often bearing bulblets in the axils. The flowers are deep yellow or tinted with lilac, borne singly on very short stems. (*Bot. Mag.* t. 1292.)

G. ovata.—A somewhat similar species, introduced in 1795, having linear thread-like leaves, dilated at base, distinctly channelled, and with cartilaginous margins. Flowers bright yellow, about 1 in. across. The variety *grandiflora* has larger flowers (*Bot. Mag.* t. 1208; *And. Bot. Rep.* tt. 94, 164); and *versicolor* has purple blossoms.

GALTONIA (after *Francis Galton*, author of "A Narrative of an Explorer in S. Africa"). Nat. Ord. Liliaceæ.—This genus contains two species of graceful South African herbaceous

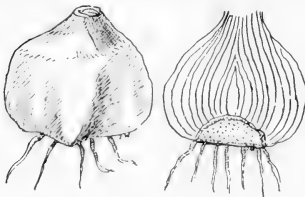


FIG. 166.—*Galtonia candidans*. bulb and section of same. (1.)

plants with roundish tunicated bulbs, long strap-shaped pointed leaves, and tall leafless scapes from which droop numerous bell-shaped flowers.

Although closely related to the Hyacinths proper, and indeed are often known as such, the Galtonias are much larger-growing and more conspicuous plants. They flourish in good garden soil of a rich and gritty nature, and become quite luxuriant in a really rich mould. To secure a bold effect several bulbs should be planted about 12 to 18 ins. apart and 5 to 6 ins. deep; in the first case in spring at the same time as the Gladioli, in warm sunny borders or beds, as the plants delight in plenty of sunshine. Once well established the plants are best left undisturbed for a few years, in which case they should receive a thin mulching of well-decayed manure in autumn.

Propagation is effected by detaching the offsets from the older bulbs and replanting in spring. Galtonias may also be raised from seeds sown under glass in spring in rich gritty soil. It takes two or three seasons for the young bulbs to reach the flowering stage, the young plants in the meantime being cultivated in pots in a cool greenhouse or cold frame.

G. candidans (*Hyacinthus candidans*).—A splendid bulbous plant, having large round bulbs and strap-shaped lanceolate leaves about $2\frac{1}{2}$ ft. long. It produces stout, erect, glaucous scapes shooting up for 4 ft. or more from the centre of the foliage in summer, and bearing at the top a raceme of twenty or more large, sweet-scented, drooping, pure white flowers like white bells. (*Ref. Bot.* t. 174; *Rev. Hort.* 1882, 32.)

G. clavata is similar in appearance, but is not so showy. It differs in having smaller greenish-white flowers with shorter segments, and lance-shaped filaments to the stamens. It is not quite so hardy as *G. candidans*, and requires protection in severe winters. (*Bot. Mag.* t. 6885.)

G. princeps is very similar to *G. candicans*, but is scarcely so attractive. It has shorter and broader racemes of



FIG. 167.—*Galtonia candicans*. ($\frac{1}{2}$.)

smaller greenish-white flowers with spreading segments. (*Ref. Bot.* t. 175.)

GASTROCHILUS (*gaster*, belly; *cheilos*, lip; in reference to the inflated lip). Nat. Ord. Scitamineæ.—A small genus intermediate between *KÆMPFERIA* and *HEDYCHIUM*, having clusters of thickish rhizomes or tubercles, broad leaves, and long-tubed flowers borne in leafy one-sided spikes.

Being natives of the East Indies, Burma, etc., these plants require hot-house treatment, and flourish in a compost of sandy loam, peat and leaf-soil in about equal proportions. When growing, plenty of water and frequent syringings are needed, as well as a temperature of 65° to 75° F. When at rest, however, a lower temperature, and little or no water

are advisable. The plants may be increased by division of the root-stocks in spring as growth is commencing.

G. albo-luteus.—A native of the Andamans, with oblong green leaves about 9 ins. long, and spikes of flowers having a white lip lined with bright yellow (*Gard. Chron.* 1894, xvi. 34).

G. Curtisi.—A Malayan species, having stalked, oblong, lance-shaped leaves about 2 ft. long, with a hairy under-surface. The white flowers with a red-edged yellow lip, are about an inch across, and are borne in clusters in the sheathing bases of the leaves. (*Bot. Mag.* t. 7363.)

Other species are—*G. Jenkinsoni*, orange and crimson; *G. longiflorus*, yellow and red; and *G. pulcherrimus*, yellow and pink—all from the East Indies.

GEISSORHIZA (*geisson*, a tile; *rhiza*, root; referring to the dry coats which cover the fleshy roots like tiles on a roof). Nat. Ord. Irideæ.—A genus containing about thirty species of little-known South African bulbs that have been in cultivation for many years. They are worth growing in botanical collections. The flowers are funnel-shaped, with six almost equal perianth segments. The leaves are narrow or sword-shaped, and the bulbs are covered with the old imbricating scale leaves at the base. The plants should be grown in a cool greenhouse or cold frame in most parts of the Kingdom, but are sufficiently hardy to be grown in the open air in the most favoured spots with protection in winter. A compost of sandy peat and a little loam suits them best. The simplest method of propagation is by means of offsets in spring. The following species may be noted:—

G. excisa (*Ixia excisa*).—This

species grows about 6 ins. high, and has oval-oblong, more or less pointed leaves distinctly spotted with black. The white flowers appear in April and May, in a loose spike on a flexuose stem. (*Bot. Mag.* t. 584.)

G. grandis.—This species grows about 1 ft. high, and has narrow sword-shaped leaves, deeply channelled at the base. The pale yellow flowers, with a blood-red vein down the centre of the segments, appear in May, drooping from a strong leafy stem. (*Bot. Mag.* t. 5877.)

G. humilis.—This species has corms about $\frac{1}{2}$ in. in diameter, stiffish awl-shaped leaves, and loose spikes of bright yellow flowers. There are several forms of it. (*Bot. Mag.* t. 1255.)

G. inflexa (*G. vaginata*).—This is perhaps the most ornamental species, about 18 ins. high, with curved sword-shaped leaves and large bright yellow flowers with a velvety heart-shaped purple blotch at the base of each segment (*Sic. Brit. Fl. Gard.* 138).

G. obtusata.—This species has linear sword-like leaves and yellow flowers suffused with rose on the outer segments, borne on stems about a foot high (*Bot. Mag.* t. 672).

G. rochensis (*Ixia rochensis*).—A handsome species with narrow pointed leaves and indigo-blue flowers having bands of white and purple crimson in the centre (*Bot. Mag.* t. 598).

G. setacea.—This species has linear setaceous leaves, and produces in June and July its whitish or sulphur-yellow flowers striped externally with red. The plant figured under this name in the *Bot. Mag.* t. 1255 is *G. humilis*.

GENTIANA (after *Gentius*, king of Illyria, who first experienced the

virtue of *Gentian*). Nat. Ord. *Gentianeæ*.—There are nearly 200 species of *Gentians*, but that here mentioned is the only one worth noting as having a swollen root-stock. For the fibrous-rooted species the reader is referred to the author's *Practical Guide to Garden Plants*, pp. 652 to 657.

G. lutea.—This vigorous European perennial has large spindle-shaped or turnip-like roots, blackish outside, yellowish and spongy within, from which the true *Gentian* root of the druggists is obtained. Like all the *Gentians*, this species has opposite leaves, broadly ovate or oblong, and strongly and deeply veined, gradually becoming smaller as they pass up the stems, which reach a height of from 4 to 6 ft. In June and July the yellow flowers appear in dense whorls, each subtended by a pair of boat-shaped leaves.

This species flourishes in rich loamy soil in sunny or partially shaded situations, and is effective in bold groups. Increased by dividing the roots in spring.

GERANIUM (*geranos*, a crane; referring to the beak-like projection beyond the seeds), CRANE'S-BILL. Nat. Ord. *Geraniaceæ*.—The true *Geraniums* differ from the Zonal *Pelargoniums* (which are popularly known as *Geraniums*) in having regular flowers without a spur, and ten stamens, while the *Pelargoniums* have mostly irregular flowers, with a spurred posterior sepal, and five stamens or less. There are about a hundred species (the most ornamental of which are described in the author's *Practical Guide to Garden Plants*, pp. 255, 256), but the only one with a swollen root-stock is—

G. tuberosum.—A native of S. Europe, with tuberous root-stock,

knotted, forked stems, and leaves divided into several linear lobes each again deeply cut into serrated lobes. The large purple flowers with deeper coloured veins appear in summer, the petals being deeply notched. The variety *Charlesi*, from Afghanistan, has several roundish superimposed tubers, and leaves less deeply lobed and divided than those of the type.

This species is hardy in the most favoured parts of the Kingdom, but requires protection in cold localities. It likes rich gritty soil, and warm sunny positions, and may be increased by division of the tuberous roots, or from seeds sown in gentle heat in spring.

GERARDANTHUS (after *W. T. Gerrard*, a botanical collector of Natal). Nat. Ord. Cucurbitaceæ.—A small genus of climbing plants, the best known being—

G. tomentosus.—A remarkable but not particularly pretty climbing plant from Natal. It has enormous root-stocks, often 6 ft. in circumference and 2 ft. in diameter. The stems, which are about $\frac{3}{4}$ in. thick, are covered with small round tubercles near the base, and in a wild state ascend without a leaf to the top of trees 50 ft. high. The Cucumber-like leaves are 3 to 4 ins. across, roundish, five to seven-lobed, strongly nerved and hairy. The small yellow flowers appear about August, the males being in clusters, the females in pairs. (*Bot. Mag.* t. 6694.)

This plant might be grown as a curiosity in a warm greenhouse, and may be raised from seeds. As it grows naturally in poor rocky soil, and has very few roots, it is not fastidious.

GESNERA (after *Conrad Gesner* (b. 1516, d. 1565), a celebrated botanist

of Zurich). Nat. Ord. Gesneraceæ.—This genus contains about sixty species of pretty, softly hairy, herbaceous plants, mostly having tuberous root-stocks, simple opposite leaves, and flowers in terminal cymes or trusses. The irregular two-lipped corolla tube is often elongated, sometimes distinctly inflated or ventricose, and often arched and gibbous at the base.

Most of the Gesneras are natives of Brazil, but some species are also found in Guiana, Colombia, and Peru, and one species is also found as far north as Mexico. Coming from these parts of America, the plants naturally require the protection of a stove or warm greenhouse in our climate. They are best grown in well-drained pots of various sizes, and a compost of turfy loam, peat, leaf-mould, and silver sand, which should be pressed firmly round the tubers. The best time for potting is in spring when the new growths begin to appear, and one or more tubers may be placed in a pot or pan according to individual taste and circumstances. The tops of the tubers should be about level or just above the surface of the soil, and the pots should be placed on shelves near the glass, so that the extra light will keep the developing growths short and sturdy. Care, however, must be taken to shade from strong sunshine. Watering must be attended to regularly, regulating the supply according to the rapidity of growth and the actual condition of the soil. Until the leaves are fully developed the syringe may be used daily to keep the young growths fresh-looking and clean, and afterwards late in the afternoon when the ventilators have been closed. As soon as the flower-spikes appear, however, syringing should be practised carefully, and care must be

taken not to wet the expanded blossoms. According to the warmth of the house, the plants may be expected to come into bloom in April, May, or June, when a night temperature of 60° to 65° or even a few degrees lower may be maintained.

After the flowering period is over the plants gradually ripen off their growth and tubers, and the amount of water is gradually reduced until finally in autumn the leaves have withered and the bulbs remain dormant in the soil. The pots should now be transferred to some cooler and more airy position with a night temperature of 50° to 55° F., where they will be free from heavy drip. If placed under the stages the pots should be turned on their sides, otherwise there is a danger of the dormant tubers either rotting with excessive moisture, or starting into premature growth.

Propagation of the tuberous Gesneras is effected by means of division of the tubers; or more easily by cuttings of the young shoots. To secure these, the old tubers should be started into growth early in the year, in a temperature of 60° F. at night and 70° F. by day, the soil being just moistened. When the shoots are about 2 ins. long they should be severed with a sharp knife beneath a joint, and dibbled into pots or boxes containing rich and very gritty mould, about 2 to 3 ins. apart. If put into a close frame or under a hand-light and kept shaded and moist for a few days, they soon root. In due course each little plant may be transferred to a 3-in. pot, in a compost of loam, leaf-mould and sand, again keeping shaded in a moist atmosphere until established. A few weeks later the plants will be large enough for 5-in. or 6-in. pots, for which a similar compost is prepared.

Once plants are established they will live for years, and the tubers increase in size from year to year like those of Gloxinias and Tuberous Begonias. When massed in bold groups in the conservatory or stove, the Gesneras with their brilliant scarlet or orange-scarlet blossoms are very effective.

The following are some of the best species, with short descriptions. They all come from Brazil, unless otherwise stated:—

G. aggregata.—Leaves oblong-ovate, crenate. Flowers scarlet, club-shaped cylindrical, on stems about 2 ft. high in summer. (*Bot. Mag. t. 2725*; *Bot. Reg. t. 329*.)

G. Blassi.—Leaves oval heart-shaped, pointed, crenulate, with reddish veins on the under-surface. Flowers cinnabar-red, in drooping panicles.

G. bulbosa.—Leaves broadly ovate, heart-shaped, serrate. Flowers scarlet. (*Bot. Mag. t. 3041*.)

G. caracasana.—Leaves elliptic, crenulate, wrinkled. Flowers red outside, yellowish within, the corolla tube having five small bosses near the base.

G. cardinalis (*G. macrantha*).—A striking species with a tuber as big as a man's fist. Leaves large oval heart-shaped, toothed. Flowers large bright red, with a long tube, and borne in a many-flowered terminal cluster. (*Garden*, 1892, ii. t. 874.)

G. Claussentiana.—A species with very large tubers and oval heart-shaped wrinkled leaves with crenulate margins. Flowers orange-red, drooping, long-stalked.

G. Cooperi.—Leaves oval heart-shaped pointed. Flowers bright scarlet, drooping, conspicuously dotted inside.

G. Donkelaari.—Leaves almost heart-shaped, green, tinted with purple and red. Flowers bright

vermilion; very numerous. (*Bot. Mag.* t. 5070.)

G. Douglasi (*G. maculata*; *G. verticillata*).—Leaves in whorls of four, ovate, toothed, the lower ones stalked, the upper sessile. Flowers bright red, drooping, and borne in clusters in the axils of the upper leaves. (*Bot. Reg.* t. 1110; *Lodd. Bot. Cab.* t. 1939.)

G. elliptica.—Leaves elliptic, wrinkled, serrate. Flowers orange-scarlet, but yellow in the variety *lutea*. (*Bot. Mag.* t. 4242.)

G. exoniensis.—A garden hybrid with deep green velvety leaves covered with reddish hairs. Flowers deep orange-scarlet, with a yellow throat; very numerous.

G. Lindleyi.—Leaves broadly ovate, crenulate, deep velvety green, tinted with red underneath. Flowers numerous, bright rose, pink-yellow at the base, and spotted with red. (*Bot. Mag.* t. 3602.)

G. nægelioides.—A beautiful garden hybrid with deep green, ovate heart-shaped, coarsely toothed leaves. Flowers large, tubular, bright rose-pink, having a yellow throat dotted with red. There are many variations of this hybrid, differing from each other chiefly in the colour of the flowers, such shades as deep violet, deep red, lilac, pure white, bright pink, rosy-lilac, etc., being represented, the blossoms in all cases being variegated with yellow in the throat or speckled with a distinct colour.

G. pendulina (*G. Marchii*).—This is the only species from Mexico. It grows about a yard high, and has ovate crenulate leaves in whorls of three. Flowers numerous, scarlet, cylindrical, club-shaped, drooping, with bosses at the base. (*Bot. Mag.* t. 3744.)

G. polyantha.—A square-stemmed

species having broadly ovate heart-shaped leaves pointed at the apex and toothed on the margins. Flowers scarlet, with a yellow throat, arranged in leafless paniced cymes.

G. Sceptrum.—Leaves in whorls of three, heart-shaped, bluntly toothed. Flowers with long tubes, white, borne in elongated clusters. The variety *ignea* has reddish-yellow flowers.

G. tuberosa (*G. rupestris*).—A species with horizontal rhizomes from the joints of which the stems arise. Leaves broadly ovate heart-shaped, toothed. Flowers numerous, bright scarlet, covered with fine hairs outside. (*Bot. Mag.* t. 3664.)

GETHYLLIS (*gethreon*, a leek; or *getheo*, to rejoice; referring to the fragrance of the flowers). Nat. Ord. Amaryllidæ.—A small genus of South African crocus-like plants having tunicated bulbs, and thread-like, narrow, or lance-shaped leaves, usually produced after the flowers have withered. The short flower-stem is underground (hypogæous), and the whitish, sweet-scented, fleeting flowers have a salver-shaped perianth with a long cylindrical tube. Stamens six, or many in six clusters, inserted in a single row at the throat of the tube.

These plants are not of great garden value, and are chiefly met with in botanical collections. They require the protection of a greenhouse, and appear to grow best in a mixture of sandy peat and loam. During the winter months the bulbs are dormant and require no water. The plants are all of small stature, rarely exceeding 6 ins. in height, and the flowers in all cases appear about July and August. The following kinds are met with:—

G. afra.—Bulbs round, 1½ to 2 ins. through. Leaves linear, twisted,

smooth, strongly ribbed. Flowers white, flushed with red on the outside. (*Bot. Reg.* t. 1016.) *G. Britteniana*, with pure white flowers, may be an extreme form of this species.

G. ciliaris.—Bulbs $1\frac{1}{2}$ ins. through, with cylindrical necks sometimes 4 to 5 ins. long. Leaves linear, spirally twisted, conspicuously ciliated. Flowers whitish. (*Jacq. Hort. Schoen.* i. 41, t. 79.)

G. lanceolata.—This has been referred to *Apodolirion lanceolatum*, by Mr J. G. Baker. It has small round bulbs, with necks 1 to $1\frac{1}{2}$ ins. long, and solitary lance-shaped leaves borne at the same time as the whitish flowers.

G. spiralis.—The round bulbs are 1 to $1\frac{1}{2}$ ins. in diameter, with necks 1 to 2 ins. long. Leaves more or less oval-shaped, spirally twisted, smooth. Flowers appear in December, white, tinged with red outside. *G. rosea* is a red-tinted form with smaller flowers. (*Bot. Mag.* t. 1088.)

G. villosa.—Bulbs small, ovoid, with necks 1 to $1\frac{1}{2}$ ins. long. Leaves linear, densely covered with stiff hairs. Flowers with hairy tube, white, tinged with pink outside.

GLADIOLUS (*gladius*, a sword; referring to the shape of the leaves), CORN FLAG. Nat. Ord. Irideæ.—A genus containing about 140 species of beautiful herbaceous plants having fibrous-coated corms, sword-like plaited leaves, and tall spikes of incurved or obliquely funnel-shaped flowers, all turned one way. The three upper segments of the perianth are usually larger than the three lower ones, but the latter are often beautifully spotted and blotched with distinct colours. Stamens three, with free filaments.

With the exception of the European *G. byzantinus* and *G. communis*, most

of the species described below are natives of S. Africa, extending from Cape Colony to the Transvaal, Natal, and the Zanzibar region. In point of beauty the natural species cannot compare with such fine garden races of Gladioli as *brenchleyensis*, *Childsi*, *Colvillei*, *gandavensis*, *Lemoinei*, *Nanceianus*, and *nanus*, but it must be remembered that their blood has been utilised by the hybridist to develop such fine plants. The following are the most important natural species and hybrid groups of Gladioli to be met with in cultivation.

G. Adlami.—This species from the Transvaal grows $1\frac{1}{2}$ to 3 ft. high, and has greenish-yellow flowers, finely dotted with red, about half a dozen blossoms to each spike (*Gard. Chron.* 1889, i. 233).

G. alatus.—A dwarf species with crowded linear leaves 6 to 12 ins. long, and bright red flowers (*Bot. Mag.* t. 586).

G. angustus.—This species grows from 1 to $1\frac{1}{2}$ ft. high, having narrow leaves, and bearing white narrowly funnel-shaped flowers having a purple blotch on the lower segments (*Bot. Mag.* t. 602; *Jacq. Ic.* t. 252).

G. armeniacus.—A handsome dwarf-growing Armenian species, with numerous small deep purplish flowers in July.

G. blandus.—A fine species $1\frac{1}{2}$ to 2 ft. high, with large white flowers in June, having red markings and a yellow tube. There is a white form called *albidus*, and another pale purple, *campanulatus*. (*Bot. Mag.* tt. 625, 648, 1665.) The variety *Mortonius* has suberect white flowers streaked with pink (*Bot. Mag.* t. 3680.)

G. brachyandrus.—A native of Tropical Africa, about 2 ft. high, which flowers in July. The blooms are bright clear scarlet, about a

dozen being borne on a spike a foot long. (*Bot. Mag.* t. 6463.)

G. brechleyensis.—This brilliant scarlet *Gladiolus* was raised about the year 1848, at Brechley, by Mr Hooker, and is practically a form of *G. gandavensis*. It, however, retains its character so well and is so unlike the usual types of *G. gandavensis*, which have the blood of more than two species in them, that it may well receive separate mention. The flower-spikes, which appear before those of *G. gandavensis*, are not nearly so heavy, and support themselves naturally very well without stakes.

G. byzantinus.—A native of Turkey and Asia Minor, about 2 ft. high. The beautiful red flowers are freely produced in June and July, and are often shaded with a tinge of purple or reddish-violet. It flourishes in any well-drained garden soil. (*Bot. Mag.* t. 874.)

G. cardinalis.—A fine but rather tender species, 3 to 4 ft. high, with large scarlet blooms in July and August, the three lower segments having a large white blotch in the centre (*Bot. Mag.* t. 135; *Red. Lil.* t. 122; *Garden*, 1885, ii. 520).

G. carmineus.—This somewhat tender species grows about 1½ ft. high, and has narrow tapering leaves about 8 ins. long. The funnel-shaped flowers are about 3 ins. across, carmine, two of the inner perianth lobes having a paler blotch at the base with a darker border. (*Bot. Mag.* t. 8068.)

G. Childsi.—A vigorous-growing hybrid, raised in 1882 by Herr Max Leichtlin of Baden-Baden, by crossing the best forms of another hybrid, *G. gandavensis*, with *G. Saundersi*. A similar hybrid was raised in Zurich by Herr Froebel, under the name of *turicensis*, which has never become

established. Max Leichtlin's hybrid (at first called *Leichtlini* after himself), found its way to America, and in due course came into the hands of John Lewis Childs, who rechristened it under the now accepted name of *Childsi*. The plants attain a height of 4 to 5 ft., and produce branching flower-stems often over 2 ft. long. The individual blossoms are 6 to 9 ins. across, the petals being of great substance, and shaded with various colours such as purple, scarlet, blue-grey, salmon, crimson, blush, rose, pink, yellow, etc., often beautifully blotched, speckled, and mottled in the throat. As there are almost innumerable variations, it is unnecessary to give a list of names, and the reader is advised to consult current catalogues.

G. Colvillei.—A popular hybrid between *G. cardinalis* and *G. tristis*.



FIG. 168.—*Gladiolus Colvillei*. (3.)

It grows about 2 ft. high, and has showy crimson-purple flowers flaked with white. There are two fine

white forms, one called *albus*, having white segments and red stamens; the other, called *The Bride*, being distinguished by having white instead of red stamens.

Gladiolus Colvillei, and especially its white varieties, are cultivated in thousands to supply blossom to the London and provincial markets. The corms are planted in the open air, in warm sheltered spots in light, rich, and deeply-dug soil in the autumn, about 4 or 5 ins. deep. A slight covering with litter or old manure is given as protection against frost, and also to keep the warmth of the soil round the roots for as long as possible. The flowers appear usually from May to July and look handsome in bold masses. When grown in pots, *G. Colvillei* and its varieties may be forced into early blossom during the earliest months of the year in the greenhouse or conservatory.

G. communis.—This is a native of S. Europe, and grows $1\frac{1}{2}$ to 2 ft. high, having narrow, lance-shaped, ribbed leaves, and bright rosy flowers about June and July. There are several forms in existence, differing chiefly in the colour of the blossom, which vary from white to rose and purple. (*Bot. Mag.* tt. 86, 1575; *Red. Lil.* t. 267.)

G. cruentus.—This is a fine species from the slopes of the Drakenburg, Natal. It grows 2 to 3 ft. high, and has linear leaves 12 to 18 ins. long. The flowers appear about September, and are borne in dense spikes about a foot long. Each blossom is about 4 ins. across, brilliant scarlet in colour, yellowish-white at the base, speckled with red, the two side petals being blotched with white. (*Bot. Mag.* t. 5810.)

G. cuspidatus.—This is another fine species, with flower-stems 2 to 3 ft. high, and whitish flowers usually

marked with purple and red on the lower segments (*Jacq. Ic.* t. 257; *Bot. Mag.* t. 582).

G. decoratus.—A native of E. Africa, 2 to 3 ft. high, with sword-shaped leaves about 1 ft. long. From six to twelve bright scarlet flowers are borne on a loose spike, the three lower segments being blotched with yellow.

G. dracocephalus.—A beautiful and distinct species from Natal, with pale green leaves 6 to 12 ins. long, and soft yellow flowers in July and August, striped with dull purple, the lower segments being greenish and spotted with purple (*Bot. Mag.* t. 5884).

G. Eckloni.—This has corms $1\frac{1}{2}$ in. thick, and very stiff thick-ribbed leaves not more than a foot long. The whitish flowers copiously spotted with minute red dots are borne on stems $1\frac{1}{2}$ to 2 ft. high. (*Bot. Mag.* t. 6335.)

G. floribundus (*G. grandiflorus*).—This grows about 3 ft. high, and is very free-flowering. The blossoms appear about May and June, and vary in colour from white, with a broad purplish stripe, to bright flesh colour striped with deep red. (*Bot. Mag.* t. 610; *And. Bot. Rep.* t. 118.)

There are many forms of this species now in cultivation, and the fact of their blooming early makes them popular at exhibitions, where they are shown in great masses. Amongst these forms mention may be made of *formosissimus*, with clear orange-red flowers blotched with white, washed with crimson-lake and edged with crimson, *insignis*, vermilion blotched with carmine; *magnificus*, carmine-rose and vermilion-red blotched with white; *Queen Victoria*, bright velvety red, blotched with white and edged with carmine; and *trimaculatus*, bright

rose, spotted with carmine and white.

G. gandavensis.—What is popularly known as the Ghent Gladiolus originated in 1837 with M. Beddinghaus, gardener to the Duc d'Areberg, at Enghien, by crossing *G. psittacinus* and *G. cardinalis*. There can, however, be little doubt that before the *gandavensis* type had become fairly fixed, the services of other species were brought into force, and the most likely of these were *G. oppositiflorus* (which shows in the white forms), *G. blandus*, and *G. ramosus*. Other species may also have been used, but in any case the *gandavensis* Gladiolus as we now know it, is the result of much crossing and intercrossing between the best forms as they were developed. M. Souchet of Fontainebleau was one of the earliest to take to the serious business of producing *gandavensis* hybrids. He used the hybrids obtained from *G. cardinalis* and *G. psittacinus*, and crossed them with *G. blandus* and *G. ramosus*, and in 1852 many of them bloomed for the first time in his garden, and were a vast improvement on the original type. The prevailing colours of the *gandavensis* Gladioli are exquisite and delicate, and consist of various shades and mixtures of white, cream, violet, crimson, lilac, purple, maroon, salmon-red, rose, scarlet, yellow, orange, pink, amaranth, etc., variously striped and blotched. (See the author's *Practical Guide to Garden Plants*, p. 950.)

G. glaucus.—A half-hardy Grecian species not exceeding 1 ft. high, having stiffish erect leaves, and numerous bluish-red flowers striped with red and white at the base (*Rev. Hort.* 1906, 318).

G. gracilis.—A distinct-looking species 1 to 3 ft. high, having thick,

stiffish, and roundish leaves 6 to 12 ins. long, and a deep squarish channel on each surface. The flowers appear in March and April, and are usually white, but vary somewhat in colour, and are similar to those of *G. recurvus*. (*Bot. Mag.* t. 562; *Red. Lil.* t. 425; *Jacq. Ic.* t. 246.)

G. grandis (*G. versicolor*).—This species grows about 18 ins. high, and has strong, roundish, deeply channelled leaves. The flowers appear in May and June, about half a dozen in a loose spike, and vary in colour from reddish-brown to brown. (*Bot. Mag.* t. 1042; *And. Bot. Reg.* 19.)

G. hastatus.—This is closely related to *G. blandus*. It has roundish deeply channelled leaves, and in April and May appear the blush-white or flesh-coloured flowers, tinted outside with red. (*Bot. Mag.* t. 1564.)

G. Kirki.—This species from Zanzibar has linear grass-like leaves 6 to 8 ins. long, and bright rose-pink flowers in a loose flexuose spike.

G. Kotschyanus.—A native of Afghanistan and Persia, with linear leaves 6 to 8 ins. long. The clear violet flowers appear about May and June, the lower segments being somewhat paler in colour than the upper ones, and having a darker band down the centre. (*Bot. Mag.* t. 6897.)

G. Leichtlini.—A Transvaal species about 2 ft. high, having bright red flowers, the lower segments of which are yellow speckled with red.

G. Lemoinei.—This beautiful section was raised by M. Lemoine of Nancy, France, by fertilising flowers of *G. purpureo-auratus* with pollen from the most beautiful forms of *G. gandavensis*. As the latter has the blood of four or five species in its veins, it follows that the *Lemoinei* hybrids contain the blood of at least one more species. During the past thirty years many choice varieties

have been raised in England and on the Continent. The *Lemoinei* hybrids are distinguished by a large, beautiful, golden-yellow blotch with borders of purple, scarlet, maroon, etc., on the lower segments. There are many shades of colour, including carmine, rosy-purple, sulphur, salmon, yellow, creamy-white, blood-red, etc., more or less beautifully blended.

G. Mackinderi.—A species from Mt. Kenia, British E. Africa, with slender stems about 2 ft. high, and very narrow leaves about 1 ft. long. Flowers scarlet with a yellow tube, on spikes about 6 ins. long. (*Bot. Mag.* t. 7869.)

G. Nancelianus.—These hybrids were also raised by M. Lemoine of Nancy, and distributed in 1889. The plants surpass in size and beauty all other kinds except the *Childsi* race. They are the result of crossing *G. Saundersi* with the best forms of *G. Lemoinei*. They are as hardy as the *gandavensis* section, and much more free-flowering. The colours are of the most brilliant and varied hues, and heavily spotted. Among the shades of colour may be mentioned purple, claret, orange, red, maroon, orange-scarlet, violet, carmine, variously striped and blotched with distinct and harmonising colours.

G. nanus.—Under this name there are now in cultivation several varieties of hybrid Gladioli that have been evolved from successive crossings of several species, such as *G. blandus*, *G. cardinalis*, *G. tristis*, *G. trimaculatus*, and no doubt others. These hybrid offspring are characterised by having slender and somewhat flexuous stems, two or three of which often spring from one corm, and by their rather small flowers resembling those of *G. Colvillei* and its varieties, having

pointed segments, the three lower ones being usually conspicuously blotched with a distinct colour.

The cultural treatment of these is precisely the same as for the *Colvillei* section, the plants being grown either in the open air or under glass according to circumstances.

G. oppositiflorus.—A native of Kaffraria, with large corms and leaves 1 to 2 ft. long. The flowers are white



FIG. 103.—*Gladiolus oppositiflorus*. (c.)

with a small red band, and from thirty to forty are borne on a stalk about 2 ft. high in autumn. This is supposed to be one of the parents of the "Gandavensis" hybrids. (*Bot. Mag.* t. 7292; *Gard. Chron.* 1893, i. i. 41; *Garden*, 1894, i. 163.)

G. Papilio.—This species grows from 1½ to 2 ft. high, and has broadly tubular blossoms of a very pale purple colour, splashed and variegated with deep purple and golden-yellow (*Bot.*

Mag. t. 5565). The variety *atratus* is distinguished by the absence of yellow in the flowers.

G. platyphyllus.—This species from Natal resembles *G. dracocephalus* in appearance, but has broader, shorter, opposite leaves, and a long spike of deep yellow flowers veined with red (*Gard. Chron.* 1893, xiv. 456).

G. primulinus.—A native of S.E. Africa, having somewhat leathery strongly ribbed leaves, 2 to 2½ ft. long



FIG. 170.—*Gladiolus primulinus*. (L.)

and about 1 in. wide, and soft yet clear primrose-yellow flowers, two to four on a stem about a foot above the leaves. This species was shown in London for the first time on 23rd August 1904, by Mr F. Fox, Alyn Bank, Wimbledon, when it was stated that the plant was a native of the Rain Forest, Victoria Falls, River Zambesi, and grows in the spray of the Falls. The petals act as an umbrella for protecting the pistils and stamens from the spray. This

species has been named "Maid of the Mist" on this account. The sketch was taken from the plant exhibited in 1904. (*Gard. Chron.* 1890, ii. 122.)

G. princeps.—This magnificent hybrid was raised in America by Dr Van Fleet, who fertilised the stigmas of *G. cruentus* with pollen from the flowers of *G. Childsi*. As the latter hybrid itself is a cross between *G. gandavensis* (*psittacinus* × *cardinalis*) and *G. Saundersi*, it is obvious that *G. princeps* has the blood of at least four distinct species in its veins, and possibly five if we consider that *G. oppositiflorus* has probably played a part in the origin of the *gandavensis* breed. Dr Van Fleet's *G. princeps* has crimson-scarlet flowers of great richness and intensity, relieved by touches of white, or frequently by a white stripe across the centre of the lower petals, which are very full and rounded. The flowers appear late in August and September, when other kinds are already fading, and although only a few flowers are open at one time, this defect is atoned for by their great size and lasting qualities.

G. psittacinus (*G. natalensis*).—A beautiful species with sword-like leaves a foot or more long, and stout erect flower-stems about 3 ft. high. The large bell-shaped flowers, ten to twelve on a spike, are rich scarlet, lined and spotted with yellow. This is one of the original parents of the *gandavensis* hybrids (*Bot. Mag. t. 3032*; *Bot. Reg. t. 1442*; *Sw. Brit. Fl. Gard.* ii. t. 281; *Lodd. Bot. Cab. t. 1756*.) The variety *Cooperi* has yellow flowers strongly lined with reddish-purple (*Bot. Mag. t. 6002*).

G. pudibundus.—A pretty garden hybrid between *G. blandus* and *G. cardinalis*. It grows from 2 to 3 ft. high, having broad, ribbed, pointed leaves, and about a dozen large bright

rose flowers on a stem. (*Sic. Brit. Fl. Gard.* ii. 176; *Pact. Mag. Bot.* ii. 197.)

G. punctatus.—A little-known species about 1½ ft. high, with narrow leaves and large flowers greenish-yellow within, the three upper segments being striped in the centre with purple.

G. purpureo-auratus.—A fine species from Natal, with broad grey-green leaves about 18 ins. long. The pale sulphur-yellow flowers have a large purple blotch on each of the two lower segments; and over a dozen blossoms appear in August on stems 3 to 4 ft. high. This species is remarkable for its small corms, only about 1 in. through, sending out runners 2 to 3 ins. long, at the end of which new corms are developed, instead of on the summit of the old corms as in other species. It may be noted that this species crossed with the pollen of *G. gandavensis* produced the first of the beautiful Lemoinei hybrids. (*Bot. Mag.* t. 5944.)

G. Quartinianus.—A native of Tropical Africa, having narrow, stiffish, strongly-veined leaves, 1 ft. or more long, and yellow flowers suffused and spotted with scarlet, borne in August on stems about 2 ft. high (*Bot. Mag.* t. 6739).

G. ramosus.—A pretty hybrid between *G. cardinalis* and *G. floribrandus*, with pointed leaves and flowers varying in colour from deep rose to red, and more or less flaked and feathered with white, and borne about July and August on slender flexuose and often branched spikes (*Pact. Mag. Bot.* vi. 99).

G. recurvus (*G. ringens*).—This species grows from 1½ to 3 ft. high, and has roundish, strongly-veined leaves. The sweetly violet-scented yellow flowers spotted with blue appear in April and May, about half

a dozen in a loose raceme. (*Bot. Mag.* t. 578; *And. Bot. Rep.* tt. 27, 227; *Red. Lil.* t. 123.)

G. Saundersi.—A beautiful species with strongly nerved sword-like leaves, 2 to 3 ft. long, and flower-stems about the same height, bearing in autumn spikes of six to twelve flowers, each over 3 ins. across, and of a beautiful crimson or pale scarlet spotted with pink and white (*Bot. Mag.* t. 5573; *Garden*, July 1877).

G. segetum.—This species extends from the Canary Islands along the Mediterranean region to Persia and Turkestan. Its corms are about 1 in. thick, the leaves are 1 to 1½ ft. long, and the bright purple flowers are borne in loose clusters. (*Bot. Mag.* t. 719.)

G. trichonemifolius.—This species has stiff, roundish leaves, and stems 6 to 18 ins. high, bearing yellow flowers with a purple blotch on the three lower segments (*Bot. Mag.* t. 1483).

G. tristis.—A native of Natal, about 1 ft. high, bearing in July funnel-shaped flowers 2 to 3 ins. deep, with a yellow ground colour, the three upper segments of the perianth being minutely spotted with reddish-brown on both surfaces, the three lower ones spotted only on the outer half (*Bot. Mag.* tt. 272, 1098; *Ref. Bot.* 23; *Red. Lil.* t. 35).

The plant known as *sulphureus* is a pale yellow self-coloured form of the type, with a graceful habit. The variety *concolor* has pale yellow or pure white flowers. (*Bot. Mag.* t. 1098.)

G. villosus.—This species has stiffish linear leaves, with a long hairy sheath, and bright-red lilac flowers (*Bot. Mag.* t. 823.)

G. watsonioides.—A native of Kilimanjaro, 2 to 3 ft. high, with stiffish, erect, narrow leaves, and loose spikes

of brilliant scarlet flowers about $1\frac{1}{2}$ ins. long (*Bot. Mag.* t. 6919). The variety *minor* is smaller in every way.

G. Watsonius.—This species grows 1 to 2 ft. high, and has flat linear lance-shaped leaves and bright red cylindrical flowers with a curved tube, the lower segments being recurved (*Bot. Mag.* t. 450; *Red. Lil.* t. 369). A variety having the perianth segments variegated with yellow from base to centre is figured in the *Bot. Mag.* t. 569.

CULTURE AND PROPAGATION OF THE GLADIOLUS.—With the exception of a few of the more tender species such as **G. Kirki**, **G. primulinus**, and **G. Quartinianus**, most of the Gladioli mentioned above may be grown in the open air in most parts of the British Islands. The natural species, although not so brilliant in hue or so luxurious in habit as the more modern garden varieties are nevertheless worthy of cultivation where space can be afforded. And who knows, considering the success that has been secured in raising such groups as the *Childsi*, *gandavensis*, *Nanceianus*, and *Lemoinei*, that there may be still a possibility of raising other fine races of Gladioli. Indeed evidence is not wanting that many nurserymen and several amateurs are paying great attention to this problem, and we may expect in the near future great developments in the way of new and vigorous hybrids.

Generally speaking, all the Gladioli like a rather stiff loamy soil which should, however, be deeply cultivated, and contain a certain amount of grit to secure greater warmth, aëration, and thorough drainage. Well-rotted stable manure within a foot or so of the surface should always be incorporated with the soil, as it is particularly valuable in retaining

moisture round the roots during hot and rainless summers. In light sandy soils it is necessary to dig in much larger quantities of well-decayed manure, and perhaps cow-manure is better than any other for a soil of this nature.

A very heavy, cold, and wet soil is about the worst for growing Gladioli. If, however, such a soil is trenched about 3 ft. deep, in September or October, at the same time working in layers of manure between each layer of soil, a wonderful improvement towards warmth, fertility, and friability will take place before the planting season for the summer- and autumn-flowering varieties.

PLANTING.—The summer- and autumn-flowering Gladioli, including all forms of *Childsi*, *Lemoinei*, *Nanceianus*, *gandavensis*, and *brenchleyensis*, are best planted about the end of March or early in April, taking into consideration the state of the weather and the locality. The corms may be planted in drills drawn a foot or 15 ins. apart and 4 or 5 ins. deep, or they may be planted with a trowel in groups in the flower-border. Nothing is lost, however, by turning the soil up in ridges, as it becomes still more friable and valuable. As the corms of the various species and sections differ a good deal in size, it may be stated as a general rule that they should be planted about three times their own depth—in other words, they should be covered with a layer of soil equal to twice their own thickness.

Warm, open, sunny situations should be chosen, and Gladioli may be grouped in the ordinary herbaceous flower-border where space permits, or in special beds by themselves. It is also an excellent plan to utilise

them with such plants as dwarf-growing Cannas, and such subjects as *Galtonia* (*Hyacinthus*) *candicans*, the *Eremuri*, or the Torch Lilies (*Kniphofias*).

During the summer months the hoe should be used frequently to stir the surface of the soil to a depth of an inch or two, thus checking evaporation of moisture from the root region, and keeping the plants in a more actively growing condition. When particularly fine results are required the soil may receive a light dressing of basic slag (2 ozs. to a square yard) when the corms are being planted, and afterwards when the flower-spikes are showing, an occasional watering with weak liquid manure will be highly beneficial.

LIFTING THE CORMS.—As soon as the flowers have withered and the leaves begin to turn yellow, the tops may be cut down to the ground, and the corms lifted and dried preparatory to storing away for the winter. Any cool, airy, but frost-proof place will be suitable for storing purposes. When cleansing the corms it is advisable to grade them into sizes and to separate the small bulblets or "spawn" from the fully developed corms, and keep them apart ready for sowing in spring as if they were seeds.

PROPAGATION.—Gladioli are easily increased (i.) by means of offsets from the old corms; (ii.) by the "spawn" or small bulblets, which are often produced freely; and (iii.) by seeds. The larger offsets should be separated from the smaller ones and from the "spawn," each group being planted in March or April in the case of the summer- and autumn-flowering varieties, or about the end of August or early September with the early-flowering ones. The latter require the soil to be well drained and in a

sheltered sunny situation, as they have to pass through the winter months. The rows may be from 6 to 9 ins. apart, according to the size of the corms—the larger ones of course having more space.

When it is desired to raise Gladioli from seed, it is as well to select the seed-parents carefully in advance. During the flowering period the finest flowers of any particular section should be noted, and the plants should be marked in some way, such as by tying a piece of coloured string or a label to them. On hot bright days the pollen from another choice variety, possessing desirable characteristics that are lacking probably in the destined seed-parent, should be taken and placed on the pistils of the latter. It is advisable in the early stages of the flowers that are to bear the seed that the stamens should be detached, and a muslin or fine gauze bag placed over the blossoms to prevent any but the desired pollen from falling on the stigmas. An hour or two before midday is generally the best time for fertilising purposes, and the ripe pollen should therefore be available for the sticky surfaces of the stigmas.

After fertilisation, the petals wither, and the seed-pod begins to swell, until eventually it becomes fully ripe. The seed should be carefully preserved in a dry airy place until about the first week in April. It may then be sown in pots or boxes of rich gritty soil; or even in the open in a nicely prepared and sheltered piece of ground. The seeds should be covered with about $\frac{1}{2}$ in. of soil, and if sown in the open, should be in drills about 6 ins. apart. The soil should be pressed down evenly and firmly on the seeds, and care must afterwards be taken to keep it moist and free from weeds.

The seedlings soon appear like blades of grass, and about September the young corms may be lifted and stored until the following April, when they may be planted in rows about 6 ins. apart every way. Many flower the second season, but the great majority will require another period of growth to acquire sufficient reserve material.

DISEASES AND PESTS.—Where the ground is infested with wireworm, as it often is in the case of newly broken pasture-land, the corms are likely to be badly injured. Land of this description should be trenched about 3 ft. deep in autumn, burying the top spit containing the wireworm and perhaps other grubs at the bottom of the trench. In this way they are completely stifled and deprived of their vegetable diet. The subsoil brought up will be perfectly free from the pest, and if well manured and exposed to the weather will be in a good fertile condition in spring. Where the ground is not trenched, money must be spent in some of the strong-smelling powders that are advertised as cures. Mice are sometimes mischievous, and must be trapped. When deep cultivation is not practised, traps of carrots or potatoes must be used to catch the grubs in the soil.

During hot dry summers "red spider" is troublesome and causes the leaves to assume a rusty appearance. Frequent use of the hoe, and a good syringing every morning and late in the afternoon are the best remedies against this pest.

The *Gladiolus* fungus (*Myriococcus fusan*) sometimes gains a footing, and is best checked by burning the diseased plants, and giving a heavy dressing of flowers of sulphur to the soil; afterwards trenching it 3 ft. deep in autumn, and burning the

top spit. Dipping the corms for about two minutes in a solution of one part of formaldehyde to five parts of water has proved a check to the disease.

Other solutions recommended are : (a) 1 oz. of sulphate of copper to 10 gallons of water; and (b) 4 ozs. commercial formalin to 15 gallons of water. The corms to be soaked for about twelve minutes in either solution before planting.

GLOBBA (native Molucca name). Nat. Ord. Scitamineæ.—A genus containing about two dozen species of ornamental-looking herbaceous plants, having thickish root-stocks or rhizomes, more or less broadly lance-shaped leaves, and resembling the *Cannas* in appearance. The curious-looking yellow or reddish flowers are borne on the ends of the shoots in simple or branched clusters. The corolla-tube is slender, with three ovate lobes, and springs from the three-cleft tubular calyx. The lateral stamens are petal-like, the lower one only being fertile.

The Globbas are not well known outside botanical collections. They are, however, easily grown in a stove house with plenty of heat and moisture, in accordance with the conditions prevailing in Borneo, Sumatra, Siam, etc., whence they come—*i.e.*, between the Equator and the 20° north latitude. They like a rich loamy soil, and may be increased by dividing the rhizomes in spring. The following species are best known :—

G. albo-bracteata (*G. alba*).—A Sumatran species, about 2 ft. high, with brownish-purple stems, green, oval lance-shaped leaves, and drooping clusters of flowers having a white calyx and a yellow corolla (*Belg. Hort.* 1885, t. 20).

G. atrosanguinea (*G. coccinea*).—An elegant Bornean plant about 1 to 1½ ft. high, with clusters of gracefully arching stems and deep glossy green, ovate lance-shaped leaves. The flowers, with scarlet bracts, are borne in dense racemes, and appear at all seasons of the year. (*Bot. Mag.* t. 6626.)

G. Schomburgki.—A native of Siam, 6 to 12 ins. high, with elliptic ovate or lance-shaped leaves pointed at the tips. The golden-yellow flowers with a bright orange-red base to the lower segment, appear in August in drooping panicles. (*Bot. Mag.* t. 6298.)

G. sessiliflora.—This is the oldest species in cultivation, having been introduced from the East Indies (Pegu) in 1807. It grows about 18 ins. high, and has lance-shaped pointed leaves, and yellow flowers produced in August in whorled spikes. (*Bot. Mag.* t. 1428.)

GLORIOSA (*gloriosus*, glorious; referring to the beauty of the flowers). Nat. Ord. Liliaceae.—A genus containing about half a dozen species of tuberous-rooted herbaceous plants having climbing or tufted stems sparingly furnished with alternate, opposite, or ternately verticillate, sessile leaves, oblong lance-shaped, and remarkable for having the tips produced into a spirally twisted tendril. The flowers are borne singly in the axils of the upper leaves. The perianth consists of six similar narrow, oblong, lance-shaped, wavy segments, at first spreading, but afterwards sharply bent back, and leaving the six hypogynous stamens, and the green superior ovary with its long-styled, three-cleft stigma bent at right angles, well exposed to view.

These remarkable-looking plants

are well worth growing in a warm greenhouse or at the cool end of a stove house. They flourish in a compost of turfy loam and fibrous peat to which a little well-decayed cow-manure, or a little basic slag or fine bone-meal has been added. The long, fleshy, tuberous roots are best potted up in spring, about March, when the new growths begin to appear, and may be covered with about 2 ins. of soil. Well-drained pots of course should be used, and a few tubers may be placed in a large pot, to secure a finer effect than when one is grown in a small pot. During growth water should be given copiously, and the syringe should be used in the morning and afternoon. When the flexuous stems are about a foot long, it will be necessary to put sticks to them, or to fasten them to a wire trellis over which they may be trained. Gloriosas are also useful plants for furnishing the sides and rafters of a warm greenhouse or stove house, and make an ornamental display, usually during July and August, or perhaps somewhat earlier. As the stems and leaves die down naturally in the autumn—a fact which should be carefully noted—water is gradually withheld, and ultimately the tubers alone are left mature and dormant during the winter months. In this state they require no water, and the pots should be turned over on the sides to avoid the dripping or draining from the benches; or they should be placed on shelves near the glass. In spring, the old tubers after showing signs of growth should be shaken out of the old soil, and repotted into fresh compost and treated as above advised. The best temperature at this period is about 55° to 65° F. at night, and 5° or 10° more by day.

Gloriosas are easily propagated in

spring by carefully dividing the tubers with a sharp strong knife, taking care to cut between the young sprouts. Each portion should have the cut surface dipped in slaked lime or soot before potting up.

When seeds are ripened they should be kept till March, and may then be sown in a rich gritty compost in a warm house having a night temperature of about 70° F. The soil must be kept fairly moist, and when the seedlings are large enough to handle easily, they should be transferred singly to 3-in. pots. When these are fairly well filled with roots, the young plants should be moved into 4-in. or 5-in. pots, keeping them moist and syringed to encourage quick growth, and shading them from very hot sunshine. No flowers should be allowed to develop the first year, as they would only weaken the plants. The second season—after the winter rest—the plants are grown on in the ordinary way.

G. abyssinica (*Clinostylis speciosa*).—A showy dwarf-growing species from Abyssinia, having large red and yellow flowers.

G. Carsoni.—A native of East Central Africa, from the shores of Lake Tanganyika, being dwarf and sturdy in growth. It has showy heads of flowers, the broad petals of which are yellow towards the centre, shading to deep-red towards the base. The tubers are small, and the stems are 8 ft. or more long. The plant is also found in abundance in Rhodesia. (*Gard. Chron.* 1904, xxxvi. 127.)

G. grandiflora (*Methonica grandiflora*).—This is closely related to *G. superba*, and is considered by some to be merely a variety of it. It is a native of Tropical Africa, and has the more or less wavy flowers often

entirely yellow in colour, but assuming a reddish tint with age.

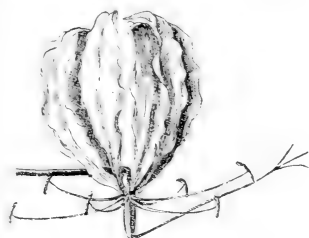


FIG. 171.—*Gloriosa grandiflora*. (3.)

G. minor.—This peculiar little species is unknown in gardens. It is a native of N.E. Equatorial Africa, having been found along the Shebéli River, and apparently grows only 3 or 4 ins. high.

G. Rothschildiana.—A native of Uganda and Mombosa, with climb-



FIG. 172.—*Gloriosa Rothschildiana*.

ing stems and tendril-tipped leaves. The flowers, with broad somewhat wavy segments are of a bright ruby-red when fully open, but are tinted

with yellow at the base at first. (*Gard. Chron.* 1903, xxxiii. 322, f. 125; *Flora and Sylva*, Aug. 1904.) The beautiful variety *citrina* has yellow flowers and leaves somewhat narrower than the type. The centre and tip of each petal is marked with a claret-coloured band, which spreads over the whole surface in time. (*Gard. Chron.* 1905, xxxviii. 67, 211, f.)

G. superba (*Methonica superba*).—A native of India, Malacca, and Tropical Africa. This is the best-known species of the genus, and was first introduced to cultivation in 1690



FIG. 173.—*Gloriosa superba*.

from the East Indies. It has climbing stems, 5 to 6 ft. long, tendriltipped leaves, and flowers with very wavy sharply reflexed segments, the lower portion of which is yellow, the upper portion being bright red margined with yellow. (*And. Bot. Rep.* t. 129; *Bot. Reg.* t. 77; *Garden*,

1890, ii. 784.) The variety *lutea*, which is abundant in Rhodesia, has flowers of pure buff-yellow without a trace of red.

G. virescens (*G. simplex*; *G. Planti*).—A native of Mozambique, with stems 3 to 4 ft. long, leaves like those of *G. superba*, and greenish-yellow flowers, bordered with yellow and tinted with red outside (*Bot. Mag.* tt. 2539, 4938). The variety *grandiflora* from Natal has yellow flowers.

GLOXINERA.—This is the name given to a bigeneric hybrid between a *Gloxinia* and *Gesnera pyramidalis*, the latter being the pollen parent.



FIG. 174.—*Gloxinera* "Brillant." (A.)

It was shown by Messrs Veitch, Chelsea, in 1894, and the following description with a figure appeared in the *Gard. Chron.* 2nd Feb. 1885, p. 144, f. 22:—The flowers are of a fair size, and of a brilliant scarlet colour tinged with magenta in the shadows. The foliage is more nearly that of a

Gloxinia than a Gesnera in appearance, being very succulent and covered with fine hairs.

GLOXINIA (after *B. P. Gloxin*, a botanist of Colmar). Nat. Ord. Gesneraceæ. — The Gloxinia of the botanist and the Gloxinia of the gardener are quite distinct genera, although they both belong to the same section of the same family.

The garden Gloxinia would be more correctly known under the name of **SINNINGIA**, as most of the forms in cultivation have been evolved by plant-breeders from *Sinningia speciosa*. This species was introduced from Brazil in 1815, Waterloo year, and to show what changes have taken place since, these garden forms may be compared with the following description of *S. speciosa*:—Plant short-stemmed, more or less hairy, with blunt or slightly pointed oblong leaves, more or less convex, usually narrowed towards the base, crenulate on the margins, velvety in texture, and sparsely clothed with hairs. Flowers with ovate lance-shaped, velvety, calyx segments; corolla tubular, bell-shaped, irregular, drooping, five-lobed, and usually violet in colour.

It would be difficult to recognise in this plant the parent of the garden Gloxinia of the present day, with its innumerable shades and spottings of colour, and its large and more or less erect and regular blossoms so distinct from the drooping, irregular, violet ones of the wild type. In the modern florists' Gloxinia all shades of colour exist except yellow and true blue, shades that may never appear. The colours now range from the purest white to the deepest crimson and the brightest of fiery reds, passing through purple, pale and

deep violet, rose, pink in numerous shades. In addition to "self" or uniformly coloured varieties there are many exquisite forms beautifully speckled with colours quite distinct from the groundwork; and the fact that by raising seedlings, still more charming combinations of colour are possible, makes Gloxinia-growing at the present day one of the most

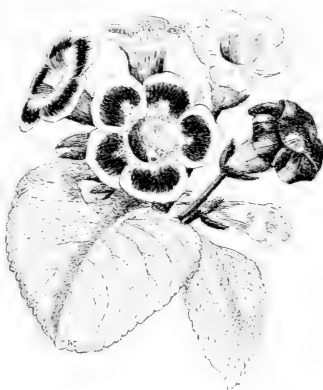


FIG. 175.—Gloxinia, various. (G.)

interesting of cultural operations. Although chiefly grown for decorative effect as pot plants, the flowers of Gloxinias are useful in a cut state, and will last several days in water. Indeed I have used the blossoms from plants grown in a cold house without any heat, for such mourning emblems as wreaths, crosses, anchors, etc., and was astonished to find that they last several days longer in the open air than the flowers of much hardier plants.

CULTURE.—The Gloxinia having a tuberous root-stock like the tuberous Begonia, may be grown in much the same way and under almost identical

conditions. The tubers vary in size according to age, and therefore require to be grown in pots of different size. Broadly speaking, the pots should be about twice the diameter of the tubers. Each one should be well-drained with a stopper and crocks, with a thin layer of moss or fibre on top. The compost most generally suitable to Gloxinias is one-half fibrous loam with a little peat, leaf-mould, and silver sand, making up the other half in equal proportions. To secure a succession of flowers during the summer months, the first batch of tubers should be potted in February, and another batch in March. The tops of the tubers should be about level with the surface of the soil, and to secure rapid growth the pots should be plunged in a bed of coco-nut fibre or leaf-mould, with a temperature of about 80° F. It is probably better, however, to have a lower temperature, say 60° to 65° F. by night, and about five to ten degrees warmer by day for the first batch of plants. The soil should be kept moist by gentle overhead sprinklings, and a humid atmosphere is always advisable during the early growing period. Once growth has fairly started the plants should be placed on a shelf near the glass, and the average temperature should be about 70° F. At the end of seven or eight weeks from the time growth has commenced, the plants may be moved to larger pots if necessary, using the same compost as recommended above, with the addition of a little old cow-manure and a sprinkling of bone-meal or basic slag. After repotting, the plants should be kept close, moist, and shaded from strong sunshine for a few days, afterwards giving as much diffused light and air as possible in a fairly humid atmosphere. A little weak liquid

manure two or three times a week will be beneficial, but its application is best discontinued once the blossoms appear. Then a somewhat cooler part of the greenhouse should be selected, and no watering or syringing overhead should be given, as it would tarnish the blooms.

In autumn the flowers wither and the fleshy leaves begin to turn yellow, shrivel, and decay. These conditions mean less and less water to the tubers, and more air and light if possible to ripen the plants off gradually for their winter sleep. Once the leaves have dropped, the tubers may be stored away in the pots on a dry airy shelf; or they may be placed in coco-nut fibre and dry leaf-mould until the following spring, in a temperature about 50° F.

PROPAGATION.—Gloxinias are easily raised from seeds, cuttings of the leaves, or by division of the old tubers. The latter are best divided between the young growths in spring, each portion being potted separately, and treated as above advised for established plants.

By means of seed it is now possible to raise large numbers of Gloxinias annually. It must, however, be remembered that any special variety can only be kept pure by raising from cuttings, or division of the tubers, as there is no guarantee whatever that seedlings will produce blossoms similar to those of the plant that bore them. And herein lies the charm of raising new varieties each year; one never knows what may turn up; some may be far superior to their progenitors, others and perhaps the majority at least as good, while a few may be inferior. The best results are likely to be obtained when careful selection and hybridisation have been practised on scientific or Mendelian lines.

To secure a succession, Gloxinia

seeds may be sown in January, February, and March, and again in June and July if necessary. Clean, well-drained pots or pans may be used. They should be filled to within half an inch of the rim with a compost of fibrous loam, with a little leaf-mould, peat, and silver sand well mixed together, and made fairly firm. The surface must be made quite fine, and may be either flat or slightly arched or raised in the centre. Water with a fine-rosed can, and afterwards carefully and thinly sow the brownish dust-like seeds over the moistened surface. The faintest sprinkling of sifted compost may be strewn over the seeds, and the pots or pans may then be placed in a temperature of about 65° to 70° in a moist position, where they can be easily shaded from the sun. Daily sprinklings will be necessary to keep the soil properly moist. When the seedlings appear more light may be given, but not strong sunshine, to make them sturdy. When the young leaves are about half an inch or so long, the little plants should be carefully lifted with a pointed stick and transferred either singly to 3-in. pots, or several in a large pot or pan in which the surface of the soil has been made convex. In due course the young plants will become large enough by May, June, or July, according to the period of sowing, for moving into 4-in. or 5-in. pots according to size. The compost and general treatment onward is then the same as described above for old-established plants. One point to observe when potting on is to keep the leaves on the surface of the soil, taking care at the same time not to cover up the crowns of the plants.

Gloxinias from leaf-cuttings are easily secured. Any leaves taken off during the summer may have the stalk inserted up to the base of the

blade in a gritty compost of loam and leaf-soil, and covered with half an inch of silver sand. If placed in bottom heat about 70° to 75° F., roots soon develop from the base of the leaf-stalk and fairly large tubers will form by the autumn.

Leaves may also be placed flat on the surface of the soil or in a bed of coco-nut fibre or leaf-mould, and if the midrib is cut through in several places underneath, roots and tubers will form in due course. It is necessary, however, to keep the leaf-blade in close contact with the soil, and this may be done by placing a pebble or piece of broken pot over the midrib at the cut places.

INSECT PESTS.—Greenfly (aphides) and thrips are sometimes troublesome, the latter chiefly if the air is too dry. Both pests are kept in check by vaporising or fumigating, and by syringing or washing the leaves with nicotine and soft-soap washes.

Amongst Gloxinias proper, mention may be made of the following:—

G. glabra (*G. fimbriata*).—A species about 9 ins. high, having white flowers with a yellow throat spotted with purple (*Bot. Mag.* t. 4430).

G. maculata.—About 1 ft. high, with purple-blue downy blossoms (*Bot. Mag.* t. 1191).

G. pallidiflora.—Flowers pale blue (*Bot. Mag.* t. 4213).

GLYPHOSPERMA (*glyphe*, carving; *sperma*, a seed; in allusion to the markings on the seeds). Nat. Ord. Liliaceae.—The only species known is **G. Palmeri**, a remarkable hardy plant, closely related to the Anthericum. It is a native of N. Mexico, and has clusters of fleshy and fibrous roots, and slender soft, bright green grass-like leaves channelled on the upper surface, and from 12 to 18 ins. long. The white starry flowers, each about

1 in. across, are borne in paniced racemes (*Bot. Mag.* t. 6717).

This plant flourishes in a well-drained sandy soil in sheltered sunny spots. During the winter months the root-stocks should be protected from excessive rains and severe frosts by a heap of litter or ashes.

GONIOSCYPHA (*gonioia*, an angle; *scyphos*, a cup; referring to the bracts at the apex of the inflorescence). Nat. Ord. Liliacæ.—The only species known is—

G. eucomoides, a native of the Bhotan Himalayas, with broad oval-oblong pointed leaves distinctly veined. The pale or dull green bell-shaped flowers with a cylindrical tube are borne in dense terminal spikes, the six lobes being roundish, blunt, and crenulate (*Gard. Chron.* 1886, xxvi. 744). This species, which is only of botanical interest, should be grown in a warm greenhouse in sandy soil.

GRIFFINIA (after W. Griffin, a patron of botany). Nat. Ord. Amaryllideæ.—This genus contains seven or eight species of ornamental bulbous plants, all natives of Brazil. They are recognised by having broad and usually stalked leaves distinctly veined and traversed obliquely by other veins. The flowers are funnel-shaped, bent or horizontal, with a very short tube, and are borne in umbels on top of a stout scape. Perianth segments six, acute, the three lower narrower than the three upper.

Being natives chiefly of Central and Southern Brazil, the Griffinions require to be grown in a warm greenhouse in winter, and almost without artificial heat in the height of summer. The winter temperature should not drop below 55° F. at night,

while in summer a night temperature of 60° to 65° F. will be sufficient.

When large specimens of Griffinions are obtained, they form handsome and unusual objects of decoration for the greenhouse and conservatory. They flourish in a compost of rich yellow loam to which a little leaf-mould and silver sand may be added. The pots should be well drained, and in no case should they be too large for the bulbs—about twice the diameter being sufficient. The plants are somewhat slow-growing, and consequently require more regular attention in regard to watering than other bulbous plants that grow quickly and soon finish their growth. When growth is active, usually after flowering is over, a little more heat and moisture are necessary. It is generally a good plan to repot after flowering, using pots a little larger than before, until large specimens are developed. Annual potting is then unnecessary, but it is well to give a top-dressing of some special fertiliser or weak liquid manure during active growth.

Griffinions are propagated by offsets detached and grown on; and by means of seeds. These should be thoroughly ripened, and when sown should not be covered with soil beyond a mere sprinkling of sand or gritty mould. The best temperature for raising plants from seed is about 60° to 65° F. The seedlings are best left in the seed-pots for a whole season before disturbing them, and then placed singly in well-drained pots of a rich loamy soil with a little sand and leaf-mould. The after-treatment is as described above. If thrips, aphides, scale, or mealy bug appear, they may be checked by syringing and sponging the leaves with solutions of nicotine and soft soap; and the houses should be fumigated or vaporised occasionally.

The following species are known :—

G. Blumenavia.—This species has ovoid bulbs about 2 ins. through, oblong-acute leaves 4 to 5 ins. long and over 2 ins. broad, and six to eight pale lilac-flowers on a slender stalk about 9 ins. high, from February to April (*Bot. Mag.* t. 5666).

G. dryades (*Amaryllis dryades*).—This has bulbs as large as a cricket ball, and bright green leaves over a foot long and 5 to 6 ins. broad. The pale lilac-blue flowers appear in August and September, ten to twelve on top of a stout stalk $1\frac{1}{2}$ to 2 ft. high. (*Bot. Mag.* t. 5786.)

G. hyacinthina (*Amaryllis hyacinthina*).—Bulbs short-necked, 2 to 3

G. intermedia.—Bulb ovoid, longer than in *G. hyacinthina*. Leaves oblong-acute, narrowed into a long stalk. Flowers pale lilac, on slender stalks about 1 ft. high, in April. (*Bot. Reg.* t. 990.)

G. Liboniana.—This has bulbs only about 1 in. through, and stalkless oblong-acute leaves 3 to 4 ins. long. About six to eight pale lilac flowers are borne in March or April on a two-edged stalk a foot long, and are noticeable for having the upper stamen suppressed. (*Lem. Jard. Fleur.* t. 290.)

G. ornata.—Bulbs 3 to 4 ins. through, with deep green oblong leaves over a foot long, 4 to 5 ins.



FIG. 176.—*Griffinia hyacinthina*. (3.)



FIG. 177.—*Griffinia ornata*. (3.)

ins. through. Leaves oblong-acute, 6 to 9 ins. long, 2 to 3 ins. broad, developed after the flowers, and rounded at the base into a channelled stalk about as long as the blade. About a dozen large bright lilac flowers are borne in the autumn or winter months on a stalk 1 to 2 ft. high. (*Bot. Reg.* t. 163.)

broad, narrowed to a short channelled stalk with a broad clasping base. About January and February nearly a dozen pale lilac flowers are borne on a thick stem a foot high. (*Bot. Mag.* t. 6367; *Gard. Chron.* 1876, i. 266, figs. 47, 48.)

G. parviflora.—Bulbs ovoid, 2 to 3 ins. through, with oblong-acute

leaves about 6 ins. long and about 3 ins. broad, narrowed into a stalk about 6 ins. long. Over a dozen pale lilac flowers appear in February or March on slender stems about a foot high. (*Bot. Reg.* t. 511.)

GYPSOPHILA (*gypsos*, chalk; *phileo*, to love; in reference to their natural love of a chalky soil). Nat. Ord. Caryophyllææ.—This genus contains about fifty species of annual and perennial herbaceous plants having swollen joints, opposite leaves, and large panicles of small tubular or bell-shaped flowers, having five narrow-clawed petals, ten stamens, and two (or rarely three) styles. The tuberous-rooted species worthy of note are:—

G. Mangini.—A Siberian species with thick fleshy roots, blue-green leaves, and small panicles of rather light rose-coloured flowers.

G. paniculata.—A light and graceful S. European perennial, with thick parsnip-like roots. It forms a dense compact bush 2 to 3 ft. high. Stems much branched, knotty, smooth and glistening, very slender and fragile. Leaves linear, lance-shaped, opposite, without stalks. Flowers during the summer, small, white, very numerous, borne on stiffish thread-like stalks.

This species may be increased by dividing the thickish roots in spring, or seeds may be sown thinly out of doors in April and May in a warm and not too sunny border with finely prepared soil. As soon as the seedlings are large enough to handle easily they may be pricked out into another bed, afterwards keeping them well watered and shaded until established. By the end of September, or in mild weather in spring, the young plants may be moved to their flowering positions in the flower-border. Once established they

produce immense clouds of blossom annually, and are valuable for cutting



FIG. 178.—*Gypsophila paniculata*, root-stock. ($\frac{1}{3}$.)

for bouquets, room decoration, etc., either in masses by themselves or mixed with other flowers.

HABILITZIA (after *C. von Hablitz*, a distinguished Prussian author and traveller). Nat. Ord. Chenopodiaceæ.

—This genus contains but one species—**H. tamnoides**. A Caucasian plant with tuberous, turnip-shaped roots, climbing, ribbed deciduous stems several feet long, and broad, entire, triangular heart-shaped, membranous, pointed leaves on long stalks. The small greenish-yellow flowers appear from July to October in drooping trusses.

This plant flourishes in ordinary garden soil, and may be used in the same way as the Hop, etc., for covering arches, trellises, etc. It is

easily increased by seeds or division of the tuberous root-stocks.

HÆMANTHUS (*haima*, blood; *anthos*, a flower; referring to the colour of the spathe and stamen filaments of some species), BLOOD FLOWER. Nat. Ord. Amaryllidæ.—This genus contains about forty species of remarkable bulbous plants having broad, blunt, more or less fleshy leaves, stout and often speckled peduncles, on top of which are borne numerous red or white flowers in dense umbels or heads surrounded by several erect or spreading membranous bracts or spathe-valves. Perianth erect, with a sub-cylindrical tube; segments equal, linear, or lance-shaped. Stamen filaments often longer than the perianth segments.

The "Blood Flowers"—as these plants are often called—are easily cultivated in the greenhouse, or even in the open air during the summer months in some cases. They flourish in a compost of sandy loam to which a little fibrous peat, leaf-mould, or old cow-manure may be added. The pots should be well drained and not too large for the bulbs—although several of the latter may be placed in a large pot or pan when particularly gorgeous effects are desired. During active growth, which is best secured in a temperature of about 60° F., the plants require fair supplies of water, and a little weak liquid manure occasionally will tend to greater vigour and freedom of flowering. When in bloom the plants should be moved to cooler and less humid parts of the greenhouse, as the flowers thus last longer. When the plants are neither in leaf or flower, very little water is necessary, and the bulbs are benefited by a period of rest and dryness. The

stock may be increased by offsets that may be taken off when repotting just as growth is commencing, each offset being placed in a pot by itself in the compost mentioned above. Some of the more showy species, such as *Katherineæ*, *Lindenii*, *mirabilis*, *multiflorus*, *magnificus*, *natalensis*, etc., are worthy of more general cultivation, although some are more of botanical than horticultural interest.

All the species mentioned below are natives of Cape Colony, except where otherwise noted.

H. albiflos (*H. intermedius*; *Diaclis ciliaris*).—Bulbs compressed, 2 to 3 ins. thick. Leaves tongue-shaped, 6 to 8 ins. long, about 3 ins. broad, and fringed with hairs; contemporary with the flowers. These are pure white, and borne in June in dense roundish heads about 2 ins. across, on peduncles 6 to 9 ins. high. (*Red. Lil.* t. 398; *Bot. Mag.* t. 1239; *Lodd. Bot. Cat.* t. 602.)

This species has several varieties such as *brachyphyllus*, in which the leaves and flower-stalks are shorter and narrower than in the type. *Burchelli*, the leaves of which are hairy on the surface as well as densely fringed with hairs; the peduncle also is hairy instead of glabrous; *pubescens* (*Bot. Reg.* t. 382; *Lodd. Bot. Cat.* t. 702) has the leaves covered with soft downy hairs.

H. albo-maculatus.—A native of Natal, with bulbs about 2 ins. thick, bearing two strap-shaped leaves, contemporary with the flowers, about a foot long, 2 to 3 ins. broad, spotted with white on the smooth surface, but obscurely fringed with hairs when young. Flowers all white, appearing in November in dense roundish umbels about 2 ins. across, on smooth, stout, green scapes about 6 ins. high. (*Gard. Chron.* 1878, i. 202.)

H. amarylloides.—Bulbs ovoid,

about 2 ins. thick, bearing two tongue-shaped, bright green, fleshy, smooth leaves after the flowers have withered. Flowers pinkish or white, borne in dense round umbels 2 to 3 ins. across, on slender stems 6 to 12 ins. high in summer. (*Jacq. Hort. Schoen.* iv. t. 408.)

H. angolensis.—A native of Angola, with elongated bulbs having three to four oblong leaves 6 to 12 ins. long, rounded at the base to a channelled stalk 6 to 9 ins. long. Flowers bright crimson, in dense umbels 4 to 5 ins. across, on stout scapes a foot high in February.

H. Arnotti.—Bulbs roundish, 3 ins. thick. Leaves two, roundish oblong, 4 to 5 ins. long, 3 to 4 ins. broad, hairy towards margin, which is fringed with long soft whitish hairs. Flowers white, in dense umbels about 2 ins. across, borne on purple-red scapes 4 to 5 ins. high in summer or autumn.

H. Bauri.—Native of Kaffraria. Bulbs oblong, compressed, 3 to 4 ins. thick. Leaves two, roundish, thick, green, fleshy, 6 ins. long and 7 to 8 ins. broad, with a truncate apex, smooth on surface, but heavily fringed with hairs. Flowers pure white, in dense umbels 2 ins. across, on stout, green, smooth scapes under 2 ins. high in November. (*Bot. Mag.* t. 6875.)

H. callosus.—Bulbs compressed, 3 to 4 ins. thick. Leaves two, roundish, oblong, smooth, 9 to 10 ins. long, 6 to 7 ins. broad, not fringed with hairs. Flowers pink, borne in dense umbels about 2 ins. across, with bright red bracts on a stout scape about 3 ins. high.

H. candidus.—This species resembles *H. coccineus* in appearance, but has large heads of pure white flowers on scapes 9 ins. high.

H. carneus (*H. brevifolius*).—A native of the mountains of Kaffraria.

Bulbs compressed, 2 to 3 ins. thick. Leaves two, developed after flowers fade, oblong or obovate, 4 to 6 ins. long, 2 to 5 ins. broad, softly hairy, especially on margins. Flowers pink, rarely white, in dense round umbels 2 to 3 ins. across, on slender scapes 6 to 12 ins. high. The variety *strigosus* has leaves quite hairless when mature. (*Bot. Reg.* t. 509; *Bot. Mag.* t. 3373.)

H. cinnabarinus.—This species is found wild from the Gold Coast to the Cameroon Mountains. It has roundish bulbs about 1 in. thick, bearing copious, fleshy, cylindrical root fibres. Leaves direct from root-stock, contemporary with flowers, with an oblong acute, membranous blade 6 to 9 ins. long, gradually narrowed into a channelled stalk about the same length. Flowers bright crimson, in umbels 3 to 4 ins. across, on a slender scape about 1 ft. high, springing from the centre of the leaves. (*Fl. d. Serr.* t. 1195; *Bot. Mag.* t. 5314.)

H. Clarkei.—This is a hybrid between *H. albijlos* and *H. coccineus*.

H. coccineus.—Bulb 3 to 4 ins. thick, compressed. Leaves two, green, unspotted, smooth, tongue-shaped, developed in winter, 1½ to 2 ft. long, 6 to 8 ins. broad, narrowed towards the base. Flowers bright red with linear segments, in umbels 2 to 3 ins. across, with bright red oblong imbricating spathes or bracts, on peduncles 6 to 9 ins. high, minutely speckled with reddish-brown. (*Bot. Mag.* t. 1075; *Red. Lil.* t. 139; *Lodd. Bot. Cat.* t. 240.)

The variety *coarctatus* has shorter spathe-valves, and leaves about 1 ft. long and 3 to 4 ins. broad (*Jacq. Hort. Schoen.* i. 30, t. 57; *Bot. Reg.* t. 181).

The variety *carinatus* has leaves about 1 ft. long, much narrower and

more channelled down the face than in the type.

H. concolor.—Bulbs oblong, compressed, with two strap-shaped leaves about 1 ft. long and $1\frac{1}{2}$ to 2 ins. broad, smooth, and not fringed with hairs. Flower-stalk about 1 ft. high, slender, bearing round umbels of bright red flowers and bright red bracts. (*Herb. Amaryll.* t. 31, fig. 2.)

H. Cooperi.—Bulbs compressed, about 4 ins. thick, having two roundish leaves 4 to 5 ins. long, produced in October, with short hairs on the margin. Peduncle much compressed, smooth, bright red, about 6 ins. high, bearing dense round umbels of blood-red flowers and bracts in July.

H. crassipes.—Bulbs ovoid, $1\frac{1}{2}$ ins. thick, with two strap-shaped leaves about 6 ins. long, $1\frac{1}{2}$ to 2 ins. broad, smooth above, fringed with soft hairs, mottled with red on the back towards the base, and produced after the pale red flowers. These are borne on red mottled stalks about 3 ins. high. (*Jacq. Hort. Schoen.* iv. 7, t. 412.)

H. deformis.—Native of Natal. Bulb 3 to 4 ins. thick, with spreading roundish leaves, 3 to 4 ins. broad, contemporary with the flowers, hairy on the surface. Peduncle very short, with umbels of white flowers in March. (*Bot. Mag.* t. 5903.)

H. hirsutus.—Native of Natal and the Transvaal. Bulbs 3 ins. thick, having two roundish, oblong, deep green leaves 5 to 6 ins. long, 3 to 4 ins. broad, contemporary with the flowers, hairy all over especially at the edges. Peduncle 5 to 6 ins. high, densely hairy, with round dense umbels, 3 to 4 ins. across, of white or pinkish flowers surrounded by bright red bracts in April.

H. imperialis.—A native of the Congo, having large roundish umbels

of orange- and salmon-coloured flowers in which the segments are unusually broad (*Gard. Chron.* 1902, xxxi. 85, 98, f. 33).

H. incarnatus.—Bulbs 2 to 3 ins. thick, with two smooth oblong leaves 6 to 8 ins. long, roughish on the margins. Peduncle reddish, smooth, 3 to 4 ins. high, bearing umbels of pale red flowers and bracts. (*Herb. Amaryll.* 237, t. 31, f. 1.)

H. Katherinæ.—A fine species from Natal. Bulbs round, 2 to 3 ins. thick, with a leafy stem about 6 ins. high. Leaves four to five, oblong, membranous, 9 to 12 ins. long, narrowed into a short spotted sheathing stalk, and with eight to ten veins on each side of the distinct midrib. Peduncle about 1 ft. high, spotted at the base, bearing an umbel 6 to 9 ins. across of bright red flowers, each with a stalk 1 to 2 ins. long. (*Bot. Mag.* t. 6778.)

H. Laurenti.—This species from the Congo has rather dense umbels about 7 ins. across of salmon-coloured flowers, each with a perianth-tube about 5 ins. long.

H. Lescauwaeti.—This species from the Congo Free State is remarkable for having a creeping root-stock instead of a bulb. The leaves are from 6 to 7 ins. long and about 2 ins. broad, with a stalk about 2 ins. long. The scape is 6 to 10 ins. high, bearing a dense umbel of rosy flowers with linear segments. (*Gard. Chron.* 1904, xxxv. 274; *Rev. Hort.* 1904, 198.)

H. Lindeni.—A fine species from the Congo, having stalked oblong leaves, and large globular heads of rosy-salmon flowers tinted with scarlet. Each blossom is nearly 2 ins. across, having narrow pointed segments and stamens conspicuously protruding. (*Ill. Hort.* xxxvii. t. 112; *Gard. Chron.* April 1893, 474, f. 73.)

H. Mackenl.—Native of Natal. Bulbs compressed, 3 to 4 ins. thick. Leaves two, contemporary with flowers in November, roundish oblong, 6 to 8 ins. long, 4 to 5 ins. broad, smooth above, but covered with soft whitish hairs on the edges and under-surface. Peduncle very short, with a few-flowered umbel of white flowers.

H. magnificus (*H. Rouperi*).—Native of Natal and Delagoa Bay. Bulbs round, 3 to 4 ins. thick, with a leafy stem 1 to 2 ft. high, not developed till after the flower-stem, and spotted with red-brown. Leaves six to eight, oblong, membranous, bright green, wavy, a foot or more long, narrowed to a short sheathing stalk, and having eight to ten main veins on each side of a distinct midrib. The very stout peduncle about a foot high springs from the side of the bulb, and bears large umbels of bright red or pale scarlet flowers with bright-green imbricating bracts. (*Floral Mag.* 1875, t. 148.)

The variety *insignis* has bracts 5 to 6 ins. long, overtopping the flowers (*Bot. Mag.* t. 4745); the variety *Gumbletoni* has roundish leaves 5 to 6 ins. long and broad, with twelve to fifteen main veins on each side of midrib, very stout peduncles 6 to 8 ins. high, very dense umbels, and red-brown bracts; the variety *superbus* has no leafy stem, and the leaves are narrower than in the type and produced directly from the bulb at the same time as the flowers in spring.

H. Mannl.—Native of W. Tropical Africa. Bulbs small, round, with five to six oblong, acute, membranous leaves about 6 ins. long, at the top of a short special stem narrowed to a short channelled stalk, and having about ten main veins on each side of the midrib. Peduncle 8 to 12 ins.

high, bearing umbels 3 to 4 ins. across of bright red flowers having lance-shaped segments. (*Bot. Mag.* t. 6364.)

H. mirabilis.—A fine species from the Belgian Congo, where it grows in the constant shade of the equatorial forest in a soil composed of sand and vegetable debris, and in a temperature ranging from 60° to 70° F. The leaves are large and strap-shaped, and the salmon-coloured flowers are borne in dense globular trusses 6 to 8 ins. through. The six obovate petals spreading, and the stamens being conspicuously exerted. (*Gard. Chron.* 25th May 1901, fig)

H. multiflorus (*H. abyssinicus*; *H. arabicus*; *H. delagoënsis*; *H. tenuiflorus*; *H. Kallweyeri*).—A very variable species found growing throughout Tropical Africa, from Sierra Leone to Kordofan, Abyssinia, and Delagoa Bay. This accounts for the numerous synonyms. Bulb 1½ to 3 ins. thick. Leaves three to four, on a short special stem, with an oblong blade 6 to 12 ins. long, narrowed into short sheathing stalks. Peduncle distinct from leafy stem, green or spotted with red, and bearing dense umbels 3 to 6 ins. across of blood-red flowers with linear segments and green reflexed bracts. (*Bot. Mag.* tt. 961, 1995, 3870; *Andr. Bot. Rep.* t. 318; *Red. Lil.* t. 204; *Lodd. Bot. Cab.* tt. 912, 1948; *Fl. d. Serr.* tt. 52, 2277; *Ill. Hort.* n.s. t. 354.)

H. natalensis.—A native of Natal, with round oblique bulbs 2 to 3 ins. thick, and having a leafy stem 1 ft. high, bearing eight to nine bright green, membranous, oblong leaves over 1 ft. long, narrowed to a short sheathing stalk, the lower tipped and spotted on the back with red-brown. The compressed furrowed peduncle arises from the axis of one of the scale-leaves, and is about 1 ft. high,

bearing a very dense round umbel, 3 to 4 ins. across, of greenish flowers with red-brown bracts and orange-coloured stamens. (*Bot. Mag. t. 5378.*)

H. Nelsoni.—A native of the Transvaal, with oblong, compressed, reddish bulbs 2 ins. through, and stalkless oblong leaves about 1 ft. long and 4 in. broad, downy above, smooth beneath. Flowers red, borne in heads about 3 ins. across, and borne on hairy scapes about 1 ft. high.

H. pubescens (*H. quadrivalvis*).—Bulbs 2 ins. thick, with two strap-shaped leaves, 6 to 9 ins. long, $1\frac{1}{2}$ to 2 ins. broad, produced after the flowers, fringed with fine hairs, smooth or hairy on both surfaces, and blotched with red on the back near the base. Peduncle dark red, 3 to 4 ins. high, with dense umbels, 1 to $1\frac{1}{2}$ ins. across, of bright red flowers having linear segments. (*Jacq. Hort. Schoen. i. 30, t. 58; Bot. Mag. t. 1523.*)

H. puniceus (*H. Redouteanus*).—This species was introduced from Cape Colony about the end of the seventeenth century. It has roundish bulbs, 2 to 3 ins. thick, with a short leafy stem, and two to four bright green, oblong, membranous leaves, 6 to 9 ins. long, with about six veins on each side of the distinct midrib. The peduncle, a foot or more long, springs from the side of the bulb, and bears a dense umbel, 3 to 4 ins. across, of pale scarlet or rarely white flowers. (*Red. Lil. t. 320; Bot. Mag. t. 1315.*)

H. rotundifolius (*H. orbicularis*).—Bulbs 3 to 4 ins. thick, with two smooth roundish leaves, 5 to 6 ins. long and broad, roughish on the margin. Peduncle bright red, about 6 ins. high, bearing in May a dense compressed umbel, $1\frac{1}{2}$ to 2 ins. across, of pale red flowers with bright red ovate bracts. (*Bot. Mag. t. 1618.*)

H. tigrinus.—Bulbs roundish compressed, 3 to 4 ins. thick. Leaves two, tongue-shaped, curved, produced after the flowers, 9 to 12 ins. long, 3 to 4 ins. broad, smooth on both surfaces but slightly fringed with hairs on the margins, and much spotted with reddish-brown towards the base on the under-surface. Peduncle, 2 to 4 ft. high, green spotted with reddish-brown, bearing pale red flowers in dense round umbels, $1\frac{1}{2}$ to 2 ins. across, and having very bright red spathe-valves. (*Jacq. Hort. Schoen. i. 29, t. 56; Bot. Mag. t. 1705.*)

HÆMODORUM (*haima*, blood; *doron*, a gift; probably in reference to the roots serving as food for the Australian natives), BLOOD ROOT. Nat. Ord. Hæmodoracæ.—A little-known genus, closely related to WACHENDORFIA, containing about twenty species of smooth erect herbs, having masses of thick fleshy roots, sheathing equitant, flat, or roundish leaves. Flowers usually small, in clustered heads or cymes, or interrupted spikes at the ends of the shoots. Perianth-tube none. Stamens three, attached to the base of the inner segments of the perianth.

The species here mentioned grow well in a mixture of peat and loam in a greenhouse, and may be increased by dividing the roots in spring.

H. planifolium.—This grows 2 to 3 ft. high, and has flattish grass-like leaves at the base. The dull purple or greenish flowers appear about August, and are borne in short, forked racemes collected in a compact panicle. (*Bot. Mag. t. 1610.*)

H. teretifolium is somewhat similar, but may be distinguished by the very long, slender, and roundish leaves.

HAYLOCKIA (after *Mr Haylock*, gardener to Dr Herbert). Nat. Ord.

Amaryllideæ.—This genus contains only one species, viz.—

H. pusilla (*Sternbergia americana*; *Zephyranthes pusilla*).—A rare little plant from Buenos Ayres and Monte Video, having roundish long-necked bulbs about 1 in. thick, and narrow linear leaves developed in winter. The short hypogæous peduncle appears about March, bearing a solitary, erect, whitish flower having a very slender perianth-tube, 1 to 2 ins. long, tinged with green. (*Gard. Chron.* 1899, xxvi, 112.)

Sandy loam, with a little peat and leaf-mould, seems to be the best compost for this plant, which should be grown either in a cold frame or planted 3 to 4 ins. deep in a sheltered border. Increased by offsets.

HEDYCHIMUM (*hedys*, sweet; *chion*, snow; in allusion to the snow-white sweet-scented flowers of some species). Nat. Ord. Scitamineæ.—A genus, closely related to *KEMPFERIA* and *CURCUMA*, having horizontal tuberous root-stocks from which arise tall stems furnished with large *Canna*-like leaves, and bearing terminal spikes of white, scarlet, or yellow flowers. Calyx-tube three-toothed; corolla-tube elongated with narrow, equal, spreading lobes. The staminodes resemble petals, being oboval-oblong, spoon-shaped, or broadly ovate; the lip is also petaloid, large, notched, or deeply cleft. Stamen one, with a very long filament.

With the exception of *H. peregrinum*, from Madagascar, the *Hedychiums*, or "Garland Flowers" as they are called, are all natives of Tropical Asia, the species in cultivation coming chiefly from India, the Himalayas, Silhet, Khasia, Java, Malaya, etc. They are ornamental in foliage and blossom, and may be grown easily in a warm greenhouse or

stove either in pots or tubs, or planted in borders in a compost of rich loam with some old cow-manure and sharp sand added. They like plenty of water at the root when growing, and also a humid atmosphere. This is secured by frequent syringings, and by damping down the floors or stages. Indeed, the plants may be grown in marshy beds or borders wherever tender aquatics are grown, or the pots or tubs may be stood 2 or 3 ins. deep in the water.

During the summer months such species as *H. coronarium*, *H. flavum*, and *H. Gardnerianum* may be utilised for giving subtropical effects in the open air if treated in the same way as advised for *Cannas* (see p. 134). In the autumn the plants should be taken up, and the roots stored away in cool dry places. When the flowers have withered the stems should be cut down, allowing the foliage to wither gradually. During the winter period of rest little or no water need be given, and the plants require no further attention until spring arrives. They should then be repotted, and if necessary the stock may be increased by dividing the crowns just before the young buds begin to sprout. A night temperature of 60° F. will induce good growth, and with attention watering and syringing very little danger need be apprehended from attacks of red spider or scale. Some species bear seeds freely, and plants can be raised by sowing in sandy loam and peat in spring, in a temperature of 70° F. The seedlings when large enough to handle should be transferred singly to small pots, and grown on as advised for the older plants.

H. acuminatum.—This grows 3 to 5 ft. high, and has broadly lance-shaped leaves ending in a thread-like point, the upper surface being smooth,

the under slightly silky. The handsome sweet-scented flowers appear in autumn, being pale yellow and pure white with red filaments. (*Bot. Mag.* t. 2969.)

H. angustifolium.—This is now considered to be a variety of *H. coccineum*. It grows 3 to 6 ft. high, and has smooth, narrow, lance-shaped leaves, a foot or more long and 1 to 2 ins. broad. The small red or scarlet flowers appear from about June to August (*Bot. Mag.* t. 2078). This species has been crossed with *H. Gardnerianum*, and has produced a good garden hybrid.

H. carneum.—A plant 3 to 4 ft. high, with slender pointed leaves over 1 ft. long, and flesh-coloured scentless flowers about July and August (*Bot. Mag.* t. 2637).

H. chrysoleucum.—A pretty species about 5 ft. high, having sweet-scented pure white flowers blotched with orange on the lip and having deep orange filaments (*Bot. Mag.* t. 4516).

H. coronarium.—This was the first species of the genus introduced from the East Indies in 1791. It grows about 5 ft. high, and has lance-shaped sheathing leaves, smooth above, downy beneath. The large pure white sweet-scented flowers appear from May to August, and are remarkable for the great size of the lip. (*Bot. Mag.* t. 708; *Lodd. Bot. Cab.* t. 507; *Red. Lil.* viii. t. 436.)

The variety *flavum* is a dwarfier plant with bright orange flowers (*Bot. Mag.* t. 2039).

H. ellipticum.—A Nepalese species, 3 to 5 ft. high, having broadly lance-shaped almost elliptic leaves. The flowers appear about August and September, the outer segments being yellow, the inner ones pure white with a deeply cleft lip. (*Lodd. Bot. Cab.* t. 1881; *Gartenjl.* t. 1201; *Roscoe, Scit.* t. 55.)

H. Elwesi.—A Himalayan species closely related to *H. coronarium*, but distinguished from that species by having larger bracts and rich golden-yellow flowers (*Gard. Chron.* 1894, xvi. 152).

H. Gardnerianum.—This magnificent species has been in cultivation since 1819. It grows 3 to 6 ft. high, and has smooth, broadly lance-shaped, stem-clasping leaves in two rows. The large sweet-scented lemon-yellow flowers appear during the summer months in erect cylindrical spikes, 12 to 18 ins. long (*Bot. Reg.* t. 774; *Bot. Mag.* t. 6913). Garden hybrids have been obtained by crossing *H. Gardnerianum* with *H. coronarium*, one called *H. Wilkeanum* being described in the *Gard. Chron.* 1894, xvi. 276. Another called *Moorei* is described in 1900, xxviii. 142.

H. gracile.—This species comes from the Sikkim Himalayas and Khasia mountains, and grows 2 to 3 ft. high. The sharp-pointed leaves are 6 to 9 ins. long and 2 to 3 ins. broad, narrowed into a stalk at the base, and the white flowers with red filaments appear during the summer and autumn. (*Bot. Mag.* t. 6638.) There is a variety called *glaucum*.

H. peregrinum.—A native of Madagascar, 3 to 5 ft. high, with elliptic-pointed leaves rounded at the base, and clear yellowish-green flowers with a white lip and pale brown bracts.

H. speciosum.—A native of Sylhet, having oblong lance-shaped leaves, and pale sulphur-yellow flowers borne on spikes 6 to 12 ins. long (*Plant. As. Rar.* iii. t. 285).

H. spicatum.—This species grows about 3 ft. high, and has linear lance-shaped leaves, smooth above, downy beneath, and clusters of white sweet-scented flowers washed with rose, the broad lip being deeply cleft (*Bot. Mag.* t. 2300).

HELIANTHUS (*helios*, the sun; *anthos*, flower), SUNFLOWER. Nat. Ord. Compositæ.—Of the fifty species of Sunflower, the Jerusalem Artichoke (*H. tuberosus*) and *H. rigidus* are the best known for their tuberous roots. The tubers of the former are too well known to need any description beyond saying that they are something like elliptic-shaped irregular potatoes with white or purple skins. They are planted largely by some market-gardeners, in rows about 2 ft. apart, in the same way as potatoes, and the thick hollow stems attain a height of 8 to 12 ft., being furnished with large coarse heart-shaped leaves. Although grown as a vegetable the Jerusalem Artichoke is ornamental in appearance, and would be an excellent plant for growing in poor or heavy soil, which becomes enriched by the action and decay of the roots.

H. rigidus (formerly known as *Harpalium*) has long thick roots ending in a slender spindle-shaped

known as *Miss Mellish* is much more vigorous than the type, often attaining a height of 8 or 9 ft., and having flowers 4 to 5 ins. or more across. Both the Jerusalem Artichoke and *H. rigidus* are easily increased by the underground tubers in autumn or spring.

HELONIAS (*helos*, a marsh; referring to natural soil). Nat. Ord. Liliacæ.—The only species is—

H. bullata.—A beautiful North American perennial 1 to 1½ ft. high, with a short tuberous root-stock, and oblong lance-shaped, radical leaves contracted into a short stalk. The small purple-rose flowers with six spreading segments appear from May to July, in dense cylindrical racemes. The variety *latifolia* has leaves broader than in the type. (*Bot. Mag.* t. 747; *Lodd. Bot. Cab.* t. 961; *And. Bot. Rep.* t. 352.)

This plant may be grown in boggy soil or wet ground near ponds or lakes, but will also succeed in sandy loam, peat, and leaf-soil in a moist, shaded part of the garden. It may be increased by seeds, or by carefully dividing the root-stocks. It is safer, however, not to disturb the plants until they have made good strong clumps.

HELONIOPSIS (from *Helonias*, the preceding genus; and *opsis*, like). Nat. Ord. Liliacæ.—There are about four species in this genus, the best known being—

H. japonica (*H. umbellata*).—A curious little Japanese plant with short thickish root-stocks, tufts of lance-shaped, abruptly pointed leaves, and a few deep rosy flowers on a stalk about March and April, having deep blue stamens.

This species very much resembles *Helonias bullata* in appearance, and



FIG. 179.—Rhizome of *Helianthus*, "Miss Mellish." (½)

tuber, from the end of which the new stem arises and attains a height of 3 to 5 ft., and produces bright yellow flowers with a purplish centre, from July to September. The variety

requires the same cultural treatment.

HEMEROCALLIS (*hemero*, a day; *kallos*, beauty; in reference to the flowers being fresh for only a day or so), DAY LILY. Nat. Ord. Liliaceæ.—A genus of ornamental herbaceous plants, having a very short rhizome, with numerous more or less thick and fleshy roots, and tufts of long narrow leaves. Flowers in short irregular panicles or clustered heads. Perianth funnel-shaped, with a cylindrical, short, or longish tube, with six much longer, oblong, spoon-shaped, erect, spreading, many-nerved lobes or segments.

The Day Lilies are easily grown plants, and flourish in any ordinary garden-soil, either in the sun or shade. They are effective when boldly massed either in borders, or on the margins of lakes, streams, etc. They are easily increased by division in the autumn or spring. Besides the kinds mentioned below there are now several garden hybrids in existence, such as—*H. × Baroni*, *H. × elmensis*, *H. × hippastroides*, *H. × Muelleri*, *H. × ochroleuca*, *H. × vomerensis*, etc.

H. aurantiaca.—A fine Japanese plant growing 2 to 3 ft. high, having tufts of deep green sword-shaped leaves and orange-red flowers. The variety *major* is a great improvement on the type, having large apricot-coloured flowers, and longer and broader leaves. Several fine garden forms have been raised by crossing *H. aurantiaca* with *H. flava* and *H. Thunbergi*, the flowers being rich orange.

H. Dumortieri (*H. rutilans*; *H. Sieboldi*).—A fine native of Japan and Eastern Siberia, having long, narrow, tapering leaves and large orange-yellow flowers, tinged with

brown outside, borne in early summer on erect scapes about 2 ft. high. (*Ref. Bot. t. 213*; *Garden*, 1887, t. 589.)

H. flava.—This very old garden plant is widely distributed from Central and S. Europe eastwards to Siberia and Japan. It grows 2 to 3 ft. high, having strong tufts of narrow deep green leaves, keeled behind, and over 2 ft. long. The sweet-scented orange-yellow flowers, with flat veinless segments, are produced in June and July in large clusters, and have a showy and distinct appearance. (*Bot. Mag. t. 19*; *Red. Lil. t. 15*.)

H. fulva.—This species also extends across Europe to Japan, like *H. flava*,



FIG. 180.—*Hemerocallis fulva*.

and grows 2 to 4 ft. high, having large tufts of long, broad, keeled leaves. The large tawny-yellow flowers with bluntish segments, each about 4 ins. across, appear in June

and July in loose clusters. (*Bot. Mag.* t. 64; *Red. Lil.* t. 16.)

There are several forms of this species—*angustifolia* (or *longituba*), with narrow leaves; *crocea*, with yellow flowers; *disticha*, once considered a distinct species, having flower-stems branched near the top, and bearing trusses of yellow flowers suffused with red within (*Bot. Mag.* t. 1433). *Kwanso* is a variety with large, double, bronzy, orange-coloured flowers; there is also a form of it with handsome variegated foliage. The variety *flore pleno* has double orange and crimson flowers. *Cypriani* is a distinct, dwarfer, and more free-flowering form with coppery-red blossoms having a golden centre, and a golden band down the centre of the segments. The variety *huphensis* has very bright coppery-red flowers with a yellow throat, the petals being very reflexed and wavy (*Gard. Chron.* 1906, xl. 159).

H. Middendorfi.—This native of Siberia and Japan resembles *H. Dumortieri*, but has broader leaves and paler golden-yellow funnel-shaped flowers (*Gartenfl.* t. 522).

H. minor (*H. graminea*).—This is a distinct-looking species from Siberia, N. China, and Japan. It grows from 6 to 9 ins. high, and is easily recognised by its very narrow, keeled, and grass-like leaves. The sweet-scented yellow flowers tinged with green appear in June and July, the three inner segments being wavy.

H. Thunbergi.—A pretty Japanese plant about 2 ft. high, with soft yellow or orange flowers in July.

HERBERTIA (after the late *Dean Herbert*, of Manchester, 1778-1847). Nat. Ord. Iridæ.—A small genus of half-hardy plants with small tunicated bulbs, narrow linear leaves, and short-tubed six-parted flowers, borne

on top of a short scape, the three inner segments being short-clawed.

These pretty little plants are not quite hardy, and should be grown either in pots or pans in a cold frame or greenhouse, or in warm borders in the mildest parts of the Kingdom. They like a mixture of sandy loam and peat, and may be increased by seeds and offsets.

H. Amatorum.—A native of Uruguay, with brown-coated corms, lance-shaped, tapering leaves 8 ins. or more long, and violet flowers about 2 ins. across (*Kew Bull.* 1907, 321).

H. Drummondiana (*H. cœrulea*).—Also from Texas, but with broad plaited leaves and violet flowers spotted with white on the claws (*Bot. Mag.* t. 3862, f. 3).

H. pulchella.—This is the best-known species, native of Chili and S. Brazil. It grows about 9 ins. high, and has narrow plaited leaves and blue or purple flowers, the segments of which are bearded at the base. (*Bot. Mag.* t. 3862, figs. 1, 2.)

H. amœna seems to be very closely related.

Other species of *Herbertia* are, **H. brasiliensis**, with blue outer segments, and yellow inner ones spotted with violet; **H. stricta**, violet; **H. unguiculata**, lilac; and **H. Watsoni**, purple.

HERMANNIA (after *Paul Hermann*, a German botanist). Nat. Ord. Sterculiaceæ.—A genus containing about eighty species, herbs or undershrubs, distributed over Mexico or Texas, Tropical Africa and Arabia, but mostly natives of S. Africa. The leaves are toothed or deeply cut, and the stipules often foliaceous. The flowers have the sepals, petals, stamens, and styles in fives, and the sessile or slightly stalked ovary also has five cells.

H. cristata.—A native of the Transvaal, having a short woody root-stock with thin wiry stems, lance-shaped toothed leaves, and orange-red flowers, drooping from the axils of the leaves (*Bot. Mag.* t. 7173).

This plant flourishes in a greenhouse in a compost of sandy loam, peat, or leaf-soil, and may be propagated from cuttings in spring.

HERRERIA (after *Gabriel A. de Herrera*, a Spanish agriculturist, 1470-1539). Nat. Ord. Liliaceæ.—A genus with two or three tuberous-rooted plants, having climbing stems, narrow lance-shaped leaves or cladodes, in whorls, and small scented flowers in axillary racemes.

H. Sarsaparilla (*H. parviflora*).—A little-known Brazilian plant, with stems about 8 ft. long, bearing lance-shaped leaves and green and yellow flowers (*Bot. Reg.* t. 1042).

This plant should be grown in peat, loam, and sand in equal proportions in a warm greenhouse. Increased by seeds or cuttings.

HESPERANTHA (*hesperos*, evening; *anthos*, a flower), EVENING FLOWER. Nat. Ord. Iridææ.—A genus containing about thirty species of dwarf-growing plants with tunicated corms, narrow linear leaves, and loose spikes of sweetly scented flowers which open in the evening—hence the name. Perianth with six equal narrow spreading segments.

These plants being natives of Southern or Tropical Africa are not hardy, and require the protection of a frame or greenhouse, or may be grown in warm well-drained and sheltered borders in the mildest parts of the country. They like a mixture of loam and peat, and may be increased by offsets. The best-known species are **H. augusta**, white;

H. cinnamomea, whitish (*Bot. Mag.* t. 1054); **H. falcata**, outer segments brown, inner pure white (*Bot. Mag.* t. 566, as *Ixia*); **H. graminifolia**, greenish-white (*Bot. Mag.* t. 1254, as *H. pilosa nuda*); **H. pilosa**, inner segments white, outer speckled with red (*Bot. Mag.* t. 1475); **H. radiata**, white striped with brown outside, leaves fistular (*Bot. Mag.* t. 573, as *Ixia*).

HESPEROCALLIS (*hesperos*, evening; *kallos*, beauty). Nat. Ord. Liliaceæ.—The only species of this genus is—

H. undulata.—A Californian plant with large, roundish, edible bulbs, which bury themselves in the sand in their native place at a depth of 6 to 18 ins. The narrow wavy leaves are bordered with white, and the sweet-scented, whitish, tubular flowers appear in April and May.

This plant seems to be unknown in cultivation, but might be tried in warm sheltered borders in well-drained sandy loam.

HESSEA (after *Paul Hesse*, a botanical traveller). Nat. Ord. Amaryllidææ.—A genus containing about eight species of South African plants, with roundish tunicated bulbs $\frac{1}{2}$ to 1 in. thick, thread-like, linear, or strap-shaped leaves, and small flowers borne in umbels. Perianth segments almost equal, more or less oblong, spreading, three-nerved down the keel.

The Hesseas are only from 3 to 6 or 12 ins. high, and require to be grown in a mixture of sandy loam and leaf-soil or peat, and are perhaps most satisfactory in a greenhouse or cold frame. In warm parts of the Kingdom the little bulbs might be planted in open, sunny, and sheltered borders. The flowers are usually produced

during the summer months, and after fading the leaves begin to appear. Increase is effected mainly by offsets.

H. crispa (formerly known also as *Amaryllis*, *Strumaria*, *Imhofia crispa*, and *Amaryllis cinnamomea*).—Closely related to *H. stellaris*. The pinkish flowers with wavy segments are borne in umbels from April to August. (*Jacq. Hort. Schoen.* t. 72; *Bot. Reg.* t. 1383.)

H. Dregeana.—Flowers reddish-white, twenty to thirty in an umbel.

H. filifolia (*Imhofia* and *Strumaria filifolia*; *Leucojum strumosum*; *Crinum tenellum*).—Leaves thread-like, produced same time as the white flowers in autumn (*Bot. Reg.* t. 440).

H. gemmata (*Strumaria* and *Imhofia gemmata*; *Imhofia Burchelliana*; *I. Bergiana*).—Leaves strap-shaped, about 6 ins. long, fringed with long fine hairs. Flowers purplish-white with wavy segments, on stalks 6 to 12 ins. high, ten to twenty in an umbel. (*Bot. Mag.* t. 1620.)

H. Rehmanni.—Leaves roundish. Flowers eight to twelve in an umbel, with much-cripsed segments.

H. spiralis, closely related to *H. filifolia*, from which it differs in having a spirally twisted stem.

H. stellaris (*Amaryllis* and *Strumaria stellaris*).—Leaves strap-shaped. Flowers pink or red, with oblong crisped segments, on stalks 3 to 9 ins. high (*Jacq. Hort. Schoen.* t. 71).

H. Zeyheri.—Leaves linear, about 1 ft. long. Flowers purplish-white, with slightly wavy oblanceolate segments.

HEXAGLOTTIS (*hex*, six; *glotta*, a tongue; in reference to the six spreading lobes of the style). Nat. Ord. Iridææ.—A small genus of South African bulbous plants, closely

related to the HOMERIAS. The only species of note is—

H. longifolia (*Homeria* and *Moraea flexuosa*).—A plant about 18 ins. high, with narrow linear leaves and yellow flowers in May and June (*Bot. Mag.* t. 695). This species requires the same cultural treatment as the Ixias. *H. virgata* is similar but has slender roundish leaves.

HIPPEASTRUM (*hippeus*, a knight; *astron*, a star; referring to the flowers of *H. equestre*), EQUESTRIAN STAR. Nat. Ord. Amaryllidææ.—A genus containing about forty species of herbaceous plants with large uncuticuled bulbs, more or less strap-shaped leaves, and hollow fleshy peduncles, bearing two or more large funnel-shaped flowers.

The Hippeastrums are still much better known under the name of Amaryllis, especially the beautiful hybrids that have been raised during the past hundred years, and which are now probably more popular than ever. The cultural notes here given refer more particularly to the garden hybrids, but they will also serve for the natural species mentioned below.

Garden Hippeastrums may be kept in a state of growth all the year round; in other words, they remain ever-green. Some of the most successful growers, however, prefer to give the plants a short period of rest. When approaching this stage the supply of water is reduced gradually, and when the foliage has withered no water at all is given to the bulbs. When growth recommences the young shoots appear from the tops of the bulbs. Then is the proper period for fresh potting, and it may be at different periods of the year, according to the time the plants went to rest. The bulbs should have the old soil shaken away from the roots, and

all easily detached offsets should be taken from the older bulbs. The latter vary in size from 3 ins. to 5 ins. in diameter, consequently pots of different sizes should be used. A 5-in. or 6-in. pot will be quite large enough for a 3-in. bulb, and an 8-in. or 10-in. pot for a 5-in. bulb; the point to bear in mind being not to have pots too large for the bulbs. The diameter of the pot should not be more than twice that of the bulb. The soil for Hippeastrums cannot be too rich. Leaf-mould and old cow-manure in about equal proportions, with a good sprinkling of silver sand makes an excellent compost, but most growers also favour the addition of some well-matured, fibrous, yellow loam. The whole should be thoroughly well mixed, by turning over three times with the spade, and the pots to be used should be well drained. The bulbs should be placed in the pots, so that when the soil has been worked in firmly round them with the fingers about one-half stands above the surface. To secure good steady growth the plants should be plunged in a tan or coco-nut fibre bed, or even in one of well-decayed leaf-mould, up to the rims, and the bottom heat should range from 75° to 80° F. The plants should have plenty of light, but a little shading must be given when the sun is very strong. The syringe should be used freely with tepid water to keep the surrounding atmosphere moist and genial, and the foliage clean and fresh. As growth progresses water is given in increasing abundance, as it is being absorbed in larger quantities by the roots. When first potted the temperature of the house should range from 55° to 60° at night, but may be increased two or three weeks later to 60° to 65°. As the fat fleshy flower-stems appear from the sides of the bulbs and leaves

a little weak liquid manure may be supplied two or three times a week as a stimulant.

Under such conditions of heat and moisture, with a good compost, Hippeastrums will often develop leaves 3 to 5 ft. long and 3 to 4 ins. broad, while one, two, or three flower-stems 2 to 4 ft. high will be thrown up from each bulb, and carry from four to eight magnificent flowers, each 6 ins.,



FIG. 181.—Hippeastrum. (1.)

sometimes as much as 9 or 10 ins. or more across.

The colours vary from the deepest scarlet almost to pure white, the broad petals being distinctly veined, and usually with a lighter coloured band—white tinted green—down the centre.

Hippeastrums are easily raised from seeds, and are just as easily cross-fertilised. The hybrids in cultivation owe their origin to a Lancashire watchmaker named Johnson, who in the year 1799 raised the first hybrid

by crossing *H. vittatum* with *H. Reginæ*. This hybrid was called *Johnsoni*, after its raiser. In 1830 Mr de Graaf of Leiden began to raise hybrids, using such forms as *H. Johnsoni*, *H. crocatum*, *H. fulgidum*, and *H. vittatum* in the process. Later on when *H. pardinum* was introduced in 1861, and *H. Leopoldi* in 1869, fresh blood was introduced into the already existing hybrids, and a more vigorous and floriferous race was produced, chiefly owing to these two species from the Andes of Peru.

When it is intended to cross any two particular forms of Hippeastrum, the versatile anthers should be removed from the tips of the long, fleshy, up-curved stamens as soon as ever the flower is sufficiently open to permit of the operation; two or three days later the three-parted stigma may have ripe pollen from another desirable variety placed upon it, the process being repeated two or three days in succession to secure perfect fertilisation. The seed-pod at the base of the flower continues to enlarge, and in due course the blackish shining seeds are perfectly ripe. They should then be sown about $\frac{1}{2}$ in. apart, either in well-drained pots or pans of rich gritty loam, covering them with about $\frac{1}{4}$ in. of soil. The seed-pots should be plunged in a hotbed, and the night temperature of the house should not fall below 60° F. Germination takes place in a week or so, and three or four weeks from the date of sowing the little plants should be carefully lifted and transferred either singly in very small pots or "thimbles," or about a dozen into a 6-in. pot, using a compost of rich and gritty loam. The little bulbs then begin to swell, and all the plants require is attention to watering, giving plenty of light and air, but at the same time maintaining a humid

atmosphere. In winter, the young plants, although evergreen, will require less water, and a lower temperature, about 55° F. at night. Soon after Christmas they should be potted up singly into small pots, or three into a 5-in. pot. They are then grown in the same way as advised above for older-established bulbs for another year, when they should be repotted, using pots in accordance with the size of the bulbs. In this way fine flowering specimens will be produced by the end of two years, or three years at the outside.

Hippeastrums are subject to attacks from aphides, red spider, thrips, scale, and mealy bug, all of which can be kept at bay by judicious syringings with quassia and tobacco solutions, and by vaporising the houses occasionally. Sometimes the bulbs rot at the base, owing to irregular watering, too much or too little. Consequently, to avoid this, water should be given when necessary, and the drainage should always be perfect. Sometimes the bulbs are attacked by the Eucharis mite (*Rhizoglyphus Robini*), minute pests like tiny grains of white sand, accompanied by red patches on the roots, or other parts of the bulbs. If the bulbs are not too far destroyed, the injured roots and scales should be cleared off and burned. The bulbs should then be washed well with either sulphur and water, paraffin emulsion, carbolic acid, lysol, cyllin, or liver of sulphur. When the surface is dry the bulbs should be firmly potted in fresh soil, and started into growth in a warm moist atmosphere.

Although fancy names are given to pet seedlings, they are of short duration, being replaced by newer favourites in due course. It is better to consult a current catalogue for a list of the latest varieties.

Amongst the natural species and distinct hybrids of *Hippeastrum*, the following are worthy of note:—

H. Ackermanni.—Crimson. The variety *pulcherrima* is figured in *Moore, Mag.* 1850, ii. 5; *Chelsoni*, in *Floral Mag.* t. 545; and other forms in same publication, n.s. tt. 77, 167, 347, and 359.

H. advenum.—A native of Chili, with narrow blue-green leaves about 1 ft. long, and yellow or red flowers (*Bot. Reg.* t. 849; *Bot. Mag.* t. 1125). The variety *pallidus* has pale yellow flowers (*Lodd. Bot. Cab.* t. 1760).

H. Alberti.—A double-flowered form of *H. equestre* or *H. Reginae*, the blossoms being orange-red, yellow at the base (*Ill. Hort.* 1866, t. 498).

H. Andreanum.—This is a native of the Colombian Cordilleras, where it was found in 1876 by Mr André. It has large bulbs and pale red flowers with streaks of brighter red.

H. Archavaletæ.—This species, from Monte Video is closely related to *H. vittatum*, differing only in having the margins of the floral segments plain. The scape is about 2 ft. high, bearing an umbel of white flowers banded with crimson.

H. aulicum.—Flowers large, with oboval petals striped with bright crimson within, shading to green at the base. Introduced from Central Brazil in 1819. (*Bot. Mag.* t. 3311; *Bot. Reg.* tt. 444, 1038.)

H. Bagnoldi (*Habranthus*).—Native of Chili. Leaves linear, about 1 ft. long. Flowers yellow tinged with red. (*Bot. Reg.* t. 1396.) The variety *punctatus* has small reddish dots on the petals.

H. bicolor.—A native of Chili, where it flowers in October. Leaves linear, 1½ to 2 ft. long. Flowers bright red, fading into yellow-green towards the base. (*Bot. Mag.* t. 2399; *Bot. Reg.* tt. 809, 1943.)

H. bifidum (*Habranthus bifidus*).—Native of Buenos Ayres and Monte Video. Introduced about 1825 by Lord Carnarvon. Leaves linear, produced after the bright red flowers. (*Bot. Mag.* t. 2599.)

H. brachyandrum.—Flowers bright red (*Bot. Mag.* t. 7344).

H. breviflorum.—A native of Buenos Ayres. First flowered at Glasgow in 1836, but seems to have dropped out of cultivation. Leaves 1½ ft. long, about 1½ ins. broad. Flowers white keeled with red, five to six on a roundish blue-green peduncle 2 to 3 ft. high. (*Herb. Amaryll.* 137, t. 21, fig. 4; *Bot. Mag.* t. 3549.)

H. calyptratum.—Introduced from Brazil in 1816. Flowers pale yellow, netted on the face with green. (*Bot. Reg.* t. 164; *Lodd. Bot. Cab.* t. 864.)

H. Cybister (*Sprekelia Cybister*).—This species was introduced from the Bolivian Andes, and forms the connecting link between *Sprekelia* and *Hippeastrum*. It is, however, lost to cultivation. Flowers bright crimson tinged with green towards the tip. (*Bot. Reg.* t. 33; *Bot. Mag.* t. 3872; *Fl. d. Serr.* tt. 455-6.)

H. equestre (*Barbados Lily*).—This is the oldest species, and "was first noticed by Hermann in 1698." It grows in Tropical America from Mexico and the West Indies to Chili and Brazil. It has stoloniferous bulbs and bright green strap-shaped leaves, 1½ ft. long, about 2 ins. broad. Flowers 4 to 5 ins. deep, bright red shading to yellowish-green at the base. (*Jacq. Hort. Schoen.* t. 63; *Bot. Mag.* t. 305; *Red. Lil.* t. 32). The variety *splendens* has larger flowers with broader petals (*Rev. Hort.* 1895, 577).

H. iguapense, from S. Brazil, has small ovoid bulbs, lance-shaped leaves 6 to 9 ins. long and over 2 ins. broad, and white flowers, the upper segments

of which are striped with red or lilac (*Wen. Ill. G. Z.* 1903, 281, t. 3).

H. Jamesoni. — Native of the Argentine, where it flowers in January. Flowers red. Not in cultivation.

H. Leopoldi. — Native of the Peruvian Andes, whence it was introduced in 1869. Leaves strap-shaped, $1\frac{1}{2}$ to 2 ft. long. Flowers regular, 5 ins. long, greenish-white in the throat, bright red in the centre, with a bifid keel of white in the lower half of the red portion. (*Floral Mag.* tt. 475, 476; *Gard. Chron.* 1870, f. 140.)

H. Muesserianum. — This is closely related to *H. aulicum*, and has salmon-coloured segments tinted with rose (*Ill. Hort.* 1896, t. 72).

H. pardinum. — Also native of Peruvian Andes. Introduced 1867. Leaves 2 ft. long, 2 ins. broad. Flowers greenish, more or less flushed, copiously and minutely spotted with red. (*Floral Mag.* t. 344; *Bot. Mag.* t. 5645.)

H. pratense (*Habranthus*). — A native of the hills and plains of Chili. Bulbs about $1\frac{1}{2}$ ins. thick. Leaves 1 to $1\frac{1}{2}$ ft. long, about $\frac{1}{2}$ in. broad, produced with the bright red bell-shaped flowers in spring and early summer. A brilliant plant for growing in masses. (*Bot. Reg.* 1842, t. 35.)

H. procerum (*Amaryllis Rayneri*). — A distinct species from S. Brazil. Leaves in two rows, curved, 2 to 3 ft. long, $1\frac{1}{2}$ to 2 ins. broad, cartilaginous on margin. Flowers 5 to 6 ins. long, lilac, not starred in the throat. (*Ill. Hort.* xi. 408; *Fl. d. Serr.* tt. 2077, 2078; *Bot. Mag.* t. 5883.)

H. psittacinum. — Introduced from S. Brazil 1814. Peduncle 2 to 3 ft. high, stout. Flowers 4 to 5 ins. long, with wavy segments crimson on the edges, with a green keel from which crimson stripes radiate. (*Bot. Reg.* t. 199; *Lodd. Bot. Cab.* t. 1204.)

H. Reginæ. — Widely distributed from Mexico and W. Indies to Brazil and Peru. First flowered at Hoxton in 1728, on the birthday of Queen Caroline. Leaves 2 ft. long, developed after the large bright red flowers, which have a large greenish-white star in the throat. (*Miller, Ic.* t. 24; *Bot. Mag.* t. 453; *Red. Lil.* t. 9.)

H. reticulatum (*Coburgia reticulata*). — Introduced in 1777 from S. Brazil. Flowers about 4 ins. long, bright mauve-red, cross-veined with a deeper tint. (*Bot. Mag.* t. 657; *And. Bot. Rep.* t. 179; *Red. Lil.* t. 424.)

The variety *striatifolium* has broader leaves with a distinct white keel (*Bot. Mag.* t. 2513; *Rot. Reg.* t. 352).

H. roseum (*Habranthus*). — A native of Monte Video, having dark brown ovoid bulbs 1 in. long, and dark green leaves 9 ins. long, followed with a scape about 6 ins. high bearing two funnel-shaped flowers of a rich rosy-crimson colour with a yellowish base (*Gard. Chron.* 1900, xxviii, 287).

H. rutilum. — Introduced from Rio de Janeiro about 1810. Bulbs stoloniferous, 2 to 3 ins. thick. Leaves about 1 ft. long, over 1 in. broad. Flowers 3 to 4 ins. long, bright crimson with a green cylindrical tube (*Bot. Reg.* t. 23; *Lodd. Bot. Cab.* t. 1449). There are several varieties, such as *acuminatum*, with very acute pale pink segments (*Bot. Reg.* tt. 534, 1188; *Bot. Mag.* t. 2273); *citrinum*, flowers bright yellow; *crocatum*, flowers with wavy saffron-coloured segments; and *fulgidum*, with broader leaves than the type, and larger bright scarlet flowers having a green base and keel on the lower half of the segments.

H. solandriiflorum. — Introduced from Tropical S. America in 1820.

Flowers 7 to 10 ins. long, with a greenish cylindrical tube 4 to 5 ins. long, and greenish-white or pale sulphur-coloured segments. (*Bot. Mag.* t. 2573, 3771; *Lodd. Bot. Cab.* t. 1200.)

H. stylosum (*Amaryllis maranensis*).—Introduced from Guiana and N. Brazil in 1821. Flowers 4 ins. long, bright flesh-red. (*Bot. Mag.* t. 2278; *Bot. Reg.* t. 719.) In the variety *nudum* the filaments are remarkably exerted and the stamens spread out as in *H. calyptratum*.

H. teretifolium (*Habranthus*).—This species from Monte Video is remarkable for having roundish leaves. The rosy-pink flowers about 2 ins. long are bell-shaped rather than tubular. (*Gard. Chron.* 1900, xxviii. 142.)

H. vittatum.—Introduced from the Andes of Peru in 1769. A variable species with flower-stems 2 to 3 ft. high, bearing from two to six flowers 4 to 6 ins. long, white towards the margin and distinctly keeled with white, striped with bright mauve-red between the keel and margin. (*Bot. Mag.* t. 129; *Red. Lil.* t. 10.) There is a white-flowered variety called *album*.

As most of the species mentioned above were at one time called *Amaryllis*, that name will be frequently found in the works cited instead of *Hippeastrum*.

HOMERIA (*homereo*, to meet; in reference to the filaments meeting in a tube round the style). Nat. Ord. Iridæ.—A small genus of South African bulbous plants closely related to *Ferraria* and *Tigridia*; recognised by their few long narrow leaves and numerous long-stalked, bell-shaped flowers having six subequal erect or spreading entire segments and filaments uniting in a tube.

These little plants require the protection of a greenhouse, but may be tried in the open air in the mildest



FIG. 182.—*Homeria*, corm and section.

parts in warm sheltered spots in rich and very gritty soil. The best-known kinds are:—

H. collina, with bright red unspotted flowers (*Bot. Mag.* t. 1033). The variety *aurantiaca* has orange-red flowers with a yellow centre (*Bot. Mag.* t. 1612), and *ochroleuca* has pale yellow flowers (*Bot. Mag.* t. 113).

H. elegans.—Flowers bright yellow, the outer segments having an orange-brown or purplish spot in the centre (*Bot. Mag.* t. 1983).

H. lineata.—Flowers coppery-red with a small yellow blotch on the claw (*Sw. Br. Fl. Gard.* t. 178).

H. maculata, yellow with a greenish blotch at base.

H. miniata.—Flowers brownish-red with a yellow centre (*Sw. Br. Fl. Gard.* t. 152; *And. Bot. Rep.* t. 404).

H. pallida, pale yellow, unspotted.

HYACINTHUS (ancient Greek name applied by Homer to the Iris, in honour of the youth Hyacinth, the favourite of Apollo), THE HYACINTH. Nat. Ord. Liliaceæ.—A genus of well-known plants with roundish tunicated bulbs, linear or strap-shaped leaves, and erect spreading or drooping flowers in loose or dense racemes on a leafless scape. Perianth bell-shaped or funnel-shaped, with six erect, spreading, or recurved lobes.

All the popular garden Hyacinths are descended from *H. orientalis*, a native of Syria, Asia Minor, etc., with roundish bulbs, lance-shaped channelled leaves, and blue flowers (*Bot. Mag.* t. 937; *Bot. Reg.* t. 995; *Red. Lil.* t. 465).

Holland is the great centre of production—the sandy soil well enriched with old cow-manure being particularly well-suited to the plants. About six rows, 9 ins. apart, are grown in narrow beds, and hurdles are placed on the windward side to shelter the plants in spring from the sand storms. Hundreds of thousands of bulbs are exported every autumn to the United Kingdom, the United States, France, Germany, etc.; and although many people are under the impression that Hyacinths could be raised as well and as easily in parts of the British Islands as in Holland, the fact remains that they are not—at least not on commercial lines.

Hyacinths are easily grown in the open air in most parts of the British Islands, and are to be found in the large gardens of the rich as well as in the backyards of the poor; while public parks and gardens vie with each other to secure a thrilling display of colour in spring.

To secure the best results the soil should be of a sandy or gritty nature, well enriched with old cow-manure or well-rotted stable manure, or failing these plenty of leaf-mould. A wet, heavy soil is not desirable, but can be improved in drainage and temperature by trenching, and the addition of plenty of sand and manure.

The best time for planting the bulbs is from the end of September till early November. They should be placed from 4 to 6 ins. deep in the soil, and from 6 to 8 ins. apart, and if a handful of coarse silver sand is

placed beneath each so much the better, especially in heavy soils. As there are many varieties, it is better when planting formal beds—whether round, square, rectangular, or elliptic—to keep each variety separate; mixing them up would lead to a disorderly appearance at the flowering season.

In severe winters the beds may be covered lightly with fine leaf-mould or coco-nut fibre as a protection against frost. When the flowers have passed their best the stems should be cut off, and when the leaves show signs of yellowing (some time in June) the bulbs may be lifted, dried and cleaned, and stored away in cool, airy places until the following October. Any offsets may be detached and planted in a special place by themselves, covering them with about twice their own diameter of soil.

If seeds are desired, of course the pods must be allowed to thoroughly ripen. The seeds may then be sown in fine sandy soil in shallow boxes or pans, in which they soon sprout. The young plants are grown on from season to season until the bulbs reach the flowering stage, perhaps at the end of from four to six or seven years.

By slitting the mature old bulbs of Hyacinths from the base upwards small bulb-like growths soon begin to develop in the slits when the coagulated sap has formed a callus. These bulblets are removed and planted in beds by themselves, and at the end of the first year's growth they form small bulbs. They are cultivated in this way in rich sandy soil for three or four years, at the end of which time they will have reached the flowering size and become a marketable article. See Figs. 20, 21, 22, p. 21. Fig. 183 shows a Hyacinth bulb giving rise to offsets from the base.

In selecting Hyacinths for planting, attention should be given to the weight rather than the size of the bulbs. Very often a large bulb throws a comparatively small truss

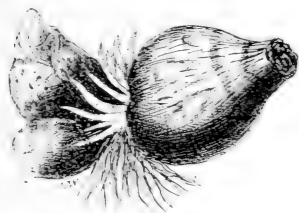


FIG. 133.—Hyacinth, bulb and offsets. (1.)

of blossom, while a smaller but more compact and heavier bulb will throw quite a fine truss of flowers.

POT-CULTURE.—A great revival seems to be taking place in the culture of Hyacinths in pots, and large prizes are now offered at the spring shows for the best examples. To attain the best results, especially if prize-winning is one of the objects in view, the very best and soundest, and therefore dearest bulbs must be secured. Each one according to size should be put into a well-drained 5-in. or 6-in. pot not later than the middle or end of September. A good compost consists of two parts rich loam, one part old cow-manure, one part leaf-mould, and one part coarse silver or river sand. This should be prepared three or four weeks before required, and the various ingredients should be thoroughly mixed together. In the potting the crown of each bulb should be left just above the surface of the soil, and a little sand may be placed under and over each. The pots should then be placed in a cold frame having a hard dry bottom of ashes, and leaf-mould or coco-nut fibre may be spread over and around

the pots so that the rims of the latter are buried about 4 ins. deep. Coal ashes or even friable gritty soil may be used instead of leaf-mould or coco-nut fibre; and some growers take the precaution to invert a 3-in. pot over the crowns of the bulbs before covering them over, for the sake of cleanliness. If early blossoms are required the plants may be taken into the greenhouse when the pots are fairly full of roots, but too much light should not be given until the etiolated leaves assume a greenish tint. Other batches of plants may be brought in from time to time as required, so that the flowers may be had from Christmas to the end of March and April, when those planted in the open ground will be coming well into bloom. For forcing purposes a night temperature of 60° to 65° F. is quite sufficient.

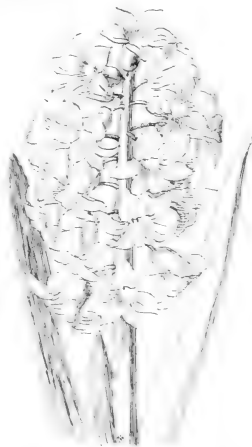


FIG. 134.—Florists' Hyacinth. (2.)

Pot plants require attention to watering and should not be given

too much, just like any other plant grown in a restricted space. A little weak liquid manure may be given once or twice a week when the growth is vigorous. The flower - spikes, if strong and sturdy, will not require staking. Sometimes, however, the trusses are rather heavy and inclined to bend down. In such cases thin neutral-tinted twigs or wires may be used as supports that are not too conspicuous.

HYACINTHS IN GLASSES.—For room decoration Hyacinths are particularly useful when grown in ornamental bowls or glasses containing water. Some designs are shown in the illustrations. The receptacles are filled with water just to the base of the bulb. This sits on a ledge all round so that it shall not be immersed. To secure good results the glasses with the bulbs and water should be placed in a dark place with a temperature of about 50° F. until the roots have grown well into the water. The bulbs may be started in advance in moist soil or coco-nut fibre before placing them in the glasses. Light and more warmth may then be given to the plants and growth will proceed steadily, the flower-truss pushing its way up from the crown through the leaves. The main point is to get the roots to grow before the leaves or flower-spike, and this cannot be accomplished if the bulbs are placed in too much heat and light at first. As the water vanishes by root absorption and evaporation, it must be renewed occasionally, and a few lumps of charcoal may be added to counteract any tendency to an offensive odour. Hyacinths may also be grown in Turnips, Beets, Swedes, or Mangels that have been scooped out and hung up and kept moistened from time to time.

"Roman" Hyacinths.—These are a French form of *H. orientalis* known as *albulus*. The flowers are pure white, and borne in graceful spikes on slender stems. Large numbers are forced in heat annually for the big markets, from Christmas to February and March, and they are often grown for early decoration in private gardens. There is a blue Roman Hyacinth also that flowers somewhat later than the white form. The *White Italian* Roman Hyacinth *H. romanus* (*Bot. Mag.* t. 939) has pure white flowers, and blooms later than the ordinary Roman type; and there is also a double-flowered Italian form with rose-coloured blossoms.

The following are some standard varieties of Hyacinths worthy of notice:—

SINGLE PURE WHITE AND TINTED
WHITE.

Baroness van Thuyll.	La Grandesse.
Duke of Clarence.	Leviathan.
Grand Blanche.	L'Innocence.
Grandeur à Mer- veille.	Madame van der Hoop.
King of Whites.	Mina.
Lady Derby.	Mr Plimsoll.
La Belle Blanchis- seuse.	Paix de l'Europe.
La Franchise.	Pavilion Blanc.
	Simplicity.
	Voltaire.

SINGLE BLUE.

*Those marked thus * are very dark.*

*Baron van Thuyll.	Electra.
*Bleu Mourant.	Galatea.
Blondin.	Grand Lilas.
Charles Dickens.	Grand Maitre.
Claret Cup.	*King Cole.
Count Andrassy.	*King of the Blues.
Czar Peter.	La Peyrouse.
Distinction.	Lord Balfour.
*Duke of Con- naught.	*Mary.

Mauve Queen. Sir William
Priestley. Mansfield.
Queen of the Blues. *William the
Regulus. First.
Schotel.

SINGLE RED, ROSE, PINK, ETC.
Baron van Thuyll, flesh colour.
Cardinal Wiseman, light rosy pink.
Charles Dickens, rose.
Duke of Avondale, bright red, striped.
Etna, brilliant rose, carmine striped.
Fabiola, pink and carmine.
General Pelissier, deep crimson.
Gertrude, rosy pink.
Gigantea, bluish red.
King of Roses, rosy red.
Lady Derby, rosy pink.
Madame Hodgson, pink, striped carmine.
Moreno, waxy pink.
Mr Stanley, deep red.
Norma, pale waxy pink.
Ornament Rose, pale rose.
Pink Perfection, fine rose.
Prince Albert Victor, very dark red.
Princess of Wales, delicate rose.
Robert Steiger, crimson.
Roi des Belges, deep red.
Rosea Maxima, rosy blush.
Rosy Gem, rose, striped red.

SINGLE YELLOW.

Adelaide Restori. Macmahon.
City of Haarlem. Marchioness of
Daylight. Lorne.
Ida. Primrose Per-
King of the Yellows. fection.

There are also many varieties having deep violet flowers, and others having double flowers coloured red, white, blue, yellow, and orange. It is better to consult a modern catalogue for these.

H. amethystinus.—This is known as the Spanish Hyacinth. It comes from S.W. Europe, and has narrow linear leaves and loose spikes of

bright blue drooping flowers about May and June. The variety *albus* has white flowers.

H. azureus.—An early-flowering Hyacinth from Asia Minor, having whitish bulbs about 1 in. in diameter, strap-shaped leaves 4 to 6 ins. long, and sky-blue bell-shaped flowers produced in dense conical spikes in February, somewhat resembling the Grape Hyacinths (*Muscari*). The variety *giganteus*, from N. Cilicia,



FIG. 185.—*Hyacinthus azureus*. (3.)

has larger flowers (*Gard. Chron.* 1898, xxiv. 190, f. 52); *robustus* is even larger; and *amphibolis* has spikes about 8 ins. high, with about fifty flowers paler in colour than the type.

This species flourishes in ordinary good gritty soil, but owing to its early flowering is often injured by frosts in the open air. The plants should therefore be protected if necessary with a hand-light or canvas screen.

HYMENOCALLIS (*hymen*, a membrane; *kallos*, beautiful; referring to

the membranous cup or corona in centre of the flower). Nat. Ord. Amaryllidæ.—A genus containing over thirty species of tunicated bulbous plants having strap-shaped leaves and (in most cases) umbels of pure white sweet-scented flowers borne on top of a solid compressed scape or peduncle. Perianth more or less funnel-shaped, with a cylindrical tube and six narrow or lance-shaped segments. Stamens six, with long protruding filaments bearing linear versatile anthers. Style slender, long, with a capitate stigma.

The *Hymenocallis* are closely related to the *Pancratiums*, and are easily grown in a compost of rich sandy loam and leaf-mould. Most of the species require to be cultivated in a warm greenhouse or even in a stove, as they are natives of Tropical and subtropical S. America and Mexico. *H. littoralis* and *H. Amancaes*, however, are often grown out of doors in the warmest parts of the British Islands, but they must be protected from the frost in winter, and the bulbs should be covered with about three times their own diameter of soil. Propagation is effected by sowing the large green-coated seeds when fully ripe; or by means of offsets when repotting the plants. If grown in pots the bulbs should be buried up to the top in the soil, and sizes too large should be avoided. The plants may also be grown in beds or borders in the greenhouse or stove, and should be well supplied with water when growing freely.

H. Amancaes (*Narcissus*, *Pancratium*, and *Ismene Amancaes*).—A beautiful species from the Hill of Amancaes, near Lima in Peru, with bulbs $1\frac{1}{2}$ to 2 ins. through, having a cylindrical neck about 6 ins. long. Leaves bright green, about 18 ins. long and $1\frac{1}{2}$ to 2 ins. broad. Flowers

greenish-yellow with bright yellow narrow segments, borne in summer on a two-edged scape 1 to 2 ft. high. The staminal cup is also bright yellow striped with green. (*Bot. Mag.* t. 1224; *Bot. Reg.* t. 660.)

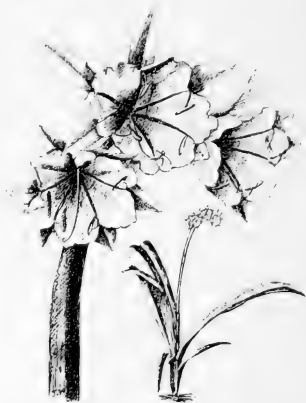


FIG. 186.—*Hymenocallis Amancaes*. (A.)

H. Andreana (*Ismene Andreana*).—This grows wild on the Andes of Ecuador at an altitude of 8000 ft. The bulbs are "as large as an apple," and the narrow pale green leaves are from 12 to 15 ins. long. One flower only is borne on the slender scape. It has a green perianth-tube, white linear segments $3\frac{1}{2}$ to 4 ins. long, and a white funnel-shaped cup 3 to 4 ins. broad, striped with green. (*Rev. Hort.* 1884, t. 468; *Garden*, May, 1884.) Cool greenhouse or half-hardy.

H. calathina (*Ismene* and *Pancratium calathinum*; *P. calathiiforme*).—Introduced from the Andes of Peru and Bolivia in 1794. Bulbs roundish, with a cylindrical neck. Leaves almost in two rows, $1\frac{1}{2}$ to 2 ft. long. Flowers two to five in an umbel,

greenish with white lance-shaped segments, and funnel-shaped cup striped with green. (*Bot. Reg.* t. 215; *Bot. Mag.* t. 2685; *Red. Lil.* t. 353.) In the variety *grandiflora* the corona is larger than in the type. Cool greenhouse or half-hardy.



FIG. 186A.—*Hymenocallis calathina*. (4.)

H. caribæa (*Pancratium caribæum*; *P. declinatum*; *P. amœnum*; *P. angustum*).—A West Indian species with bulbs 3 to 4 ins. through, and leaves 2 to 3 ft. long and 3 to 4 ins. broad. Flowers pure white, six to twelve in an umbel, with linear segments 3 to 3½ ins. long, and a regular funnel-shaped cup. (*Bot. Mag.* t. 826; *Red. Lil.* t. 414; *Lodd. Bot. Cab.* t. 558; *Bot. Reg.* t. 221.) The variety *patens* has a larger tube and longer segments.

Mr Baker considers *H. caymanensis* to be "doubtfully distinct specifically from *H. caribæa*," but it has a much longer perianth-tube.

H. concinna, from Mexico, resembles *H. caribæa*. It has strap-shaped lanceolate leaves over 1 ft. long, deeply channelled down the face. The slender scape, 9 to 12 ins. high, bears a couple of pure white flowers in June, the petals being 2 to 3 ins. long and ¼ in. broad, with a shallow cup-shaped corona in the centre. (*Gard. Chron.* 1893, xiv. 150.)

H. cordifolia.—A species from Venezuela, remarkable for its broad

Eucharis-like leaves 2½ ft. long. Flowers white, about twenty in an umbel, each with a tube 4 ins. or more long. (*Rev. Hort.* 1899, 445, f. 191.)

H. crassifolia, from the S. United States, also comes very near *H. caribæa*, but has a greenish perianth-tube and somewhat shorter segments (*Saund. Ref. Bot.* t. 331).

H. eucharidifolia.—A Tropical American species with ovoid bulbs 2 to 3 ins. through, oblong acute leaves about 1 ft. long and 3 to 4 ins. broad, and large green-tubed flowers with narrow segments 3 to 3½ ins. long and a narrow funnel-shaped cup in the centre.

H. expansa (*Pancratium expansum*).—A native of the West Indies, intermediate between *H. caribæa* and *H. littoralis*. The leaves are longer and narrower, and the perianth-tube more slender than in *H. caribæa*. (*Bot. Mag.* t. 1941.)

H. glauca.—A Mexican species with oblong, acute, blue-green leaves 1½ ft. long, 3 to 4 ins. broad, narrowed to a short deeply channelled petiole. Flowers with a greenish perianth-tube 2 to 3 ins. long, and a spreading cup about 1 in. deep.

H. Harrisiana.—A Mexican species with oblanceolate leaves about 1 ft. long and 2 ins. broad above the middle. Flowers in May, with perianth-tube 3 to 4 ins. long, and narrow segments 2½ to 3 ins. long, with a narrow plaited cup in the centre. (*Bot. Mag.* t. 6562.)

H. lacera (*H. rotata*; *Pancratium rotatum*).—A native of S. United States, with ovoid bulbs, 1½ to 2 ins. through, having a long neck, and produces numerous stolons. Leaves 12 to 18 ins. long, about 1 in. broad. Flowers with greenish perianth-tube 3 to 4 ins. long, and linear segments same

length. The cup in centre is very flat and shallow, $1\frac{1}{2}$ to 2 ins. across. (*Bot. Mag.* t. 827; *Lodd. Bot. Cab.* t. 19; *Saund. Ref. Bot.* t. 357.)

H. littoralis (*H. adnata*; *Pancretium littorale*; *P. americanum*).—A very old and variable species, native of Tropical America, where it is widely distributed. The bulbs are 3 to 4 ins. through, and bear several bright green leaves 2 to $2\frac{1}{2}$ ft. long and $1\frac{1}{2}$ ins. broad. From four to eight flowers are borne on top of a two-edged scape $1\frac{1}{2}$ to 2 ft. high, the perianth-tube being 6 to 7 ins. long, tinged with green, and the long narrow segments being recurved and attached to the base of the broadly funnel-shaped cup. (*Trans. Linn. Soc.* ii. 74, t. 13; *Jacq. Hort. Vind.* iii. t. 750; *Journ. Hort.* Feb. 1909, 165.)

H. Macleana (*Ismene Macleana*).—Introduced by Maclean in 1834 from the Andes of Peru. It has very prolific ovoid bulbs about 2 ins. through, and bright green narrow leaves a foot or more long. Flowers with a greenish tube and linear suberect segments surrounding a white funnel-shaped cup striped with green. (*Bot. Mag.* t. 3675.)

H. macrostephana.—This is probably a hybrid between *H. calathina* and *H. speciosa*, as it is not recorded as having been introduced from any part of America. It is a strong-growing plant with ovoid bulbs about 2 ins. through, and bright green oblanceolate leaves $2\frac{1}{2}$ to 3 ft. long. From six to ten large pure white flowers are borne in March and April, having a greenish tube 3 ins. long, and linear segments surrounding a broadly funnel-shaped cup about 2 ins. across. (*Bot. Mag.* t. 6436.)

H. ovata (*Pancretium ovatum*; *P. fragrans*; *P. amœnum*, Ker).—A West Indian species closely related

to *H. speciosa*. Bulbs 3 to 4 ins. through. Leaves oblong acute, 1 ft. or more long, 4 to 6 ins. broad. From six to ten pure white fragrant flowers are borne on a scape, the linear segments surrounding a regularly funnel-shaped cup about a inch deep. (*Bot. Reg.* t. 43; *Bot. Mag.* 1467.)

H. quitoënsis (*Ismene tenuifolia*).—A native of the mountains of Ecuador, with tufts of thin narrow bright green leaves a foot long. Flowers solitary, with greenish slender tube, and suberect lance-shaped segments $2\frac{1}{2}$ to 3 ins. long. The funnel-shaped cup about 2 ins. long and $1\frac{1}{2}$ ins. across is pure white ribbed with green. (*Bot. Mag.* t. 6397.)

H. schizostephana.—A Brazilian species similar to *H. caribæa* in appearance, but the filaments are very stout and winged at the base, forming an irregular cup as if torn (*Gard. Chron.* 1899, xxv. 386).

H. senegambica.—This is remarkable as being the only Old World species, being a native of the sandy shores of the Congo. It comes close to *H. littoralis*, and has arching strap-shaped leaves about 2 ft. long, and large trusses of flowers on scapes about 2 ft. high. Perianth-tube slender, 5 to 6 ins. long. Segments very narrow, about 4 ins. long, round the funnel-shaped cup over 1 in. across.

H. speciosa (*Pancretium speciosum*).—One of the best-known species in cultivation. It is a native of the West Indies, and has bulbs 3 to 4 ins. through, and numerous oblanceolate, oblong, bright green leaves, $1\frac{1}{2}$ to 2 ft. long. The sweet-scented pure white flowers have a greenish tube about 3 ins. long, and shorter segments and funnel-shaped cup. (*Bot. Mag.* t. 1453; *Red. Lil.* t. 412.) The variety *angustifolia* has very stiff

narrow leaves (*Gard. Chron.* 1903, xxxiii. 116).

H. tubiflora (*H. guianensis*; *H. petiolata*; *Pancratium guianense*; *P. tubiflorum*; *P. petiolatum*).—This is a native of Guiana, Trinidad, and the Amazon Valley, and, according to Mr Baker, it was "introduced into cultivation at Kew about 1803 from bulbs taken in a captured French vessel from Cayenne, and again by Lambert in 1818." The ovoid bulbs are 3 to 4 ins. through, and have thin oblong acute leaves 8 to 12 ins. long, 4 to 5 ins. broad in the middle. Flowers numerous, with an erect slender tube 6 to 8 ins. long, and linear segments 4 ins. long, the narrow funnel-shaped central cup being about 1 in. deep. (*Bot. Reg.* t. 265.)

H. undulata (*Pancratium undulatum*).—A Venezuelan plant with large ovoid bulbs and thin oblong acute leaves about 1 ft. long and 5 to 6 ins. broad in the middle, narrowed gradually into a long stalk. About a dozen flowers are borne on top of a scape 2 ft. high, the perianth-tube being 6 to 7 ins. long, with linear, drooping, wavy segments 3 to 3½ ins. long, and a funnel-shaped cup about 1 in. deep.

HYPOXIS (*hypo*, beneath; *oxys*, sharp; referring to the base of the seed-pod). Nat. Ord. Amaryllidæ.—A genus containing over fifty species of pretty little bulbous plants distributed over Tropical Asia, Australia, the Mascarene Islands, Tropical and South Africa, and Tropical and North America. They have narrow leaves, often covered with soft hairs or down, and starry six-parted flowers borne either singly or in clusters. They are practically unknown outside botanical collections. A compost of sandy peat and loam suits them very well, and some of the species may be

grown in a cool greenhouse, although most of them prefer a more genial atmosphere. Increased by division.

The best-known species, all with yellow flowers, unless otherwise mentioned, are:—**H. angustifolia**, **H. colchicifolia**, **H. erecta** (*Bot. Mag.* t. 710), **H. hemerocallidea** (*Bot. Mag.* t. 5690), **H. latifolia** (*Bot. Mag.* t. 4817), **H. longifolia** (*Bot. Mag.* t. 6035), **H. multiceps**, **H. obtusa** (*Bot. Reg.* t. 159), **H. regia**, **H. Rooperi**



FIG. 187.—*Hypoxis stellata*. (3.)

(*Lem. Jard. Fleur.* t. 303), **H. serrata** (*Bot. Mag.* tt. 709, 917); **H. stellata**, and its variety *elegans* (*Bot. Mag.* t. 1223), having white and blue flowers; and **H. villosa** (*Bot. Mag.* t. 711).

All the above are natives of S. Africa except *H. erecta*, which comes from N. America.

ICACINA (name given on account of the resemblance of the branches

to a tree called *Icaco*). Nat. Ord. Oleaceæ.—The only species that has been introduced, and is still practically unknown, is *I. Manni*, a native of the Gulf of Guinea. It is a hot-house perennial with a large smooth, roundish, tuberous root-stock 6 to 12 ins. in diameter, from which arise slender climbing stems, bearing opposite, elliptic, truncated leaves of membranous texture. The small silky yellow blossoms with protruding stamens appear about October, in short cymes from the axils of the leaves. (*Bot. Mag.* t. 6260.)

This species will grow in sandy loam and leaf-mould, and requires plenty of heat and moisture. Increased by cuttings of the young shoots in spring, inserted in bottom heat under a bell-glass or frame.

INCARVILLEA (in honour of *Père d'Incarville*, a Chinese Jesuit missionary, and correspondent of Bernard de Jussieu). Nat. Ord. Bignoniaceæ.—There are several species of *Incarvillea*, some annuals and biennials, but the only perennials of a tuberous character are those here mentioned.

I. Delavayi.—A charming hardy herbaceous perennial, native of China, with large fleshy, spindle-shaped roots, and large leaves pinnately cut into numerous elliptic, crenulate segments. The large rosy-carmine tubular flowers, spotted with yellow and brown at the base, are borne in loose trusses during the summer months, on stems 1½ to 2 ft. high. (*Rev. Hort.* 1893, t. 544.)

This species flourishes in ordinary good garden soil of a gritty character, and should be grown in sunny situations to secure the depth of colour in the flowers. It may be easily raised from seeds sown in spring in gentle heat, or by means of cuttings detached from the tubers in spring, and inserted

in sandy soil under a bell-glass or light.

I. grandiflora, also from China, is like *I. Delavayi*, but has shorter leaves and leaflets, also a shorter flower-stem bearing a few rosy-red flowers (*Gard. Chron.* 1898, xxiv. 8). It is somewhat more tender than *I. Delavayi*, but is on the whole a finer flowering plant.

I. variabilis.—A native of W. China, 1 to 1½ ft. high, with pinnate leaves, and loose erect racemes of small rose-purple tubular flowers (*Bot. Mag.* t. 7651).

IPOMÆA (*ips*, Bindweed; *omoios*, similar). Nat. Ord. Convolvulaceæ.—This genus contains some 300 to 400 species according to various authorities. They are divided into annuals and perennials, some being hardy, others requiring the protection of a greenhouse or hothouse, but all alike in having climbing and twining stems like our Common Bearbind (*Convolvulus*), and beautiful funnel-shaped flowers. Representatives of the genus are found in almost every part of the subtropical and tropical world, consequently cultural conditions vary. There are comparatively few species having tuberous root-stocks, those mentioned here being amongst the best known. They nearly all lose their leaves and stems in winter, so that they enjoy a period of repose during that season. Very little or no water is then required. In spring, however, when growth recommences plenty of moisture is necessary. A compost of fibrous loam with a little leaf-mould and sand suits most of them perfectly. Propagation of the tuberous species is effected by division of the roots, or by cuttings from them in spring, inserted in sandy soil under a light.

I. Batatas.—The "Sweet Potato"



FIG. 188.—*Incarvillea Delavayi*, tuberous root-stock. (1.)



FIG. 189.—*Incarvillea Delavayi*. (1/2.)

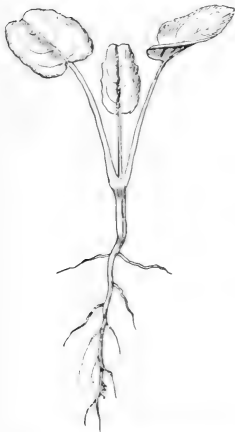


FIG. 190.—*Incarvillea Delavayi*, seedling.



FIG. 191.—*Incarvillea grandiflora*. (1.)

of the East Indies, with potato-like tubers, heart-shaped angular leaves, and flowers white within, purple outside. A plant of great economic value in the Tropics.

I. bignonioides.—A native of Cayenne, with deep purple flowers and trilobed leaves (*Bot. Mag.* t. 2645).

I. bonariensis (*I. jicifolia*).—A fine species from Buenos Ayres, with heart-shaped leaves cut into three to five lobes, and more or less tubular lilac-purple flowers (*Bot. Mag.* t. 3665; *Bot. Reg.* 1841, t. 13).

I. Jalapa (*Convolvulus Jalapa*), FALSE JALAP.—A native of S. United States, with large tuberous roots, membranous, heart-shaped, pointed leaves, and inflated tubular flowers of red, white, or clear bright pink colour (*Bot. Mag.* t. 1572).

I. pandurata (*Convolvulus panduratus*; *C. candicans*).—The large fleshy roots of this United States species often weigh from 2 to 16 lbs. The heart-shaped pointed leaves are somewhat downy beneath, and the white flowers are tinted with purple in the throat. (*Bot. Mag.* tt. 1603, 1939.)

I. paniculata.—An East Indian species, having leaves palmately divided into five to seven ovate lance-shaped or elliptic lobes, and large purple flowers in June.

I. Purga (*Exogonium Purga*).—This species from Xalapa, Mexico, yields the true purgative jalap of commerce. It has blackish tuberous roots about the size of an orange, and the climbing stems, 10 to 20 ft. long, are furnished with heart-shaped pointed leaves lobed at the base. The long-tubed, rose-purple, funnel-shaped flowers appear in late summer or autumn, and are only of short duration; others appear in quick succession. (*Bot. Reg.* 33, t. 49.)

The Jalap plant may be grown in a

cool greenhouse with ease. If the roots are protected with a heap of ashes in winter, it will flourish in the open air.

I. Woodi.—A tuberous-rooted species from Zululand, having woody stems, heart-shaped, purple-tinted leaves, and short-stalked clusters of large bell-shaped, rosy-purple flowers.

IRIS (from *iris*, the eye; referring to the variety and beauty of the flowers). Nat. Ord. Iridæ.—A genus containing nearly 200 species of ornamental herbaceous plants with woody or fleshy root-stocks or spindle-shaped bulbs, and sword-like, linear, or angular leaves. The flowers emerge from sheathing scales, sometimes singly, but often scattered on an erect scape. Perianth-tube short, with the three outer segments (or "falls") reflexed and often "bearded" at the base; the three inner segments (or "standards") erect, often smaller than the falls. Stamens three, inserted at the base of the falls, and sheltered beneath the three winged and overarching petal-like stigmas.

The species belonging to the genus being so varied in character and appearance, were at one time placed in several distinct genera by various authors. The introduction of new species and a closer examination of the plants, however, show that the various sections are all built on much the same lines.

For garden purposes it may be convenient to divide Irises roughly into four main groups, as follows:—1. "Bearded" Irises; 2. "Beardless" Irises; 3. "Oncocyclus," or "Cushion" Irises, with which may be associated those known as "Regelia" Irises; and 4. "Bulbous" or "Xiphion" and "Juno" Irises.

Of these groups, the first three agree in the main in having *rhizo-*

matous root-stocks of a woody or fleshy character; the fourth group comprises species the great majority of which have a distinctly *bulbous* root-stock, and are also much dwarfer in habit, with narrow angular leaves, and small flowers remarkable for their brilliant and varied colouring.

The following classification will give a clearer view of the principal species belonging to the various groups:—

I.—BEARDED AND CRESTED IRISES.

<i>I. Alberti.</i>	* <i>I. kumaonensis.</i>
<i>I. balkana.</i>	* <i>I. lacustris.</i>
<i>I. Bartoni.</i>	<i>I. lutescens.</i>
<i>I. benacensis.</i>	<i>I. Meda.</i>
<i>I. biflora.</i>	* <i>I. Milesi.</i>
<i>I. Biliotti.</i>	<i>I. neglecta.</i>
<i>I. Chamæiris.</i>	<i>I. pallida.</i>
<i>I. Ciengialti.</i>	<i>I. plicata.</i>
* <i>I. cristata.</i>	<i>I. pumila.</i>
* <i>I. Duthiei.</i>	<i>I. rubro-margi-</i>
<i>I. Eulefeldi.</i>	<i>nata.</i>
<i>I. flavescens.</i>	<i>I. sambucina.</i>
<i>I. florentina.</i>	<i>I. squalens.</i>
<i>I. germanica.</i>	<i>I. Sverti.</i>
* <i>I. gracilipes.</i>	* <i>I. tectorum.</i>
* <i>I. Hookeriana.</i>	<i>I. variegata.</i>
<i>I. hybrida.</i>	

There are two distinct sections of the Bearded Irises, the most showy of which has been called "Pogoniris" by Mr Baker in his *Handbook of the Iridæ*. The other group, distinguished by an asterisk (*), are known as "Evansia" and "Pseudevansia."

The Bearded Irises, of which the Common Flag (*I. germanica*) may be taken as the best-known type, are recognised by having stout creeping root-stocks, sword-like leaves, and an erect stalk with several flowers. They are a charming group of garden plants, and most of them being perfectly hardy and vigorous, and free in blossom, are easily grown in almost any good garden soil. Before

planting, this should be trenched, and have some old or well-rotted manure dug into it. The best time for planting this group is in early autumn, at which season the stock may also be increased if necessary by dividing the rhizomes. As a rule, a somewhat shaded position will suit the plants better than a very sunny one, as the flowers, which are naturally of a fleeting character, thus last longer.

II.—BEARDLESS IRISES.

<i>I. aurea.</i>	<i>I. missouriensis.</i>
<i>I. bracteata.</i>	<i>I. Monnierii.</i>
<i>I. cretensis.</i>	<i>I. nepalensis.</i>
<i>I. Douglasiana.</i>	<i>I. orientalis.</i>
<i>I. foetidissima.</i>	<i>I. Pseudacorus.</i>
<i>I. fulva.</i>	<i>I. ruthenica.</i>
<i>I. graminea.</i>	<i>I. setosa.</i>
<i>I. Grant Duffi.</i>	<i>I. sibirica.</i>
<i>I. Guldenstædt-</i>	<i>I. spuria.</i>
<i>tiana.</i>	<i>I. tenax.</i>
<i>I. hexagona.</i>	<i>I. trojana.</i>
<i>I. lævigata.</i>	<i>I. unguicularis.</i>
<i>I. longipetala.</i>	<i>I. versicolor.</i>

CULTURE. — The chief difference between this group and the preceding one is the absence of hairs or "beard" on the falls, and in their somewhat more varied character. The same cultural conditions will not suit all alike, and while some grow quite easily in ordinary garden soil, others are somewhat fastidious and require special attention. These points will be noted under the different species as required.

III.—ONCOCYCLUS OR "CUSHION" AND "REGELIA" IRISES.

<i>I. acutiloba.</i>	<i>I. Haynei.</i>
<i>I. atrofusca.</i>	<i>I. Helenæ.</i>
<i>I. atropurpurea.</i>	<i>I. Heylandiana.</i>
* <i>I. Barnumæ.</i>	<i>I. iberica.</i>
<i>I. Bismarckiana.</i>	* <i>I. Korolkovi.</i>
<i>I. Gatesi.</i>	* <i>I. Leichtlini.</i>

<i>I. Lorteti.</i>	<i>I. Sofarana.</i>
<i>I. lupina.</i>	* <i>I. Suworowi.</i>
<i>I. Maria.</i>	<i>I. Susiana.</i>
<i>I. paradoxa.</i>	* <i>I. vaga.</i>
<i>I. Sari.</i>	

The "Oncocyclus" or "Cushion" Irises as they are called, are remarkable for their large and showy blossoms, the outer segments of which are diffusely hairy down the claw and the lower part of the blade or "fall." The "Regelia" group, distinguished above by an asterisk (*), are somewhat similar in appearance, and form the connecting link between the large and showy Bearded Irises of the Pogoniris group. As mentioned below, the Oncocyclus and Regelia Irises are readily intercrossed, and several fine hybrids have been raised between them. In the near future we may expect other hybrids between these and the most ornamental of the Bearded Irises like *I. florentina*, *I. germanica*, etc.

CULTURE.—In regard to this group of Irises, I cannot do better than quote from the *Practical Guide to Garden Plants* as follows:—

These are usually the largest, most charming, and most beautifully coloured of all the Irises; but unfortunately they are also the most difficult to grow thoroughly well. According to the late Sir Michael Foster, F.R.S., who had devoted many years to the cultivation and study of these Irises, the characteristics of the group are as follows. In the rhizome the young bud, instead of being attached to the stock by a broad flattened base, and projecting slightly, stands out in the form of a nipple, the base of which is often constricted. In many forms the attachment is lengthened into a cord, often a very narrow one, so that the bud is at the end of a stolon.

According to the narrowness and length (or the reverse) of the connection of the bud with the stock, the rhizome may be spoken of as more or less spreading or creeping, or more or less compact.

The foliage as compared with other Irises is scanty, and the leaves narrow, and mostly sickle-shaped. The flower-stem or scape usually bears only a single flower, which is conspicuous by its size, colour, and marking. The "falls" are usually more or less bearded at the base, and occasionally there are also a few hairs on the claw of the standards. There is another group of Irises closely allied to the Oncocyclus, but as the flowers are somewhat different in shape, and more than one on a stem, they have been distinguished by Sir Michael Foster under the name of "Regelia." *I. Korolkowi* represents this section.

Notwithstanding the fact that Oncocyclus Irises are somewhat difficult to grow successfully, the great beauty and variety of form of their flowers will be an ample recompense for any special trouble taken with them. The main points in their cultivation are (1) shallow planting, (2) gritty, well-drained soil, (3) non-disturbance in autumn, and (4) absence of wet overhead and at the root from the time the leaves wither until growth starts again naturally.

The Rev. Mr Ewbank, of Ryde, I.W., who, as well as Sir Michael Foster and Herr Max Leichtlin of Baden-Baden, has devoted much attention to the cultivation of this group of Irises, has placed on record in *The Garden* the method by which he has succeeded in growing them almost to perfection. He makes a raised bed some 6 ins. or so above the surrounding soil, and uses road

scrapings pure and simple in which to plant his Irises. This soil is light, rich, gritty, and easily penetrated. Moreover it cakes at the top, and even in hot weather does not become dead dry if no glass be put over it. When the plants have finished flowering in early summer a light is placed over them, in such a way that there is free circulation of air. This protects the ripening plants from rain, and they can dry off in the soil without being disturbed. To ensure a dry bottom, Mr Ewbank placed about 1 ft. beneath the surface of the soil some paving-stones, and thus prevented the ascent of moisture from the subsoil.

The best time to plant *Oncocyclus* Irises is the first week in June, and if the methods of Mr Ewbank are adopted (or a modification of them, so long as the principle remains the same), there is every chance of securing success. With a dry well-drained bottom, the beds only require to be covered with a layer of straw or litter from the time of planting—say 1st November till about 1st February—simply to keep off excessive rains.

HYBRIDS BETWEEN THE "ONCOCYCLUS" AND "REGELIA" IRISES.

For some years past attempts have been made to secure a new race of hardy Irises by combining the best qualities of the *Oncocyclus* and *Regelia* groups. Such a race is now an established fact, thanks to the enterprise of Mr C. G. Van Tubergen, jun., of Haarlem. During the past eight or nine years he has been fertilising the finest and most perfect forms of the *Regelia* group—such as *Korolkowi*, *vaga*, *Leichtlini*, and *Suworowi*—with pollen from the best

forms of such *Oncocyclus* Irises as *Susiana*, *Mariae*, *Lorteti*, *iberica*, *Gatesi*, etc.

The new hybrid Irises, however, to which the name of "*Regelio-Cyclus*" has been given, not only flower freely but increase rapidly. They delight in a good sandy loam, to which may be added a liberal quantity of well-decomposed cow-manure. The soil must be dug to a depth of 2 or 3



FIG. 192.—Iris, *Regelio-Cyclus* forms. (4.)

ft., so as to secure perfect drainage. This is a most important condition, as anything like stagnant water in the soil is likely to cause the rhizomes to decay during the winter months. Stiff, heavy soils must be made lighter and more porous by the addition of plenty of sand or grit, and it is wise to surround the rhizomes with a good layer of sand at the time of planting. Besides the sand and cow-dung, it is also an advantage to add a little mortar rubble, as these

Irises enjoy a certain amount of chalk or lime in the soil.

The rhizomes should not be planted too deeply, otherwise the growths are apt to come up weakly, and the flower-spikes may fail to develop. In heavy soils, the rhizomes may be covered with about 2 ins. of soil, while another $\frac{1}{2}$ in. or so may be added in light or friable soils. The roots, when present on the rhizomes, should be carefully spread out and not huddled together, so as to encourage the development of thread-like fibres before the winter sets in.

The best time to plant the rhizomes is from the beginning to the end of October. There is no real necessity to plant before the middle of September; but on the other hand, it is very detrimental—if not fatal—to keep the plants out of the ground until November.

Although the *Regelio-Cyclus* Irises are hardy, it is advisable to plant them in the warmest and most sheltered part of the garden if the best results are to be secured. They like plenty of sunshine to enable them to come to early maturity. The best position, therefore, for them would be on a sheltered border facing due south, and one in which the soil has been dug and manured as recommended above.

During the summer months the leaves begin to fade. This indicates the approach of maturity and the gradual cessation of growth, and brings the season to about the middle of July. At this time the rhizomes should be carefully lifted and allowed to dry in a shady spot for a few days, after which the leaves may be cut down, the roots trimmed a little, and the rhizomes stored away in dry sand or earth until the time for planting again comes round.

IV.—“BULBOUS” OR “XIPHION” AND “JUNO” (J) IRISES.

- | | |
|----------------------------|-----------------------------|
| <i>I. Aitchisoni</i> (J). | <i>I. persica</i> (J). |
| <i>I. alata</i> (J). | <i>I. reticulata</i> . |
| <i>I. Bakeriana</i> . | <i>I. Rosenbachiana</i> |
| <i>I. Boissieri</i> . | (J). |
| <i>I. caucasica</i> (J). | <i>I. serotina</i> . |
| <i>I. Danfordiæ</i> (J). | <i>I. sirdjarensis</i> (J). |
| <i>I. filifolia</i> . | <i>I. Sisyrrinchium</i> . |
| <i>I. Fosteriana</i> (J). | <i>I. stenophylla</i> . |
| <i>I. fumosa</i> (J). | <i>I. tingitana</i> . |
| <i>I. juncea</i> . | <i>I. tuberosa</i> . |
| <i>I. Kolpakowski-</i> | <i>I. Vartani</i> . |
| <i>ana</i> . | <i>I. xiphioides</i> . |
| <i>I. orchivoides</i> (J). | <i>I. Xiphium</i> . |

CULTURE, ETC.—The “Bulbous” Irises are a charming group, and are gradually winning their way into many gardens. Many, however, are merely of botanical interest. The best-known examples are the Spanish Irises (*I. Xiphium*), and the English Irises (*I. xiphioides*), which have been grown for many years, the Spanish Irises being especial favourites, not only in private gardens, but in market gardens. Most of the plants in this section have a roundish or spindle-shaped bulb or root-stock, from which arise narrow, ribbed, furrowed, or grass-like leaves, and flowers of beautiful colour.

With some of the rarer kinds attention must be given to cultural details. A warm sunny position should be chosen, and the soil should be deeply dug and of a rich and gritty nature. Once planted, they are best left undisturbed for three or four years, until they become well established and perhaps too close together. The best and safest time for lifting the bulbs is when the leaves have withered. The large and small bulbs should be separated from each other and replanted in different places. When the stock of any par-

ticular species or variety is limited, it is better to grow the plants in pots or pans. In this way they can be looked after more easily, but must be properly supplied with moisture during the growing period.

When seeds are ripened, they should be sown in rich gritty soil in well-drained pots or pans, and kept in cold frames. For two or three seasons the young plants should be grown singly in small pots, or several in a large one, until sturdy enough for the flower-border.

ALPHABETICAL LIST OF SPECIES.

The following is a short descriptive list of the best Irises met with in gardens, and arranged in alphabetical order. The word "fall" means the three outer segments, and the word "standard" means the three inner segments of the flowers. The three petal-like stigmas, each one usually sheltering a single stamen in the centre, must not be confused with the falls and standards.

I. acutiloba.—A rare and distinct Caucasian *Oncocyclus* Iris, with slender creeping root-stocks and narrow slender leaves curved into a semicircle. Falls almost strap-shaped, with a sharply reflexed lance-shaped blade, pale lilac and dark purple with darker distinct veins, and a ridge of dense, short, dark purple or blackish hairs at the base; standards pale lilac. (*Gartenfl.* t. 812, f. 1.)

I. Aitchisoni.—A species from the Punjab, with purplish flowers. The claw of the fall has radiating purple veins on a creamy-yellow ground, the blade being rich deep purple with an orange crest. (*Gard.* 1898, t. 1182.)

This is a bulbous Iris of the Juno group. The variety *chrysantha* has bright yellow flowers.

I. alata (*I. scorpioides*; *I. transtaganica*; *I. trialata*; *I. microptera*;

Xiphion alatum).—A handsome bulbous Iris, native of S. Europe and N. Africa, with lance-shaped, pointed, pale green, distichous leaves about 1 ft. long. Flowers from October to December, with a bright lilac-purple limb about 3 ins. deep; falls oblong, with bright yellow ridge at the base; standards somewhat spoon-shaped, 1 in. long, spreading horizontally. (*Bot. Rey.* t. 1876.)

This species varies a good deal, and several forms have received special names like *ilacina*, *speciosa*, *cinerea*, *nigrescens*, *cupreata*, *magna*, *Leichtlini*, *pallida*, *alba*, etc.

I. Alberti.—A native of Turkestan, with a stout root-stock and sword-like slightly glaucous leaves 1½ to 2 ft. long. The large bright lilac flowers appear in May and June, having densely bearded falls veined with dull brown and lilac on a white ground. (*Bot. Mag.* t. 7020.)

I. alborpurpurea.—A Japanese species closely related to *I. hexagona*. It has white flowers spotted with purple, the inner segments being erect. (*Bot. Mag.* t. 7511.)

I. aphylla (*I. furcata*).—A Central European and Caucasian Iris, with leaves 6 to 12 ins. long and less than 1 in. broad. The dark lilac flowers are about 2½ ins. long, having a white beard. (*Bot. Mag.* t. 2361; *Bot. Rey.* t. 801.)

I. Aschersoni.—This species from Asia Minor is closely related to *I. Grant Duffi*, but has much narrower leaves, and the flowers are greenish-yellow with purple lines (*Gard.* 1902, lxi. 288, ff.).

I. asiatica.—This is closely related to *I. germanica*, but has larger flowers. It has grey-blue standards, with falls of a rich bluish-purple, and yellow and brown veins. Native of Asia Minor.

I. atrofusca.—A beautiful *Oncocy-*

clus Iris from Palestine. It has weak pale green or slightly glaucous leaves about a foot long. The large solitary flowers are of a deep violet-purple colour. The wedge-shaped falls are about 3 ins. long, $1\frac{1}{2}$ ins. broad, and of a deep almost blackish velvety-purple, bearded at the base with brownish black and yellow hairs. The roundish standards are much larger, and of a deep violet-purple distinctly veined with radiating lines and dots of a deeper colour.

I. atropurpurea.—A Syrian species related to *I. iberica*. Flowers with



FIG. 193.—*Iris atropurpurea*. (3.)

narrow ovate falls blotched and bearded with yellow at the base and tipped with dark purple or black; standards larger and roundish, deep black-purple, with veins of a deeper colour. Style reddish purple-brown with smallish quadrate crest. There is an improved Italian form called

“Odysseus.” (*Ill. Hort.* t. 1889; *Gartenfl.* t. 136.)

I. atrovioleacea.—This is probably a hybrid between *I. Chamæiris* and *I. pallida*. It has sword-shaped, very glaucous leaves about 1 ft. long and 1 inch broad. The large dark violet flowers are very fragrant and generally appear about May, the falls having a white beard tipped with yellow.

I. aurea.—A handsome beardless Himalayan Iris, 3 to 4 ft. high, with stout stems and sword-like leaves about 2 ft. long. Flowers in June, bright golden-yellow; falls oblong, crisped at the edges; standards ob lanceolate, shorter than the falls. (*Bot. Reg.* t. 59; *Garden*, 1887, t. 579.) The variety *intermedia* resembles the type in colour, but has the narrow standards of *I. orientalis*.

I. Bakeriana.—A pretty Armenian



FIG. 194.—*Iris Bakeriana*. (3.)

Iris with ovoid bulbs and cylindrical, eight-ribbed, horny-pointed leaves

about 1 ft. long. Flowers from January to March, very fragrant, having narrow oblanceolate standards of a sky-blue colour, and broader, oblong, spoon-shaped more or less erect "falls," white, blotched with deep blue or violet, and edged with deep violet. The flowers vary a good deal in colour, and include a beautiful white form. (*Bot. Mag.* t. 7084.)

I. balkana.—A tufted species about 1 ft. high, native of the Balkan mountains, with sharp-pointed sword-like leaves. Flowers dark purple-lilac, the fall having a dense white beard tipped with lilac.

I. Barnumæ.—A *Regelia* Iris from the hills of Kurdistan, with slender



FIG. 195.—*Iris Barnumæ.*

root-stock and stems only a few inches high. It comes near *I. iberica*, but has narrower and less sickle-shaped leaves, and smaller and less attractive dull wine-purple flowers, marked with deeper coloured veins, and a brownish-yellow style blotched and spotted with

reddish-purple. Falls smaller and narrower than the roundish standards, and having a beard of yellow hairs tipped with purple. There is a charming yellow-flowered variety. (*Bot. Mag.* t. 7050.)

I. Bartoni.—A handsome Afghan species, with pale green sword-like leaves about 18 ins. long and $1\frac{1}{2}$ to 2 ins. broad, strongly ribbed. Flowers in June, strongly scented, having creamy-white falls veined with greenish-yellow, violet-purple on the claw, and a white and orange beard; standards creamy-white veined with purple. (*Bot. Mag.* t. 6869.)

I. benacensis.—A native of the Southern Tyrol, 12 to 15 ins. high, with sword-like leaves. The flowers have long obovate deep violet falls, with still deeper veins, and end in a whitish claw veined with coppery violet, while the beard is white at the base and yellow above. The broad oblong standards are violet, as are also the triangular crests of the stigma.

I. biflora (*I. fragrans*; *I. nudicaulis*; *I. subbiflora*).—A beautiful S. European Iris 9 to 18 ins. high, with a stout short creeping root-stock and blue-green sword-like leaves. Flowers in April, bright violet-purple; the obovate falls having a yellow beard. (*Bot. Mag.* t. 5806.)

I. Biliotti.—A handsome Iris of the *germanica* group, $2\frac{1}{2}$ to 3 ft. high, native of Asia Minor. The flowers are very fragrant. The wedge-shaped falls are about $3\frac{1}{2}$ ins. long, reddish-purple with dark, almost black, veins, and a white beard tipped with yellow. The standards are about $3\frac{1}{2}$ ins. long and 2 ins. broad, bluish-purple with fine delicate deep blue veins.

I. Bismarckiana.—A handsome Cushion Iris from Mount Lebanon, having creeping root-stocks and leaves like *I. Susiana*, and flowers veined

with dark reddish purple-brown on a pale yellow ground, and bearded at the base with dark purple or blackish hairs; standards veined with blue on a creamy-white ground.



FIG. 196.—*Iris Bismarckiana*. ($\frac{1}{2}$.)

I. Boissieri.—A dwarf bulbous Iris about 1 ft. high, native of the Gerez Mountains in Spain, with linear leaves. Flowers in June, 2 to 3 ins. across, with fiddle-shaped spreading falls of rich red-purple, and a distinct golden-yellow bearded ridge; standards purple above, reddish below; styles reddish-purple with darker veins. (*Bot. Mag.* t. 7097.)

I. Bolleana.—A native of Asia Minor, with tufts of limp and strangely curled leaves, and clear yellow flowers with or without bright violet blotches on the tips of the inner segments.

I. bosniaca.—A Bosnian Iris 1 to 1½ ft. high, having clear yellow flowers (*Gard.* 1898, 441).

I. bracteata.—A distinct Iris from Oregon. It has solitary rigid leaves 1 to 2 ft. long and about $\frac{1}{2}$ in. broad. The large almost pure yellow flowers have falls veined with bluish-purple. As a rule, the body colour changes to white and the veins to deep rose with age.

I. bucharica.—A pretty Iris in the way of *I. orchoides*, but having



FIG. 197.—*Iris bucharica*.

broader leaves. The white and yellow flowers appear in April on stems about 1 to 1½ ft. high. Native of Bokhara. (*Gard. Chron.* 1902, xxxi. 385, f. 135; *Flora and Sylva*, December 1905.)

I. Caroliniana.—This is closely related to *I. versicolor*, from which it differs by its erect, glaucous, much shorter leaves.

I. caucasica.—A bulbous Iris, native of the Caucasus to Persia, about 6 ins. high, with four to six lance-shaped sickle-like leaves. Flowers in February and March, 2 to 3 ins. across, pale yellow. The variety *major* is larger,

the ridge of the falls being of a deeper or orange-yellow, toothed or even fringed with hair-like processes; the variety *Kharput* has flowers greenish-yellow, except the central orange ridge of the falls. *I. assyriaca*, with white flowers, closely resembles *I. caucasica*.



FIG. 198.—*Iris caucasica*. (3.)

I. Chamæiris.—A pretty S. European species 4 to 6 ins. high, with tufts of pale green leaves about $\frac{1}{2}$ in. broad. Flowers in April, bright yellow tinged and veined with brown, and having a bright orange-yellow beard. (*Red. Lil.* t. 263.) The variety *balkana* has bright lilac-purple flowers; *olbiensis* has the falls white at the base, veined with purple, bearded with white and tipped with yellow. (*Bot. Mag.* t. 6110.)

I. chrysantha.—A bearded Iris with narrow leaves, long peduncles, and pale yellow flowers (*Bot. Mag.* t. 7784).

I. Ciengialti.—A pretty Iris from Mount Ciengialto, having yellow-green leaves 6 to 9 ins. long and about $\frac{1}{2}$ in. broad. Flowers in May and June, sky-blue flushed with violet, the falls having a thick stunted white beard tipped with orange. The variety *Loppio* has blue-green leaves, and rich deep blue flowers. (See *Gard. Chron.* 1886, 554, 586.)

I. Colletti.—This is the name of

the plant hitherto known as *I. nepalensis letha*. It is a native of Upper Burmah, and has deliciously fragrant flowers of a delicate lavender colour. (*Bot. Mag.* t. 7889.)

I. Cosniæ.—A dwarf species, with large flowers, the standards being clear yellow with dark purple markings, the falls being similar, but pencilled with purple (*Gard.* xlvii. 351).

I. cretensis.—A native of S.E. Europe, with dense tufts of erect, stiffish, narrow, linear, ribbed leaves, in the centre of which the deep lilac flowers veined with bright yellow nestle in April and May (*Bot. Mag.* t. 6343).

I. cristata.—A handsome species 4 to 6 ins. high, native of the Eastern United States, with rosettes of linear leaves. Flowers in April and May, rich amethyst-blue, with blunt obovate falls having a yellow beardless crest and beautifully fringed edges. (*Bot. Mag.* t. 412; *Red. Lil.* t. 76.)

I. Cypriana.—A native of Cyprus, closely related to *I. pallida*. It has bright lilac sweet-scented flowers 6 to 7 ins. across when open, late in June. (*Gard. Chron.* 1888, ii. 182.)

I. Danfordiæ (*I. Bornmülleri*).—A charming little bulbous Iris about 3 ins. high, with four-sided horny-pointed leaves. Flowers in February or earlier, bright golden-yellow spotted with brown; falls oblong, spoon-shaped; standards reduced to a mere bristle. (*Bot. Mag.* t. 7140; *Garden*, 1890, 753.) It belongs to the Juno group, and is a native of the Cilician Taurus.

I. Delavayi.—A tall-growing Chinese species nearly related to *I. sibirica*. The flowers are of a beautiful violet colour, blotched with white. (*Rev. Hort.* 1895, 398, ff. 128-9.)

I. demavendica.—A distinct

Cushion Iris about 6 ins. high, from Mt. Demavend in Persia. The stems bear two large rich claret-red flowers, the standards of which are paler, and the falls richly veined. (*Gard. Chron.* 1906, xxxix. 364.)

I. Douglasiana.—A slender Californian species 6 to 12 ins. high, with tufts of thick, stiffish, strongly-ribbed, linear leaves. Flowers in June, soft yellow, $1\frac{1}{2}$ to 2 ins. deep; falls handsomely veined with bright lilac-purple. (*Bot. Mag.* t. 6083; *Gartenfl.* t. 1222.)

I. Duthiei.—A native of N. India, with knotty rhizomes and yellowish-green leaves about 2 ft. long and $\frac{1}{2}$ in. broad. The solitary sessile flowers appear in May. The lance-shaped falls are reddish-lilac above, with darker veins and blotches, and a white beard tipped with yellow at the base; greenish-yellow beneath, with the veins and blotches showing through. The oblong ovate standards are pale reddish-lilac with darker veins.

I. Eulefeldi.—A native of Eastern Turkestan, about 1 ft. high, with blue-green sickle-shaped leaves 1 ft. or more long. Flowers in May and June, reddish-purple; falls purple, with a long white and bluish-purple beard; standards purple and reddish-purple, with a yellowish claw. (*Bot. Mag.* t. 6902.)

I. Ewbankiana.—A Persian Cushion Iris near *I. acutiloba* and *I. Meda*, having creamy-white flowers veined with brown purple, and distinguished by having its lance-shaped outer segments spreading horizontally (*Gard. Chron.* 1901, xxix. 397, f. 152; *Rev. Hort.* 1901, ff. 172, 173).

I. filifolia (*Xiphium filifolium*).—A native of S. Spain and N. Africa, resembling *I. Xiphium* in bulb and foliage, and having slender roundish stems 12 to 18 ins. high, with six or more filiform leaves over a foot long, the outer ones mottled with purple.

Flowers about the end of June, bright deep purple, spotted with black, and having a patch of orange on the blade of the large oblong, fiddle-shaped fall. (*Bot. Mag.* t. 5928.)

I. flavescens.—A native of E. Europe and W. Asia, 2 to 3 ft. high, with the habit and foliage of *I. germanica*. Flowers in May, lemon-yellow; falls bearded with orange-yellow and veined at the base with purple-brown. (*Bot. Reg.* 1845, t. 35.)

I. flavissima.—A native of Asia Minor, 4 to 6 ins. high, with sword-shaped leaves, and rich lemon-yellow flowers about $1\frac{1}{2}$ ins. across. The large roundish falls have an orange-yellow hairy ridge, while the erect spoon-shaped standards are much smaller. (*Gard. Chron.* 25th May 1901, 326, f.)

I. florentina (*Florentine Iris*).—A fine fragrant S. European species, with thick, fleshy, creeping rootstocks, tufts of blue-green sword-like leaves, and flower-stems 2 to 3 ft. high. Flowers in May and June, 3 to 6 ins. deep, whitish, tinged with pale lavender, and having a bright yellow beard on the falls. The flowers in the variety *albicans* are almost pure white. (*Bot. Mag.* tt. 273, 671.)

I. foetidissima (*Fetid Gladwin*; *Roast Beef Plant*).—A beautiful British Flag, with flower-stems 2 to 3 ft. high, and deep green sword-shaped leaves. Flowers from May to July, usually purple or bluish-lilac, 2 to 3 ins. deep. There is a variety with pretty variegated foliage, striped with ivory-white lines, which looks particularly handsome in spring.

The Gladwin flourishes in moist and partially shaded places in ordinary garden soil, and is rendered conspicuous in the autumn by its bursted pods of orange-scarlet seeds.

I. Fosteriana.—A pretty bulbous

Iris, about 1 ft. high, native of Afghanistan, with slender elongated bulbs, having fleshy roots and linear leaves, not unlike those of the Spanish Iris (*I. Xiphium*), but much striped on the outside. Flowers in March, about 2 ins. across, with yellow falls and styles, but reddish-purple standards. (*Bot. Mag.* t. 7215.)

This species is very difficult to grow; according to the late Sir M. Foster a moderately stiff soil suits it best. It should be kept as dry as possible in winter, and hot in summer. It should be sheltered from winds and kept free from the roots of trees and shrubs.

I. fulva.—A United States beardless Flag, 2 to 3 ft. high, with bright green, narrow, sword-shaped leaves.



FIG. 199.—*Iris fulva*. (1.)

Flowers in June, bright coppery brown, 2 to 3 ins. deep, the oblong clawed falls having a reddish-brown down on the keel. (*Bot. Mag.* t. 1496.) Also known as *I. cuprea*.

I. fumosa (*Xiphion Aucheri*).—A

Syrian species related to *I. sindjarensis*, from which it differs in having shorter and broader leaves, and in the stem bearing eight to ten greenish-yellow smoky tinted flowers in April.

I. galatica.—A native of Asia Minor related to *I. persica*. The colour of the flowers varies from greenish-yellow to silver-grey suffused with purple, and with deeper purple falls. (*Gard.* 1905, lxvii, 203.)

I. Gatesi.—A large and handsome Cushion Iris from Armenia, resembling *I. Susiana*, but having a more compact rhizome, and shorter, narrower, and deeper green leaves. The blooms appear in June, and are of a soft delicate grey—the result of very thin clear veins and minute purple dots on a creamy-white ground. The hairs on the claw beneath the grey or brownish style flecked with dark purple are crowded into a diffuse beard. The ripe capsule is often 5 ins. long. The plants should be sheltered as much as possible from wind. (*Gard. Chron.* 1890, ii, 18, f.; *Garden*, 1893, t. 897.)

I. germanica (*Common or German Flag*).—This well-known Iris from Central and S. Europe has a thick, fleshy, creeping root-stock, tufts of glaucous sword-like leaves, and flower-stems 2 to 3 ft. high, bearing many large fragrant and elegant purple and lilac blossoms in May and June; the falls have a conspicuous yellow beard on a whitish ground veined with brown. (*Bot. Mag.* t. 670.)

There are many forms, all beautiful and easily grown, the best being *alba*, white; *atropurpurea*, deep reddish-purple; *grisea*, white veined and netted with lilac; *major*, large, blue and purple; *Agnes*, pale lavender and blue; *Arlequin*, brown and black; *Argus*, violet; *Calypso*, white streaked

with purple; *Canary Bird*, yellow; *Laura*, pale yellow and deep purple; *Lucretia*, porcelain, striped purple; *Othello*, yellow and violet; *Sappho*, golden-yellow and bright blue; etc.



FIG. 200.—*Iris germanica*. (½.)



FIG. 201.—*Iris Grant Duffii*. (½.)

I. gracilipes.—A somewhat tender Japanese species 6 to 12 ins. high, with a slender branching root-stock, narrow pointed leaves 6 to 12 ins. long, and with purple or lilac flowers about 2 ins. across, with yellow crests (*Bot. Mag.* t. 7926).

I. graminea.—A pretty beardless Iris from Central and Southern Europe, with tufts of linear grassy leaves 12 to 18 ins. long. Flowers slightly fragrant, produced in May and June, bright lilac-purple in colour, 1½ to 2 ins. deep, the roundish falls being veined with bluish-purple on a white ground. (*Bot. Mag.* t. 681.)

I. Grant Duffii.—A pretty species, native of the Holy Land, recognised

I. Guldenstœdtiana (*I. halophila*; *I. stenogyne*).—A beardless Siberian Iris with stout flower-stems about 2 ft. high, and firm, sharp-pointed, sword-like leaves. Flowers in June, 2 ins. deep; falls white with an orange base; standards pure white with a yellow keel and margin. There is an almost pure white variety, *alba*, and a blue one called *cœrulea*.

I. Haynei.—A native of Palestine, closely related to *I. Savi*. It has weak linear leaves 6 to 9 ins. long and about ½ in. broad. The huge flowers are soft lavender-purple beautifully veined and dotted with deep purple. The falls are deeper in colour than the standards, having a blackish blotch and numerous blackish-purple hairs on the basal

portion. The plant grows $1\frac{1}{2}$ to 2 ft. high, and flowers in April.



FIG. 202.—*Iris Haynei*. (3.)

I. Heldreichi (*I. stenophylla*).—A beautiful bulbous Iris, native of the Cilician Taurus. It grows 3 to 5 ins. high, and has tufts of grass-like channelled leaves which are only 2 to 3 ins. high when the flowers appear in February and March. The blooms are 3 to 4 ins. across, soft mauvy purple, the falls having a large triangular blotch of black velvety purple in front of the raised yellow crest, on each side of which are purplish spots or blotches. *Gard. Chron.* 1900, xxviii. 170, f. 55; *Bot. Mag.* t. 7743.)

I. Helenæ.—A lovely Iris, native of Egypt and Palestine, closely related to *I. iberica* and *I. Mariæ*, with large flowers having bright lilac standards and purple falls veined with black, and having a velvety-black blotch at the base.

I. hexagona.—A native of the

South United States, 3 to 4 ft high, with sword-shaped leaves 2 to 3 ft. long and over an inch wide. Flowers in April and May, pale or deep lilac, with spoon-shaped standards and obovate clawed falls. Closely related to this species is the Japanese *I. albopurpurea*, which has white flowers spotted with purple. (*Bot. Mag.* t. 6787.)

I. Heylandiana.—A rare Cushion Iris from Mesopotamia. It is near *I. Sari*, but the leaves are somewhat narrower. Both falls and standards are marked with brown-violet or black-purple veins, on a dingy white ground. The beard on the fall is white, more or less tinged with yellow.

I. Hookeri (*I. tripetala*).—A Canadian Iris, with narrow sword-shaped leaves 1 to $1\frac{1}{2}$ ft. long, and bright lilac flowers over 2 ins. long, the falls having a roundish blade. This species is like *I. versicolor*, but has small wedge-shaped pointed standards. (*Bot. Mag.* t. 2886.)

I. Hookeriana.—A Bengalese Iris with rather fleshy rhizomes and yellowish-green leaves about a foot long. Falls obovate lance-shaped, densely bearded, with white hairs tipped with orange and bluish-purple with darker blotches. The narrow obovate standards are bluish-purple. (*Bot. Mag.* t. 7246.)

I. hybrida (*I. amœna*).—Under this name comes a large number of garden Irises, derived probably by hybridising and cross-breeding *I. germanica*, *I. variegata*, *I. squalens*, and other species. The sword-like leaves are a foot or more long. The large flowers appear in June, and usually have whitish, pale lilac, violet, yellow, brown, and generally pale coloured standards, and deeper coloured falls (lilac, purple, etc.), with a bright yellow beard on a white ground, and

variously blotched and striped. (*Red. Lil.* t. 336.)

I. iberica.—A strikingly handsome Cushion Iris from the Caucasus, with a compact rhizome, and sickle-shaped leaves 4 to 6 ins. long. Flowers in May, pale lilac, distinctly lined and speckled with purple; falls roundish, creamy-white with black-purple



FIG. 203.—*Iris iberica*. (1.)

blotches and a conspicuous deep velvety blackish-purple blotch at the base. (*Bot. Mag.* t. 5847.) The variety *ochracea* has rich orange falls tinged with brown, and standards nearly pure white. *Belli* has dark lilac standards. *Van Houttei* is a natural hybrid between *I. iberica* and *I. Susiana*.

I. juncea (*I. imberbis*; *I. mauritanica*).—A graceful bulbous Iris, native of S. Italy and Spain, and N. Africa, with roundish bulbs and slender rush-like leaves about 1 ft. long, appearing late in autumn.

Flowers in June and July, very fragrant, rich golden-yellow; the falls are broadly fiddle-shaped, and much larger than the oblanceolate notched standards. The variety *pallida* is a soft canary-yellow, and *numidica* is lemon-coloured. (*Bot. Mag.* t. 5890.)

I. Kashmiriana.—A native of Kashmir closely related to *I. florentina*, with leaves 18 ins. long and 1 in. broad. The large pure white flowers with yellow-tipped beards are borne in clusters late in May on stems about 3 ft. high. (*Gard. Chron.* 1877, ii. 744.)

I. Kolpakowskiana.—A pretty Iris from Turkestan, with round netted bulbs and linear leaves. Flowers in March, fragrant; the oblong lance-shaped falls of rich red-purple and bright golden-yellow with broken purple veins, the oblong standards being pale lilac or purple. (*Gard.* t. 658, f. 4; *Gartenfl.* t. 939.)

This is a very difficult Iris to grow, as the imported bulbs mostly die after the first year.

I. Korolkowi.—A native of Turkestan, 1 to 1½ ft. high, with linear glaucous leaves and large whitish flowers tinged with brown and copiously veined with a deeper colour; falls oblong, bearded; standards rather broader, erect (*Bot. Mag.* t. 7025). The variety *concolor* has bright lilac-purple flowers; *Leichtliniana* has creamy-white flowers marked with a blackish-purple blotch at the base of the falls; *venosa* has greyish-lilac flowers distinctly veined with purple; and *violacea* violet or puce-coloured flowers with darker veins.

I. kumaonensis (*I. Kingiana*; *I. longifolia*; *I. tigrina*).—A native of the Western Himalayas, at an elevation of about 11,500 ft. It has stout, short, creeping root-stocks, and

narrow leaves 6 to 9 ins. long. Flowers in May; with dark lilac falls, mottled with paler lilac and having a white and yellow beard; standards paler in colour. (*Bot. Mag. t. 6957.*) The variety *caulescens* has stems about 6 ins. high and mauve-lilac standards, and deep purple-lilac falls with deeper coloured mottlings.



FIG. 204.—*Iris Korolkowii*. (↓.)

***I. lacustris*.**—A free-growing North American Iris, with creeping root-stocks and charming sky-blue flowers with a yellow crest produced in early spring, and often again in autumn.

***I. laevigata* (*I. Kämpferi*), Japanese Iris.**—This remarkable species, native of Siberia and Japan, has the largest flowers in the genus, and is better known under the name of *I. Kämpferi*. It grows about 2 ft. high, and has pale green, weakish, sword-shaped leaves. The blooms, which appear in June and July, are very variable in size and colour, sometimes measuring 8 to 10 ins.

across. In the wild type the large roundish falls are violet-blue, with a bright yellow blotch at the base, and the much smaller oblong-ovate standards are usually of a much paler blue. There are, however, a great number of varieties with pure

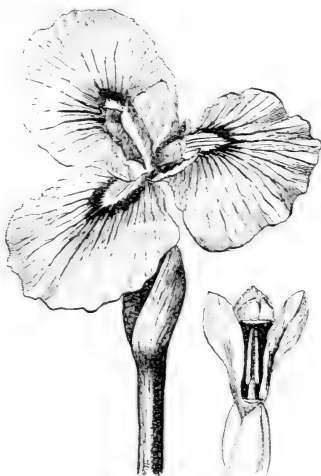


FIG. 205.—*Iris laevigata*. (♂.)

white, lilac, magenta, purple, and other shades of colour, all more or less constant in the yellow blotch at the base of the falls. There are varieties in which the colour becomes streaked or blotched; and also double-flowered forms. (*Bot. Mag. t. 6132.*)

I. laevigata and its varieties flourish in a moist, peaty loam, and in warm, sunny, or not too shady positions by the banks of streams, lakes, ponds, etc. The plants may be increased by careful division of the root-stocks in autumn. Seeds may also be saved and sown in early spring, in pots or pans in cold frames. Every spring a large number of root-

stocks of this species are imported direct from Japan.

I. Leichtlini (*I. vaga*).—A pretty species from Turkestan, with creeping root-stocks and erect, slender, sharp-pointed, sword-like leaves. Flowers yellowish, purple and brownish-red, with broadly lance-shaped standards, and obovate spoon-shaped falls, having a bluish-white beard. (*Gartenfl.* t. 1244, f. 7.)

I. longipetala.—A Californian Iris, 2 to 3 ft. high, with narrow sword-like leaves 12 to 18 ins. long. Flowers in June and July, 2 to 3 ins. deep, bright lilac, with obovate falls, having a bright yellow keel and violet veins on a white ground. (*Bot. Mag.* t. 5298.) The variety *montana* (figured in *Bot. Mag.* t. 6579 as *I. missouriensis*) is much dwarfer, with narrower leaves and smaller flowers.

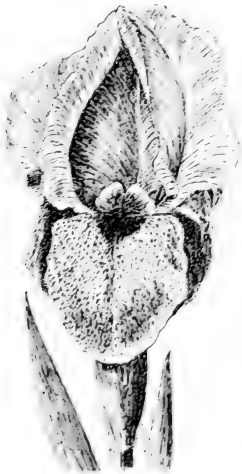


FIG. 295.—*Iris Lorteti*. (1.)

I. Lorteti.—A very attractive Cushion Iris, native of S. Lebanon,

resembling *I. Sari*, *I. Gatesi*, and *I. Susiana*, with sword-shaped leaves and very large flowers, very variable in colour. The standards are pale pink or delicate rose veined with purple, the falls being pale blue or lavender covered with crimson spots, and a deep crimson or blackish-purple blotch at the base. Other forms have creamy-yellow falls heavily spotted with purple, and almost pure white or pale violet standards distinctly but very thinly veined with violet. (*Bot. Mag.* t. 7291.) The variety *alba* has pure white flowers.

I. lupina (*Wolf's Ear Iris*).—A distinct and handsome Cushion Iris, native of Armenia and Central Asia Minor, and intermediate between *I. iberica* and *I. Susiana*. It has compact rhizomes and sickle-like leaves about 9 ins. long. Flowers in May and June, borne singly on stems 2 to 6 ins. high, with brownish-red veins on a creamy-yellow or greenish-yellow ground, the red of the veins often merging into deep dark purple, the broad lance-shaped falls having a triangular blotch of very dark, almost blackish purple in front of a diffuse yellow beard at the base. (*Garden*, 1893, t. 897.) The variety *robusta* has silver grey standards veined with brown.

I. lurida.—An old garden plant, native of S. Europe, closely related to *I. variegata*. It has, however, narrower leaves and flowers earlier in the year (April), the upper half of the falls and standards being of a dead purple colour with bright yellow beards. (*Bot. Mag.* t. 986.)

I. lutescens.—A South European Iris with slightly glaucous sword-like leaves, and large handsome flowers in May, with pale yellow falls tinged and veined with purple-brown, and having a bright yellow beard;

standards broader, primrose-yellow, suddenly narrowed to a claw (*Bot. Mag. t. 2861*).

The variety *Statellæ* is a handsome plant about 1 ft. high, with pale yellowish flowers veined with green, and bearded with bright yellow (*Bot. Mag. t. 6894*).

I. Mariæ.—A pretty Cushion Iris about 6 ins. high, from Egypt and Palestine, having rather slender compact rhizomes, and foliage like that of *I. iberica*, but narrower and less distinctly sickle-shaped. The flowers are of a uniform lilac colour, marked with deeper coloured veins and having a deep dark purple blotch at the base of the fall, the claw of which is studded with deep purple hairs.

I. Masiaë.—This resembles *I. Grant Duffi*, but has deep purple flowers.

I. Meda.—A handsome Persian Iris of the *Oncocyclus* group with very narrow erect leaves. The flowers have pale lilac, narrow, pointed falls with a dense yellow beard and a deep purple blotch at the base, while the standards are of a paler lilac colour. The colour varies somewhat, some flowers having a greenish-yellow ground, the falls having thick purple veins. (*Bot. Mag. t. 7040*.)

I. melanosticta.—A beardless Iris from Syria, similar in habit and foliage to *I. Grant Duffi* but differing in the colour of the flowers, the outer segments of which are yellow with dark violet veins at the base, and four or five large dark violet blotches on the limb (*Gartenfl. 1907, 495*).

I. Milesi.—A Himalayan Iris about 3 ft. high, with pale green, tapering, sword-shaped leaves $1\frac{1}{2}$ to 2 ft. long, and clusters of large bright lilac flowers in May and June, on stems about 3 ft. high, the falls having deeper lilac veins radiating from the yellow base (*Bot. Mag. t. 6889*).

I. minuta.—A Japanese species, with slender rhizomes, linear leaves 5 to 6 ins. long, and small bright yellow flowers.

I. missouriensis (*I. Tolmieana*).—An attractive Iris from the Rocky Mountains, with tufts of linear



FIG. 207.—*Iris missouriensis*. (L.)

tapering leaves about 1 ft. long. Flowers in May, large, pale bluish-lilac veined with purple, the falls being faintly stained with yellow towards the base. The plant figured in *Bot. Mag. t. 6579* is a form of *I. longipetala*.

I. Monnierii.—A large and handsome beardless Iris, native of Crete, with erect lance-shaped leaves about 2 ft. long. Flowers in June and July, on stout roundish stems 3 to 4 ft. high, bright lemon-yellow in colour, the roundish falls being sometimes edged with white. (*Red. Lil. t. 236*.)

I. neglecta.—A handsome Iris of the *germanica* group. The flowers appear in June, and have bright lilac

or deep blue falls veined with purple-red on a whitish ground, and bearded with bright yellow, the standards being pale lilac. There are many fine garden forms having various shades of lavender, violet, blue, and white. (*Bot. Mag.* t. 2435.)

I. nepalensis (*I. decora*).—A distinct Iris, 6 to 12 ins. high, native of Nepal. Rhizomes small, covered by a net of fibres, and having white fleshy, thong-like roots, and linear sword-shaped, tapering, striped leaves. Flowers of a delicate pale lavender, the lanceolate spoon-shaped falls having a median ridge of yellow hairs towards the base. The flowers are very fleeting, opening in the morning and fading before evening.

The variety *Letha*, from the Chin Hills in Upper Burmah, is a better garden plant. It has deliciously fragrant flowers of a delicate lavender colour. It is now known as *I. Colletti*, and is figured in the *Bot. Mag.* t. 7839. (*Bot. Reg.* t. 878.) It is better to treat this Iris as recommended for the *Oncocyclus* group (see p. 292).

I. obtusifolia.—A Persian species, with short oblong, bluntish leaves, and yellow flowers with striped falls and a bearded crest (*Bot. Mag.* t. 7701).

I. ochro-aurea.—This seems to be a hybrid between *I. ochroleuca* and *I. aurea*. The rich yellow beardless falls are edged with creamy-white, and the standards are erect and bilobed. (*Gard. Chron.* 1900, xxviii. 32.)

I. orchoides (*Orchid Iris*).—A distinct bulbous Iris found wild in Western Turkestan and Bokhara, remarkable for having bulbs sometimes as large as a goose's egg. The flowers, 2 to 3 ins. across, are borne in March and April all along the stems, 1½ to 2 ft. high. They are of a rich yellow, with or without a

greenish tint or spot, the oblong reflexed falls being variously spotted, blotched, and veined with violet. (*Bot. Mag.* t. 7111.)

The variety *cœrulea* has pale blue or lavender flowers, the ridge of the fall being yellow with lavender blotches, the whole blade being sometimes creamy-yellow. In *oculata* the yellow flowers have blue blotches on the fall, and *linifolia* has yellow flowers and extremely narrow leaves.

I. orientalis (*I. ochroleuca*; *I. gigantea*).—A splendid beardless Iris of unknown origin. It has slender sword-

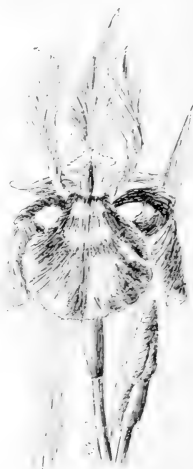


FIG. 208.—*Iris orientalis*. (3.)

like leaves about 4 ft. long, and flower-stems often 6 ft. high, bearing clusters of large ivory-white flowers in June, the roundish-obovate falls having a large yellow blotch at the base. (*Bot. Mag.* t. 61; *Red. Lil.* t. 350.)

There are several forms, some with larger flowers than others.

I. palæstina.—A pretty bulbous

Iris of the Juno group, from the mountains of Palestine. It has sickle-shaped pointed leaves 3 to 6 ins. long, and produces its pale yellow flowers tinged with lilac during the winter months. The variety *cærulea* has blue flowers.

I. pallida.—A splendid Iris of the *germanica* type, native of the Mediterranean region, having tufts of sword-shaped leaves 12 to 18 ins. long. Flowers in June, on stems 2 to 3 ft. high, scented like orange-blossom, and varying in colour from bright slaty lilac to deep lilac-purple, the falls having a bright yellow beard towards the base, which is veined with bright lilac on a white ground. There are several forms of this species, among the best being *australis*, *cælestis*, *Cypriana*, *dalmatica*, and *Queen of May*. (*Bot. Mag.* t. 685; *Red. Lil.* t. 366.)

I. paradoxa.—A singular Cushion Iris from Western Persia and the Caucasus, having slender, compact rhizomes and few narrow, short, more or less sickle-shaped leaves. The name *paradoxa* alludes to the great disproportion between the small strap-shaped, stout, and almost leathery fall, half an inch or less wide, spreading horizontally and ending in a rounded apex, while the standard is large, roundish, and erect, and delicate and flimsy in texture. In the typical species the standard is veined with deep violet or bluish-violet, the intervening spaces being of a paler tint. Over the claw of the standard and along a median streak the colour is creamy-white, densely dotted with violet. The style is brownish-yellow with lines of dark purple spots. Some varieties have white or red-purple standards. (*Bot. Mag.* t. 7081.) This species and *I. sambucina* have produced a hybrid called *I. paracina* or *I.*

parsamb (*Flora and Sylva*, March 1905).



FIG. 209.—*Iris paradoxa*. (G.S.)

I. persica (*I. bulbosa persica*; *Xiphium persicum*).—A charming little bulbous Iris, native of Persia and the more southern parts of Eastern and Central Asia Minor, sometimes with ovoid bulbs as large as a hen's egg, and linear lance-shaped, tapering, sickle-shaped leaves. Flowers in February and March, 2 to 3 ins. across, violet-scented, usually borne singly on the scarcely visible stem. The wavy falls are of a pale bluish-green or whitish colour with a conspicuous and beardless bright-yellow keel, in front of which are blotches and spots of deep almost black violet. (*Bot. Mag.* t. 1; *Red. Lil.* t. 189.)

The variety *purpurea* is almost entirely of a dark reddish-purple colour with an orange ridge on the fall, and a deeper tint in front. Other varieties are light purple,

almost lavender, yellowish-lilac, sea-green, etc., but all have a conspicuous patch of deep purple-violet or even black in front of the orange or yellow keel. In the variety *Isaacsoni* the fall is creamy-white in front, tinged with green and broken by thick violet veins which, running parallel to the median, violet-dotted, yellow streak on the claw, form a conspicuous violet zone around the ridge on the blade. There is no patch of deep colour in front as in the other forms.

I. plicata.—A plant of unknown origin 2 to 3 ft. high, with sword-like leaves 12 to 18 ins. long, and clusters of large fragrant flowers produced in June and July; falls pure white in the centre, veined with bright lilac at the edges, and having a yellow-tipped beard; standards pure white edged with lilac (*Bot. Mag.* t. 810; *Red. Lil.* t. 356).

I. pseudacorus (*Yellow Flag* or *Water Flag*).—A well-known British Iris found near river banks, ditches, etc., having a stout creeping root-stock, and glaucous sword-shaped leaves 2 to 4 ft. long. Flowers from May to August, large, almost scentless, 3 to 4 ins. across, bright yellow with a deeper spot at the base of the falls, which are veined with brown or purple. The variety *acoroides* from N. America has small sulphur-yellow flowers. There is a beautiful variety in which the leaves are striped with ivory-white, as in a form of *I. fetidissima*, and another with golden-yellow stripes, but these are much clearer and finer looking in spring than in summer and autumn.

I. pseudo-variegata.—This belongs to the *germanica* section, and has bright yellow flowers with brown-yellow veined falls (*Gard.* 1899, t. 418).

I. pumila.—A charming little Iris 4 to 5 ins. high, from S. Europe and Asia Minor, with sword-shaped leaves.

Flowers in April, bright lilac-purple or deep violet colour, the reflexed falls having a dense white beard at the base, the standards being usually paler in colour. (*Bot. Mag.* tt. 9, 1209, 1261; *Red. Lil.* t. 261.)



FIG. 210.—*Iris pumila*. (3.)

There are several forms, among which may be mentioned *albida*—the Crimean Iris—greyish-white; *atro-cærulea*, deep purple; *attica*, yellow veined with brownish-lilac; *cærulea*, bright blue with yellow beards; *cælestis*, sky-blue; *gracilis*, pure white with bronze falls; and *lutescens*, bright yellow.

I. Reichenbachiana is closely related to *I. lutescens*. It has bright pale yellow flowers.

I. reticulata (*Netted Iris*).—A charming Caucasian Iris having ovoid bulbs and four-sided, horny-pointed, narrow leaves about 1 ft. long. Flowers from January to March, deep violet and sweetly scented,

the long narrow falls having a bright golden or orange patch at the base. (*Bot. Mag.* t. 5577; *Gartenfl.* tt. 452, 779; *Lodd. Bot. Cat.* t. 1829.)

There are many beautiful forms, the most distinct being:—

(1) *Cyanea*, with flower-stems scarcely raised above the surface of the soil, and bright blue flowers.

(2) *Histrio*.—The flowers open from December to March; they are bright blue blotched with golden-yellow and having deep purple blotches on the blade of the falls (*Bot. Mag.* t. 6033).

(3) *Histrioides* opens its flowers before the leaves appear, and these are eventually stouter and longer than in any other form of *I. reticulata*. The flowers are 4 to 5 ins. across, usually of a bright blue, sometimes assuming a light violet tint; the ridge of the fall is golden-yellow with a white or creamy zone outside veined and blotched with violet.

(4) *Humilis*.—Flowers of a rich red-purple colour, the fall having a bright orange or yellow ridge surrounded by a zone of dense creamy-white, broken up by dots and veins of deep purple.

(5) *Krelagei*.—This flowers rather earlier than the type, of a more or less deep claret-purple colour with golden-yellow ridges to the falls.

(6) *Purpurea*.—Flowers of a fine deep reddish-purple, the blade of the falls being particularly dark and the ridge yellow.

(7) *Sophenensis*.—The flowers vary in colour from a dark red-purple to a blue-purple, or to a lilac or lavender, the whole having a peculiar metallic sheen, and the orange ridge on the falls is continued unevenly along the entire length.

There is also a form called *major* or *cerulea*, having various shades of pale blue.

I. Rosenbachiana.—A lovely little bulbous Iris from the mountains of Eastern Buchara and Turkestan, at an elevation of 6000 to 9000 ft. The bulbs have numerous fleshy and often ovoid roots, and tufts of lance-shaped bluntish leaves about 8 ins. long and 2 ins. broad. The sessile solitary flowers usually appear from February to April. The prevailing colour is a combination of purple, yellow, and white, but is very variable, and some forms are of a rich crimson or purple-blue, passing into a dull or dingy lavender, while others are nearly pure yellow with a few purple or violet markings. There is also a form with pure white flowers, with a blotch of deep violet on the fall. (*Gartenfl.* t. 1227; *Gard.* t. 653; *Bot. Mag.* t. 7135.)

I. rubro-marginata.—A pretty Iris about 4 ins. high, native of Scutari, having red-edged sickle-shaped leaves 3 to 4 ins. long, and large yellow or lilac and purple-bearded flowers in spring (*Gard. Chron.* 1875, i. 524).

I. ruthenica.—A beardless species, native of E. Europe and Asia, with linear ribbed leaves and fragrant flowers in March and April, on slender stems 1 to 4 ins. high. The prevailing colour is lilac-purple, the falls being veined with white. The variety *violacea* has violet-coloured blooms. (*Bot. Mag.* tt. 1123, 1393.)

I. sambucina.—A native of Central Europe, Asia Minor, etc., with tufts of glaucous leaves 15 to 18 ins. long, and clusters of large Elder-scented flowers produced in May, on branching stems about 2 ft. high; falls claret-purple with a yellow beard; standards dull yellow, suffused with dull claret-purple (*Bot. Mag.* t. 187); very near *I. squalens*, but not so vigorous in growth.

I. Sari.—A fine Cushion Iris from

the banks of the river Sar in Cilicia. The typical plant, which has bright lilac flowers, does not appear to be in cultivation, but is represented by the variety *livida*, which has narrow sword-shaped falcate leaves about 6 ins. long. The flowers appear in May, and resemble those of *I. Susiana*, but are somewhat smaller, and of a soft violet-purple with deeper spots and veins, the falls being darker in colour than the roundish standards, and having a diffuse brownish-black beard. (*Bot. Mag.* t. 6960.)

The variety *Nazarenæ* from Palestine has the falls heavily veined with rows of brownish-purple spots on a pale or straw-yellow ground, and a large maroon blotch in the centre, while the standards are creamy-white beautifully veined with blue.

I. serotina.—A native of the calcareous mountains near Jaen, in Spain. It resembles the Spanish Iris (*I. Xiphium*), but differs in its very late flowering in August or September, and in being less vigorous, with the upper leaves very thin and awl-like, in having reddish spathe-valves, and especially in the fall having an oblong-lanceolate blade and a narrow linear claw.

I. setosa (*I. brachycuspis*).—A handsome Iris, native of Eastern Siberia, Japan, and North America, somewhat resembling *I. sibirica*. The thin leaves are 1 to 1½ ft. long, and the large bright lilac flowers are produced in May and June, on stoutish branched stems 2 to 3 ft. high. (*Bot. Reg.* 1847, t. 10; *Bot. Mag.* t. 2326.) The variety *atro-cærulea* has darker blue flowers than the type.

I. sibirica.—A beautiful beardless Iris, native of Central and South Europe to Siberia, with linear ribbed leaves 1 to 2 ft. long. Flowers in May and June, borne on hollow stems 1 to

2½ ft. high, bright lilac-blue, the falls being veined with deep violet on a paler ground. (*Bot. Mag.* tt. 50, 1163, 1604.) There are many beautiful garden forms including double-flowered ones, the white one, *alba*, being one of the most distinct, having



FIG. 211.—*Iris sibirica*. (½.)

white flowers mottled with purple. *Orientalis* differs from the type by the redness of its young leaves, shorter flower-stems, and deeper coloured but less lasting flowers.

I. Sieheana.—This is closely related to *I. persica purpurea*, differing chiefly in having the wings of the fall more blunt, and the lip less rounded. The flowers vary from silver-grey to pale reddish-purple blotched with white and yellow and spotted with deep brown. (*Gard. Chron.* 1904, xxxv. 282.)

I. sindjarenensis.—An interesting bulbous Iris, native of Mesopotamia, having very large elongated bulbs. Leaves long and narrowing gradually

to a sharp point, bent into a double channel, much striped on the outside, glossy green on the inside. The vanilla-scented flowers, 2 to 4 ins. across, appear in March and April, and are of a somewhat slaty blue, broken by the yellow ridge of the fall and by greenish-blue veins and dots. (*Bot. Mag.* t. 7145.) *I. × sindersi* is a hybrid between this species and *I. persica* (*Gard. Chron.* 1901, xxix, 105, f. 46.)

I. Sisyrrinchium (*I. fugax*; *I. ægyptia*; *I. samaritana*; *I. juncofolia*; etc., etc.)—This distinct little bulbous Iris about 6 ins. high, with shaggy-coated roundish bulbs and arched linear pointed leaves, is the "Spanish" or "Barbary Nut" of Parkinson. It is widely distributed on both sides of the Mediterranean shores, and is also found from Asia Minor to Afghanistan and the Punjab. The fragrant flowers appear in May and June, but only last a few hours. They vary in colour from light blue to reddish-purple, with variable spots and veins on the blade of the fall, which bears a broad white patch and a median yellow streak, often spotted. (*Bot. Mag.* tt. 1407, 6096). There is a white-flowered form; *monophylla* has one leaf only, and small dull-coloured flowers; and *maricoides* has much-spotted flowers.

I. Sofarana.—This species from Lebanon comes nearest *I. Sari*. It has leaves 10 ins. long and about an inch broad. The large solitary flowers are borne on scapes about 10 ins. high. The elliptic falls have a creamy-white ground, but this is almost obscured, and they appear to be blackish-purple owing to thick-set blotched and netted veins of deep purple, with a beard of scattered dark purple hairs on the claw, in front of which is a deep black blotch. The roundish standards are much

lighter in colour than the falls. The white groundwork is covered with thin purple forking veins and numerous purple spots, while the broad horizontal styles are almost blackish-purple. The variety *magnifica* is a large-flowered form with red-brown falls shaded with purple, and having a purple crest. (*Gard. Chron.* 1899, xxvi, 389, 391, f. 125.)

I. Sprengeri.—This is the smallest of the Cushion or *Oncocyclus* Irises, being only 4 ins. high, with a stolon-bearing root-stock. The grey-green leaves are about 4 ins. long. The outer segments of the flowers are yellow with bright purple-red spots and veins; the inner segments are silvery-white veined with purple-red and black, and the beard is golden-yellow. (*Gard. Chron.* 1904, xxxvi, 50, f. 21.)

I. spuria.—An elegant beardless Iris 1 to 2 ft. high, native of Europe, Asia, Algeria, etc., with erect or spreading sword-shaped leaves about 1 ft. long. Flowers in June and July, large, and of a bright lilac colour, the falls having a bright yellow keel running down the claw which is faintly streaked with purple on a white ground. (*Bot. Mag.* tt. 58, 1131, 1514.)

The variety *Monspur* is really a hybrid between this species and *I. Monnieri*, the first syllable of each parent forming the name. The variety *Notha* is larger than the type, and is said to be found wild in the salt marshes of Siberia.

I. squalens.—A very old garden plant, native of Europe and Asia, with tufts of glaucous sword-like leaves and clusters of faintly Elder-scented large flowers borne in May and June, on branched stems 2 to 3 ft. high. The obovate wedge-shaped falls are bright lilac-purple, with a conspicuous yellow beard, while the

erect and rather crisped standards are dullish lilac and yellow or brownish-yellow. (*Bot. Mag.* t. 787.)

There are many forms with a vast range of colour among shades of lavender, blue, violet, bronze-yellow, mauve, primrose, golden-yellow, crimson, etc., as in the *germanica*, *neglecta*, and *pallida* sections, which they somewhat resemble.

I. Straussi.—A dwarf bearded Persian Iris, about 3 ins. high, with narrow leaves and brown-violet coloured flowers (*Gard.* 1899, lvi. 149).

I. Susiana (*Mourning Iris*).—A



FIG. 212.—*Iris Susiana*. (3.)

remarkably handsome and singular Cushion Iris, native of the Levant and Asia Minor. It is 12 to 18 ins. high, with pale or yellowish-green, stem-clasping, sword-like leaves about 1 in. broad. The large flowers appear in April, having a dark silver-grey appearance, produced by numerous

veins and dots of blackish-brown or purple with a flush of purple or lilac on a creamy-white ground; the falls have a broad cushion of brownish-black hairs near the base. (*Bot. Mag.* t. 91.) *Muhlenbergiana* is a dwarf form with yellow flowers.

I. Suworowi (*I. lineata*).—A curious Iris of the Regelia group, native of Turkestan, with narrow sword-shaped leaves, and greenish flowers veined with bluish-green; both falls and standards are elliptic lance-shaped ending in a sharp point, the falls being furnished with a blue beard from the base to centre (*Bot. Mag.* t. 7029).

I. Swerti.—A handsome Iris of unknown origin, with glaucous sword-



FIG. 213.—*Iris Tauri*. (3.)

shaped leaves, and clusters of fragrant flowers in May and June on stems 1 to 1½ ft. high. Colour pure white slightly veined with lilac, and edged with purple, the obovate cuneate falls being decorated with a yellow beard, while the much-crisped pure white standards are keeled and edged with purple. (*Red. Lil.* t. 306.)

I. Tauri.—A bulbous species, native

of Asia Minor, having bright green leaves, and dark violet long-tubed flowers streaked with white, and having orange-yellow crests edged with white (*Bot. Mag.* t. 7793).

I. tectorum (*I. tomiotopa*).—A beautiful beardless Iris about 1 ft.



FIG. 214.—*Iris tectorum*. (3.)

high, native of Japan, with thin pale green sword-like leaves about 1 ft. long. Flowers in May and June, 1½ to 2 ins. deep, usually bright lilac; the blunt crisped falls are veined with dark lilac, the claw having a deeply lacinated white and lilac crest. (*Bot. Mag.* t. 6118.) There is a white-flowered variety, *candida*, and a dark blue one, *atrocaerulea*.

I. tenax.—A handsome Californian species 6 to 12 ins. high, with two linear leaves and bright lilac-purple flowers 2 to 3 ins. deep, borne on slender stems in May and June (*Bot. Mag.* t. 3343; *Bot. Reg.* t. 1218).

I. tenuis.—A beardless Iris, native of Oregon, with tufts of thin and

narrow green leaves 12 to 15 ins. long, and white flowers faintly veined with yellow and lilac (*Gard.* 1888, t. 1).



FIG. 215.—*Iris tenax*. (3.)

I. tingitana.—A beautiful bulbous Iris, native of Tangiers, with large ovoid pointed bulbs and deeply channelled leaves, which are broad like those of *I. xiphoides*, but very glaucous and striated outside. Flowers in March and April, 5 to 6 ins. across, on stems about 2 ft. high. Falls light or deep blue, or bluish-purple, with deeper veins, and a yellow keel spreading into a broad patch behind. (*Bot. Mag.* t. 6775.)

The most suitable place for *I. tingitana* is at the base of a south wall. Fig. 216.

I. trojana.—A native of Troy, about 3 ft. high, with glaucous green sword-shaped leaves and sweet-scented flowers of a bright purplish-violet, the base being white with

yellow margins veined with coppery purple. The broadly elliptic standards are violet, and the styles are bluish-violet with broad-toothed crests.

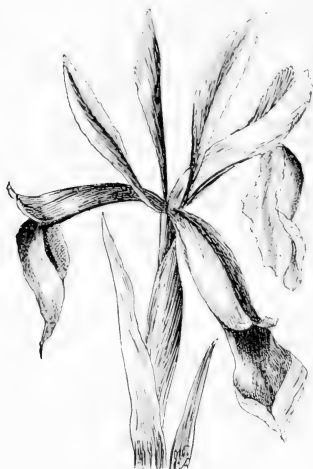


FIG. 216.—*Iris tingitana*. ($\frac{1}{2}$.)

I. Tubergeniana.—This is related to *I. orchioides* and *I. caucasica*. The falls are bright yellow while the standards are minute and three-toothed. (*Gard. Chron.* 1899, xxv. 225.)

I. tuberosa (*Hermodactylus tuberosus*), *Snake's Head Iris*.—A distinct and interesting species, native of the Mediterranean shores. It has a tuberous branched root-stock like a small hard, deformed Potato. The leaves are often very long, four-sided, with a horny point. The flowers, about 2 ins. across, appear in March and April on slender hollow stems about 1 ft. long, and are of a peculiar olive-green colour, with dark almost black velvety purple falls, occasionally

streaked with yellow or bright green. (*Bot. Mag.* t. 531.)



FIG. 217.—*Iris tuberosa*. ($\frac{1}{2}$.)

I. unguicularis (*I. stylosa*).—A lovely beardless Algerian Iris with a rhizome as thick as a man's finger and tufts of distichous linear bright green leaves equalling or overtopping the large fragrant bright lilac or sky-blue flowers, which are produced from October to April (*Bot. Mag.* t. 5773).

There are several forms of this species, including *alba*, with large white flowers, and *speciosa*, with deep rich blue flowers veined with white. There are also forms known as *angustifolia*, *Elisabethæ*, *grandiflora*, *lilacina*, *marginata*, *pavonia*, and *purpurea*.

They are all best grown in spots sheltered from rain and wind.

I. urmiensis.—A Cushion Iris from Persia, about 7 ins. high, and having yellow flowers (*Gard. Chron.* 1900, xxviii. 373, f. 116).

I. vaga.—A Regelia Iris, native of Turkestan, with stolon-bearing root-stocks, erect curving leaves, and yellowish, purple, and brown-red flowers (*Gartenfl.* 1244, f. 7).



FIG. 218.—*Iris unguicularis*. (1.)

I. variegata.—A very handsome Austrian Iris of the *germanica* group, with tufts of sword-like leaves 12 to 18 ins. long, purple at the base. Flowers in May and June; falls oblong, narrowed at the base, deep claret-brown, with a bright yellow beard and brown veins on a yellow ground; standards erect, oblong, bright lemon-yellow. (*Bot. Mag.* t. 16; *Red. Lil.* t. 292.)

There are many beautiful forms having various shades of yellow, bronze, and purple predominating; although *alba*, with white flowers, is an exception.

I. Vartani.—A curious little bulbous Iris from the neighbourhood of Nazareth, with ovoid netted bulbs,

and four-sided horny-tipped leaves 4 to 6 ins. long at the time of flowering. Flowers 3 to 4 ins. across, appearing about October. The predominating colour is slaty blue or dull lavender; the falls having a yellow or white blade with black dots on the claw. (*Bot. Mag.* t. 6942.)

I. verna.—A beardless Iris from the S. United States, about 1½ ft. high, with narrow finely-veined leaves and deep violet flowers, having an orange keel to the falls. The leaves persist during the winter.

I. versicolor.—A beautiful beardless Iris from N. America, with rather glaucous sword-shaped leaves and clusters of large claret-purple flowers, borne in May and June, on stems 1 to 2 ft. high. The standards are paler in colour than the much larger falls, which are beautifully veined with deep purple. (*Bot. Mag.* t. 21.) There is a good deal of variation in the colour, and several forms exist, that known as *kermesina* having lilac standards and reddish-lilac falls net-veined with white.

Iris virginica is considered to be a form of this, having bright lilac flowers (*Bot. Mag.* t. 703).

I. Warleyensis.—A native of E. Bokhara, related to *I. orchoides cœrulea*, from which it differs chiefly in the colour of the flowers, in which shades of violet predominate. The falls are deep violet with a bright orange crest. (*Gard. Chron.* 1902, xxxi. 386, f. 134; *Flora and Sylva*, December 1905.)

I. Willmottiana.—A native of E. Turkestan closely related to *I. caucasica*, but with lavender (not yellow) or pale purple flowers blotched with white (*Gard. Chron.* 1901, xxix. 261, f. 100).

I. xiphioides (*I. anglica*; *I. pyrenaica*; *Xiphion latifolium*), *English Iris*.—A beautiful Pyrenean Iris hav-

ing bulbs with brown more or less shaggy coats. The leaves are stouter and broader than those of the Spanish Iris. Flowers in July, of a rich deep blue in the wild type, with a conspicuous golden keel on the rounded fiddle-shaped fall. (*Bot. Mag.* t. 687; *Red. Lil.* t. 212.)

There are now a large number of cultivated forms of the English Iris, varying in colour from blue and through various hues of purple to red and pure white. In catalogues many distinctive names will be found, some of the best forms being *Blanche Fleur*, *La Sincérité*, *Oriental*, and *Mont Blanc*, among the whites, the latter being a particularly fine form; *Anna Maria*, *Bleu Mourant*, *Clio*, *Conquerant*, *Charles Dickens*, *Ceres*, *l'Obscurité* and *Nimrod*, among the lilac, blue, and purple and violet shades; *Masterpièce* and *Nimrod*, blackish-purple; *Duke of Portland*, *La Triomphante*, and *Penelope*, among the white and rose, or purple-spotted and striped shades. There are many other names, all differing according to the particular catalogue.

I. Xiphium (*I. hispanica*; *Xiphion vulgare*), *Spanish Iris*.—A charming bulbous Iris, native of S. Europe, with smooth, brownish, ovoid bulbs, and linear, glaucous, awl-shaped leaves 12 to 18 ins. long. Flowers in May and June, 3 to 4 ins. across, variously coloured with shades of purple, bronze, and yellow, and having a large number of garden varieties, including white ones. (*Bot. Mag.* t. 686.)

A distinct natural form from Portugal, known as *lusitanica*, has pure yellow flowers with an orange blotch on the fall, and is doubtless the progenitor of the various yellow garden varieties (*Bot. Mag.* t. 679). The form known as "Thunderbolt"

is a strong free-growing plant 2 ft. or more high, having large flowers of a peculiar bronzy or smoky hue, produced by the fusion of purple and yellow with brown. The variety *Battandieri*, from Algiers, is like the type, but has very glaucous foliage and dead white flowers with an orange ridge on the fall.

As a cut flower the Spanish Iris is excellent. Long before the flowers



FIG. 219.—*Iris xiphium*. ($\frac{1}{2}$.)

in the British Islands open out of doors, tons of "spears," or unopened blossoms, are sent to the London markets from the south of France, the Riviera, and the Channel Islands. These are placed in water and stood in the genial temperature of a hot-house, where they open beautifully bright and clear in a few days, and are then fit for sale.

The following are a few of the

finest garden forms of the Spanish Iris, and all are worth growing:—

Adelina Patti, deep bronze; *Sappho*, splendid bronze; *Agnes*, blue, very fine; *Alexander V. Humboldt*, deep blue; *Formosa*, dark blue; *Leonidas*, dark violet-blue; *Louise*, lilac-blue, very large, extra fine; *Athalia*, pure white; *Blanche Superbe*, pure white, dwarf; *British Queen*, pure white; *La Dame Blanche*, pure white, dwarf; *La Neige*, pure white, large; *Mont Blanc*, pure white, dwarf; *Belle Chinoise*, very fine yellow; *Chrysolora*, very fine bright yellow; *Leander*, deep yellow, very large, scented; *Ovidius*, clear pale yellow; *Princess May*, yellow with bluish centre; *William the First*, golden-yellow.

ISOLOMA (*isos*, equal; *loma*, a border; the corolla lobes being equal). Nat. Ord. Gesneraceæ.—This genus contains about sixty species of warm-house herbaceous plants closely related to the Achimenes and Gesnera, and resembling the first-named in having scaly or catkin-like rhizomes. The leaves are opposite, and usually densely clothed with soft velvety hairs. The flowers are tubular, resembling the Achimenes in form and size. The plants formerly known under the name of TYDÆA now belong to this genus. For cultural details see ACHIMENES and GESNERA.

The following species may be noted. They are all natives of Tropical America, ranging from Bolivia and Peru to Mexico:—

I. amabile.—This grows about 1 ft. high, has greenish-purple stems, and large deep rose flowers (*Bot. Mag.* t. 4999).

I. bogotense (*Achimenes picta*).—This grows 1 to 2 ft. high, and has drooping yellow flowers, red above

and striped and dotted with red inside (*Bot. Mag.* t. 4126).

I. Deppeanum (*Gesnera elongata*).—Height 2 to 3 ft., with orange-red flowers in velvety umbels (*Bot. Mag.* t. 3725).

I. erianthum.—A handsome erect plant from Colombia, 2 to 4 ft. high, with underground scaly rhizomes, and thick stems and leaves covered with soft brownish hairs. Leaves ovate lance-shaped, with stalks 4 to 6 ins. long. Flowers orange-red or cinnabar, velvety, drooping, borne in clusters in the axils of the upper leaves. (*Bot. Mag.* t. 7907.)

I. hondense.—A free-flowering species about 1 ft. high, with yellow flowers (*Bot. Mag.* t. 4217).

Other species equally beautiful and interesting, and mostly having red or yellow flowers, are—**I. longifolium**, orange-red; **I. molle**, red (*Bot. Mag.* t. 3815); **I. ocellatum**, bright red (*Bot. Mag.* t. 4359); **I. pictum**, scarlet (*Bot. Mag.* tt. 4126, 4431); **I. Schiedeianum**, scarlet (*Bot. Mag.* t. 4152); **I. Seemannii**, bright brick-red (*Bot. Mag.* t. 4504); **I. triflorum**, yellow (*Bot. Mag.* t. 4342); and **I. tubiflora**, yellow, tinted with red.

I. hypocyrtiflorum, formerly known as *Gloxinia*. This species has orange-red almost globular flowers. (*Bot. Mag.* t. 5655.)

IXIA (*ixia*, bird-lime; in reference to the sticky juice). Nat. Ord. Irideæ.—A genus of South African herbs with smooth or fibrous-coated bulbs or corms, and erect, strongly-veined, sword-shaped leaves. Flowers with a funnel-shaped or salver-shaped perianth, borne on slender spikes.

Ixias are closely related to Sparaxis, Babiana, and Tritonia, but differ structurally in details. They are elegant plants of fairly easy growth, but unfortunately are not hardy

except in the very mildest parts of the British Islands. If given protection, however, in severe winters with a little straw, bracken, or litter, the bulbs may be planted on warm, sunny, and sheltered borders in many parts, any time between October or November and January, the bulbs being buried about 3 ins. below the surface of the soil. This should consist of loam, peat or leaf-soil, and coarse sand in about equal proportions, and the drainage should be perfect, as anything like wet heavy soil is almost sure to be fatal to the plants. During growth in spring, the soil may be freshened up with a hand-fork, to prevent it getting caked, and also cause the moisture to rise to the roots. After the flowers are over, and the leaves have withered, the bulbs should be kept dry and in a resting condition until growth starts again. In bleak localities it will be found safer to grow the bulbs in pots or pans, protecting them in a cold frame, and when root action and growth are established, the plants may be gently forced into blossom in a greenhouse, early in the year. In a cut state with long stems, there are few spring flowers to rival the peculiar charm and elegance of the *Ixias*, of which there are now many garden varieties.

Ixias are best increased by offsets, which are detached at the time of re-planting, and these will flower the second year; or by seeds sown in sandy soil in spring in a warm greenhouse. The seedlings should be grown on for a year or two before planting out, or distributing too much.

There are about two dozen species known, but the following is a good selection. They grow 12 to 18 ins. high:—

I. aristata.—Whitish, pink (*Bot. Mag.* t. 589).

I. capillaris.—Fleshy or lilac (*Bot. Mag.* tt. 570, 617, 1013).

I. flexuosa.—Pink or lilac (*Bot. Mag.* t. 624).

I. hybrida.—White, tinted pink (*Bot. Mag.* t. 128).

I. linearis.—Lilac (*Bot. Mag.* t. 570).

I. lutea.—Bright yellow (*Bot. Mag.* t. 646).

I. maculata.—Orange - yellow, blotched in the throat (*Bot. Mag.* t. 539; *Red. Lil.* t. 138). The variety *ochroleuca* has creamy-yellow flowers with a broad brown band in the centre (*Bot. Mag.* t. 1285); and *nigroalbida* has pure white flowers with a blackish centre.



FIG. 220.—*Ixia viridiflora*. (3.)

I. monadelphica.—A variable species, having lilac flowers with a blue or greenish centre, and having the filaments of the stamens united into a tube (*Bot. Mag.* t. 607).

I. odorata.—Yellow, sweet-scented (*Bot. Mag.* t. 1173).

I. paniculata (*I. longiflora*; *Tritonia longiflora*).—Creamy - white, often tinted with pink and with a blackish centre (*Bot. Mag.* tt. 256, 1502; *Red. Lil.* t. 34).

I. patens (*I. filiformis*).—Pale pink, bell-shaped (*Bot. Mag.* t. 522; *Red. Lil.* tt. 30, 140).

I. polystachya (*I. erecta*).—White (*Bot. Mag.* t. 623).

I. speciosa (*I. crateroides*).—Deep red or crimson; one of the best (*Bot. Mag.* t. 594).

I. viridiflora.—Soft sea-green, with a blackish shining blotch in the centre; very attractive and curious (*Bot. Mag.* tt. 549, 579; *Red. Lil.* t. 476).

IXIOLIRION (from *ixia*, and *leirion*, a lily; *i.e.*, an *Ixia*-like Lily). Nat. Ord. Amaryllidææ.—A small genus of bulbous plants with linear leaves and umbels of funnel-shaped flowers on top of a slender erect stem. Perianth segments six, more or less erect, oblanceolate, acute.

The two species here mentioned are the only ones in the genus. They should be grown in warm, sunny, and sheltered positions in the open air in rich and well-drained sandy soil. When the bulbs are dormant from autumn onwards, they should be kept dry, and if left in the open border, the winter rains should be warded off with a sloping covering of straw or litter, or with an old light. Propagation is effected by offsets in spring; and also by sowing any ripened seeds in gentle warmth at the same period.

I. Kolpakowskianum.—This grows wild in Turkestan, at an elevation of 3000 to 6000 ft. It has tufts of grass-like leaves, and produces its whitish or bluish flowers about April and May (*Gartenfl.* t. 953).

I. montanum.—A beautiful species from W. Asia, having long-necked

ovoid bulbs about 1 in. through, and grassy leaves. The bright lilac flowers in graceful umbels appear in early summer (June), and have the segments distinctly three to five ribbed. (*Bot. Reg.* 1844, t. 66.)



FIG. 221.—*Ixiolirion tataricum*. (A.)

The variety *tataricum* or *Ledebouri* has narrower leaves and smaller flowers; *macranthum* has much larger flowers than the type, deep blue shaded with purple; and *brachyantherum* (or *Pallasi*) has beautiful violet-blue flowers tinged with rose, and with a darker coloured band down the centre of each segment.

KÆMPFERIA (after Kämpfer, a German naturalist). Nat. Ord. Scitamineæ.—A genus containing about twenty species of hothouse plants closely related to *Roscoëa*, *Hedychium*, and *Curcuma*. They have thickened, tuberous-like root-stocks, and leafy spikes of flowers. The

corolla has an elongated tube and spreading or reflexed lobes, the lip being bilobed. The side staminodes are broad and petal-like.

These plants flourish in sandy peat and loam and leaf-mould, and require a temperature of 65° to 75° F. when in full growth, but 15° or 20° less when dormant. They are best propagated by dividing the roots as growth is commencing, and are, perhaps, more valuable for the decorative character of their leaves than anything else. The best-known kinds are :—

K. angustifolia.—From Bengal. About 1 ft. high, with lance-shaped wavy leaves, and pure white and purple flowers. (*Red. Lil.* t. 389.)

K. atrovirens.—A Bornean species about 9 ins. high, with sharp-pointed, elliptic, oblong leaves, deep-green above, purplish beneath, and violet-purple flowers (*Ill. Hort.* 1886, 610).

K. Ethelæ.—A native of Natal, about 1 to 2 ft. high, having oblong lance-shaped leaves a foot long, and solitary rose-purple flowers with a yellow blotch on the lower lip-like segments (*Gard. Chron.* 1898, xxiii. 94, f. 34).

K. Galanga.—This is a well-known economic plant in the East Indies, being cultivated for its clusters of ovoid tubercules, which are employed medicinally and for perfumes. It grows about a foot high, and has oval roundish leaves, green and smooth above, grey-green and downy beneath. The flowers are pure white and appear in summer. (*Bot. Mag.* t. 850.)

K. Gilberti.—One of the most ornamental species from Moulmein. It has tufts of recurving oblong, lance-shaped, wavy, deep green leaves conspicuously but irregularly bordered with white. The flowers are white and purple.

K. Kirki.—A beautiful stove herbaceous plant, having green plantain-like leaves, and stout erect flower-stalks 1 ft. or more high, bearing numerous large flowers which expand in pairs from the bottom upwards, lasting for several weeks. Each flower is about 3 ins. across, flattish, and of a soft rosy-mauve with a yellow blotch in the centre, having radiating lines of white. (*Gard.* November 1881, 504.)

The variety *elatior* differs from the type in being taller, and the large rose-coloured flowers having a golden-yellow blotch at the base of the lip, the sides being marked with purple (*Bot. Mag.* t. 8188).

K. lutea.—A stemless plant, native of Penang, having leaves about 9 ins. long, 4 ins. broad, smooth above, hairy beneath. The yellow flowers with orange lip are borne on scapes 3 to 4 ins. high. (*Kew Bull.* 1907, 60.)

K. macrosiphon.—A native of German E. Africa, with tufts of green lance-shaped leaves a foot long, and numerous blue flowers (*Gard. Chron.* 1898, xxiv. 195).

K. ornata.—A fine foliage plant from Borneo, having long-stalked, sharply-pointed, lance-shaped leaves, glossy green above with a broad white central band, and purple beneath. The yellow flowers with an orange lip appear in summer. (*Ill. Hort.* 1884, 159.)

K. pandurata.—A Sumatran species with spindle-shaped root-stocks, short reddish stems, smooth, oval lance-shaped leaves, and red and purple flowers (*Lodd. Bot. Cat.* t. 587; *Bot. Reg.* t. 173).

K. Parishii.—An ornamental species from Moulmein. It grows about 1 ft. high, and has pale green, erect, lance-shaped leaves, and white and bright violet flowers. (*Bot. Mag.* t. 5763.)

K. Roscoeana.—A Burmese stemless species about 6 ins. high, with roundish pointed leaves variegated on the upper surface. The white flowers appear about October. (*Bot. Mag.* t. 5600.)

K. rosea.—A native of British Central Africa, having a short fleshy root-stock and thickish string-like roots. The leaves, including the stalk, are about 18 ins. long and 4 ins. broad, with a bright green plaited blade. The bright rose-red flowers, with a blotch of orange in the throat, are over 2 ins. across, and are borne on scapes 18 ins. high. (*Gard. Chron.* 1904, xxxv. 20.)

K. rotunda (*K. longa*).—A very old East Indian species about a foot high, having numerous irregularly shaped aromatic root-stocks; long-stalked, oblong, lance-shaped leaves, smooth and green above, downy and purple beneath. The sweet-scented white flowers, striped with red on the margins, appear in summer. (*Bot. Mag.* tt. 920, 6054; *Garden*, 1888, t. 662.)

K. secunda.—A native of the Khasia Hills, Assam, etc., with leaves 3 to 4 ins. long, membranous, obliquely lance-shaped, pointed. Flowers in August and September, reddish with a white centre. (*Bot. Mag.* t. 6999.)

LACHENALIA (after *Mons. de la Chenal* (b. 1736, d. 1800), a Swiss botanical author). Nat. Ord. Liliaceæ. —A genus containing about forty species of South African bulbous plants closely related to the Hyacinths and Scillas, having tunicated egg-shaped bulbs, fleshy strap-shaped leaves sometimes mottled or spotted, and erect scapes bearing numerous drooping tubular flowers, in which the three inner segments are often longer than the three outer ones.

Comparatively few species are

cultivated, and these chiefly in botanical collections. A few hybrids have been raised, and are an improvement on the natural species from a garden point of view. Grown in pots or pans and massed close together, Lachenalias are elegant plants when in blossom during the winter and early spring months (from January to



FIG. 222.—*Lachenalia*. (1.)

April and May). The best time to pot the bulbs is about the end of July or early in August, using a compost of two parts fibrous loam, one part leaf-mould, and one part well-rotted cow-manure; to this may be added a good sprinkling of coarse silver sand, the whole being thoroughly mixed. From six to ten bulbs, according to size, may be placed in a 5-in. pot, covering them with about $\frac{1}{4}$ in. of soil. The bulbs may also be planted in flattish pans or in wire hanging-baskets. In the latter case the baskets must be lined with moss to prevent

the soil dropping out. After potting or basketing, the soil may receive a good watering to settle it, and the plants should be placed in a cold frame or in the greenhouse. Until growth has fairly started the soil should be kept just moist, the supply of water increasing or decreasing afterwards, according to growth and the state of the weather. As the plants are tender they must be sheltered in a greenhouse in winter, and should have a minimum temperature of about 45° F. When the flower-stems are showing, a little weak liquid manure two or three times a week will be beneficial. When flowering is quite over and the leaves begin to wither, the plants may be transferred to the frame again, and kept dry until the period for repotting comes round. Then the stock may be increased by separating the offsets, and growing them on separately from the mother bulbs. The blackish shining seeds may also be sown, when thoroughly ripe in rich gritty soil in pots or pans, and in a temperature of 60° to 65° F. When large enough to handle easily, the seedlings should be pricked out into other pots, pans, or boxes, and grown on in a sunny place near the glass when established. In about three years flowering bulbs are produced from seeds. The following are a few of the best Lachenalias:—

L. aurea.—Leaves broad, fleshy, channelled, spotted with dark purple. Flowers golden-yellow fading to purple, borne on purple spotted scapes a foot or more high. The variety *gigantea* is a much finer plant than the type. (*Bot. Mag.* t. 5992.)

L. aureo-reflexa.—As the name indicates, this is a hybrid between *L. aurea* and *L. reflexa*. It has bright yellow flowers, the outer segments being tipped with green, and fading to reddish-brown. The fleshy lance-

shaped recurved leaves are not spotted.

L. Cami.—A fine seedling form, having shining green leaves about 9 ins. long mottled with dull brown. From twelve to twenty flowers are borne on a heavily blotched scape about 1 ft. high, the colour being orange-yellow tinted with green, with bright red buds.

L. contaminata.—Leaves roundish spotted. Flowers white, often tinted with pink. (*Bot. Mag.* t. 1401.)

L. convallarioides.—This species has solitary tapering leaves 6 to 12 ins. long and 1 in. broad, and bell-shaped flowers purple-pink in bud, but afterwards white with a heather-like scent. The colour and shape remind one of Lily of the Valley. (*Gard.* 1904, lxv. 213, 264.)

L. fistulosa.—This species is distinct in growth, the two fleshy leaves being nearly as broad as long. The sweet-scented flowers are tinged with pale blue at the base and tipped with purple.

L. glaucina.—Leaves, usually two, lance-shaped, spotted, about 1 ft. long. Flowers white, more or less tinted with yellow and red. (*Bot. Mag.* t. 3552.)

L. isopetala.—A rare species 4 to 8 ins. high, with two long pointed leaves, and pale flowers tinged with pale rose or red.

L. lilacina.—A rare species, having short and very narrow leaves, and pretty flowers of bright lilac shaded blue, borne on stems densely mottled with reddish-brown.

L. Nelsoni.—A fine hybrid between *L. aurea* and *L. tricolor*, and named after the Rev. John Nelson, who raised the first hybrid Lachenalia. It is a free grower, and has stout scapes over a foot high of rich yellow flowers. A fine plant for growing in bold masses.

L. orchtioides.—Closely related to

L. glaucina, and very variable in colour. Leaves deep green spotted, and spikes of yellowish or whitish flowers more or less tinted with red or blue.

L. pallida.—A rare species with long fleshy erect leaves, purple on the under-surface. The small erect flowers are borne in dense spikes and are pure white tipped with green.

L. pendula.—A fine species, remarkable for its large bulbs, deep green lance-shaped leaves sometimes faintly mottled with brown. Flowers $1\frac{1}{2}$ to 2 ins. long, orange-red tipped with emerald green and purple, and borne on scapes 12 to 18 ins. high. (*Bot. Mag.* t. 590.) The variety *Aureliana* has finer flowers, and somewhat glaucous leaves. It is said to be naturalised in Provence. (*Rev. Hort.* 1890, t. 396.)

L. pustulata.—Leaves fleshy, lance-shaped, 6 to 9 ins. long, wrinkled. Flowers whitish. (*Bot. Mag.* t. 817.)

L. racemosa.—Leaves lance-shaped, much wrinkled. Flowers whitish tinted with red. (*Bot. Mag.* t. 1517.)

L. reflexa.—A species with pairs of dark green, deeply-channelled and recurved leaves thickened into a horny tip. The long yellow flowers are swollen in the middle and almost closed at the mouth.

L. Regeliana.—A hybrid between *L. reflexa* and *L. tricolor aurea*, having unspotted leaves and pure yellow flowers.

L. rosea.—A very rare species distinguished by its unspotted leaves, 6 to 9 ins. long, and bright red flowers.

L. rubida.—Leaves slightly mottled with brown. Flowers ruby-red, borne on heavily spotted scapes. (*Bot. Mag.* t. 993.) In the varieties *tigrina* and *punctata* the flowers are heavily spotted with deep red.

L. tricolor.—A well-known species with broad fleshy green leaves about 12 ins. long, mottled with dull purple. From twelve to twenty tubular flowers, red, yellow, and green, are borne on scapes about 1 ft. high. (*Bot. Mag.* t. 82.) There are many varieties, the best-known being *luteola*, with quite yellowish flowers; *aurea*, bright yellow; *quadricolor*, with several shades; *superba*, a fine form with large flowers; and *Warei*, bright yellow tipped with green.

L. unifolia is remarkable for having only one narrow leaf with blood-red blotches, and dense trusses of white flowers.

L. versicolor.—A variable species, having blister-like blotches on the leaves, and bearing small bell-shaped flowers varying from green and yellow to pink and purple.

L. violacea.—A strong-growing species with spotted leaves and white inflated flowers tinged with violet and green.

LAPEYROUSIA (after *P. Picot de la Peyrouse*, a Toulouse botanist, 1744-1818). Nat. Ord. Iridææ.—This genus contains over thirty species of plants having corms with matted tunics, roundish, linear, or narrow sword-shaped leaves arranged distichously, and starry six-petalled flowers. The best-known member of the genus is still called *Anomatheca cruenta*—a name that has been retained for the present in this work (see p. 82). The plants which are all natives of South and Tropical Africa are generally confined to botanical collections, and are of little garden value. The following species may be noted:—*L. anceps*, bluish-purple; *L. corymbosa*, bright blue with a white band at base (*Bot. Mag.* t. 595); *L. fissifolia*, white or rose, sweet-scented (*Bot. Mag.* t. 1246);

and *L. grandiflora*, bright scarlet (*Bot. Mag.* t. 6924).

LATHYRUS (*Lathuros*, ancient Greek name of the Pea). Nat. Ord. Leguminosæ. — This genus contains about a hundred and seventy species of hardy annuals and perennials, and includes the Sweet Pea and the Everlasting Pea. Most of the species have fibrous roots, remarkable, like all the Leguminosæ, for the numerous warty nodules containing bacteria that are borne on the roots. The most noted tuberous-rooted kind is—

L. tuberosus. — A species widely distributed throughout Europe, Western Asia, and Northern Africa, and naturalised even in parts of the British Islands. It has tuberous root-stocks, from which arise four-angled climbing stems 2 to 3 ft long. The leaves are composed of two oblong elliptic more or less pointed leaflets, at the base of which are narrow semi-sagittate stipules. The large sweet-scented bright pink or rose flowers appear from May to July, three to six on a long stalk.

This species will grow luxuriantly in any good garden soil, and may be increased by division of the root-stocks or by seeds sown in the open air when ripe or in spring.

LEONTICE (*leon*, a lion; in reference to the supposed resemblance of the leaf to the point of a lion's foot). Nat. Ord. Berberidæ. — A small genus of tuberous-rooted herbs having leaves twice- or thrice-pinnately cut, and yellow flowers in racemes or panicles. Sepals six to nine, petal-like; petals six, much shorter than the sepals. Stamens six.

These plants flourish in light sandy soil in warm positions in the rocky or border, but the tuberous root-

stocks should be protected with litter or bracken, etc., in severe winters. The plants may be increased by seeds sown in cold frames when ripe, or by division of the root-stocks in spring.

L. Alberti, from Turkestan, grows about 1 ft. high, and has five-parted digitate leaves with bluntly elliptic lobes. The golden-yellow flowers, striped outside with red, appear in April in conical clusters.

L. altaica (*Bongardia Rauwolfi*).— From the Altai Mountains, has three-parted leaves divided into five elliptic blue-green leaflets, and produces its terminal clusters of yellow flowers in April (*Bot. Mag.* t. 3245).

L. darwasica, from Bokhara, is somewhat similar, as is also

L. Leontopetalum, from the Levant, which has large tuberous roots, known as Lion Turnips, much-divided leaves, and yellow flowers.

L. triphylla, from N. America, grows from 2 to 3 ft. high, and produces its white flowers in May. The leaves when dried are very fragrant-smelling.

LEUCOCORYNE (*leukos*, white; *koryne*, a club; referring to the sterile anthers). Nat. Ord. Liliaceæ. — A small genus of Chilean plants having tunicated bulbs or corms, narrow leaves, and few-flowered umbels of salver-shaped flowers with a cylindrical tube. There are three perfect stamens, and three staminodes.

These plants can only be regarded as half-hardy except in the more favoured parts of the Kingdom, and are not very well-known. They require the same cultural treatment as the *Ixias*—which see (p. 319).

The species best known are **L. alliacea**, white; **L. purpurea**, lavender and crimson maroon (*Gard. Chron.* 1894, xlv. 144).

LEUCOJUM (*leukos*, white; *ion*, a violet; referring to the colour and fragrance of the flowers), **SNOWFLAKE**. Nat. Ord. Amaryllideæ. — A genus containing nine species of ornamental herbs having tunicated bulbs, narrow strap-shaped leaves, and large broadly bell-shaped, snowdrop-like blossoms.

The Snowflakes flourish in ordinary garden soil of a rich and sandy nature, and once planted may be left to look after themselves. To be effective they should be massed in bold clumps in the rockery, or border, or between deciduous shrubs. They are readily increased by offsets, which should be detached after the leaves have withered. The following species are good garden plants:—

L. æstivum.—This free-growing species, popularly known as the "Summer Snowflake," is widely dis-



FIG. 223.—*Leucojum æstivum*, bulb. (1.)

tributed over Central and S. Europe from Britain and France to the Crimea, being found in wet meadows and osier beds in the south-eastern parts of England. The egg-shaped bulbs are 1 to 1½ ins. through, and give rise to bluntly strap-shaped leaves 12 to 18 ins. long. The drooping pure white flowers, about 1 in. long, are tipped with green, and appear from the end of April to the

end of May. (*Bot. Mag.* t. 1210; *Red. Lil.* t. 135.)

L. autumnale (*Acis autumnalis*).—This species is found wild from Portugal and Morocco to the Ionian Islands. The roundish bulbs are only about ½ in. thick, and the slender thread-like leaves are usually produced after the flowers have withered in August and September. The blossoms are white tinted with pink, the segments being five- to seven-veined. (*Bot. Mag.* t. 960.) The variety *cephalonica* has a two-valved spathe instead of a single linear one; and the variety *pulchellum* produces its white pendulous flowers at the same time as the leaves. Tender.

L. hyemale (*Acis hiemalis*).—A native of S. France, with small round bulbs and narrow leaves about 1 ft. long at the same time as the flowers. These are white tinged with green outside, and appear in April, and not in winter as the name *hyemale* would indicate. (*Bot. Mag.* t. 6711.)

L. longifolium (*Acis longifolia*).—This grows wild at an altitude of 4500 to 6000 ft., on the Corsican Mountains. It has small brown-coated bulbs, very slender, flaccid thread-like leaves 6 to 12 ins. long, and small white flowers ¼ to ½ in. long in April and May.

L. pulchellum (*L. Hernandezi*).—A native of Sardinia and the Balearic Isles, closely related to *L. æstivum*, from which it differs chiefly in having narrower leaves and smaller flowers somewhat later in the season. Fig. 224.

L. roseum (*Acis rosea*).—A small-bulbed Corsican plant with thread-like leaves after the flowers, and rosy-red blossoms ½ in. long, in September and October (*Sw. Brit. Fl. Gard.* t. 297).

L. trichophyllum (*Acis trichophylla*).—A pretty little plant from

FIG. 224.—*Leucojum pulchellum*.FIG. 225.—*Leucojum vernum carpaticum*. (3.)

S. Europe and W. Africa, with thread-like leaves, and white flowers in April (*Bot. Reg.* t. 544). The variety *grandiflorum* has somewhat larger flowers (*Red. Lil.* t. 217).

L. vernum.—The best of the genus, native of Central and Southern Europe, and now naturalised in parts of Dorset. It has round green-skinned bulbs about 1 in. through, and strap-shaped leaves 6 to 9 ins. long and about $\frac{1}{2}$ in. broad. The sweet-scented flowers, pure white tipped with green, appear in March and April. (*Bot. Mag.* t. 46.) The variety *biflorum* or *Vagneri*, has more than one flower on a scape, and often produces its blossoms as early as January and February. (*Gard. Chron.* 1903, xliii. 131.) In the variety *carpaticum* the white segments are tipped with yellow instead of green. (*Bot. Mag.* t. 1993.)

LEWISIA (after Capt. Lewis, the traveller). Nat. Ord. Portulacæ.

L. rediviva (*Spathum*).—A pretty

FIG. 226.—*Lewisia rediviva*.

North American plant 1 to 3 ins. high, with edible, tapering, fleshy,

red-skinned roots, white within. Leaves densely tufted, linear, fleshy, withering on the appearance of the flowers. The latter, 3 to 4 ins. across, appear in summer on one-flowered scapes, jointed above the middle, pink, with a nearly white centre. Sepals six to eight, broadly ovate, contorted, imbricate, finely veined with red, persistent.

L. Tweediei.—A pretty little plant forming tufts of bright green fleshy spoon-shaped leaves with rather long stoutish stalks. The individual flowers are about an inch across, and of a pale salmon-pink colour with yellow anthers varying to pale yellow when fully expanded. They appear in June and July, one to each stem. (*Bot. Mag.* t. 7633.)

The *Lewisia*s should be planted in a sunny nook or crevice in the rockery, where the fleshy roots will obtain plenty of moisture, and because the flowers will not readily develop in shady spots. After blooming, *L. rediviva* shrivels up into a withered, string-like mass. In very hot seasons the plants should be watered every day. Propagation is effected by seeds, or by dividing the roots in spring.

LIATRIS (derivation unknown), SNAKEROOT. Nat. Ord. Compositæ.—A genus containing about twenty species of North American perennials having tuberous root-stocks and erect slender stems furnished with narrow leaves and purplish or white heads of flowers in spikes, racemes, or panicles.

The plants are nearly all perfectly hardy, and when grown in bold masses are effective in the flower-border, owing to the dense masses of blossom which are usually produced in August and September and open from the top downwards. Any ordinary good

garden soil will suit the *Liatris*es, and the stock may be increased in autumn or spring by division of the tuberous root-stocks, or by seeds sown in autumn or spring.

L. Chapmanni grows about 3 ft. high, and produces violet-purple spikes of bloom. Being a native of Florida, it is safer to protect the tubers in winter with bracken, litter, etc., or to have them taken up and stored in a frost-proof place until spring, in the same way as Dahlias.

L. elegans.—This purple-flowered species grows from 2 to 4 ft. high, the lower leaves being spoon-shaped, the upper ones narrow and sometimes spiny-tipped (*Bot. Reg.* t. 267).

L. graminifolia.—This species has narrow grass-like leaves on stems about 3 ft. high, and loose spikes of violet-purple flowers. The variety *pilosa* has narrow hair-like bracts to the flower-heads. (*Bot. Mag.* t. 3829.) The variety *dubia* grows about 6 ft. high, 2½ ft. of which are bright deep shining lilac flowers. (*Gard.* 1899, lvi. 212.)

L. odoratissima (*Trilisa odoratissima*).—A pretty species 2 to 4 ft. high, with bright purple flower-heads, and leaves which emit a vanilla-like odour when dried, or cut, or bruised.

L. punctata.—This species has large tuberous root-stocks, and leaf-stems dotted with brown, the violet-purple flowers being borne on the tops of stems 2 to 3 ft. high.

L. pycnostachya grows from 3 to 5 ft. high, and is known by its stiffish leaves and pale purple flower-heads, borne in dense spikes 12 to 18 ins. long.

This species is often treated as a biennial, the seeds being sown one year in cold frames in autumn, to produce flowering plants the next.

L. scariosa grows about 3 ft. high, and has very long and narrow leaves

and purple flower-heads, each about 2 ins. across (*Bot. Mag.* t. 1709; *Bot. Reg.* t. 1654).

L. spicata.—A handsome and well-known species 2 to 3 ft. high, having lance-shaped pointed leaves fringed at the base, and bright purple flower-heads in spikes 6 to 15 ins. long (*Bot. Mag.* t. 1411).

L. squarrosa.—A fine species 2 to 3 ft. high, with stiffish leaves and bright purple flower-heads, the involucre of which is composed of elongated leafy bracts.

LIBERTIA (after *Marie à Libert*, a Belgian lady botanist). Nat. Ord. Iridææ.—There are several species in the genus, but the best is—

L. formosa.—A beautiful Chilean perennial with a creeping root-stock, from which arise deep green, narrow, sword-shaped and more or less recurving leaves about 1 ft. long. The pure white flowers appear in May and June, and open from the bottom upwards on the spikes about 2 ft. high. (*Bot. Reg.* t. 1630; *Bot. Mag.* t. 3294.)

Other species of *Libertia*, all with white flowers, are **L. grandiflora**, **L. ixioides**, **L. paniculata** (*Bot. Mag.* t. 6263), and **L. pulchella**.

Libertias are fairly hardy in the milder parts of the Kingdom, and should be planted in bold masses in the border or rock-garden in warm, sheltered nooks. They prefer a compost of rich sandy peat, and might therefore be associated with such Ericaceous plants as *Rhododendrons*, *Azaleas*, *Kalmias*, and *Heaths*. The plants are most easily propagated by severing the root-stocks with a sharp knife in spring just as growth is about to commence.

LILIUM (from *leirion*, the Greek name of Lily; or from the Celtic *li*,

white), LILY. Nat. Ord. Liliacæ.—A large genus of ornamental flowering plants, usually having large scaly bulbs and erect stems bearing lance-shaped leaves, and one or more showy, more or less drooping or horizontal flowers. The funnel-shaped or bell-shaped perianth has six distinct, erect, spreading or recurving segments or petals, the three inner ones being usually larger and broader than the three outer ones. Stamens six, with large brown, red, or orange versatile anthers at the end of long slender filaments.

The *Liliums* are natives of the northern hemisphere, and are found in a wild state in the New World in Canada, California, and other parts of the United States, and in the Old World in Central and Southern Europe, Siberia, the Caucasus, Asia Minor, extending eastwards to Nepal, the Himalayas, Burma, China, the Philippine Islands, and Japan. With such a wide range of distribution, it is natural that *Liliums* should be found growing under different conditions as to soil, climate, temperature, and elevation. To show at a glance various habitats of the species, *Liliums* may be classed into Old-World species and New-World species as follows:—

(i.) OLD-WORLD LILIUMS.

* *L. Alexandrae*. Japan.

† *L. awatum*. Japan.

L. Bakerianum. Burma.

* *L. Batemanii*. Japan.

† *L. Browni*. Japan.

* *L. bulbiferum*. Europe.

† *L. callosum*. Japan.

* *L. candidum*. Europe.

* *L. carniolicum*. Carniola.

* *L. chalconicum*. Europe.

† *L. concolor*. China.

‡ *L. cordifolium*. Japan.

* *L. croceum*. Europe.

OLD-WORLD LILIUMS—*continued*.

- * *L. davuricum*. Siberia.
- † *L. Delavayi*. China.
- † *L. Duchartrei*. Tibet.
- † *L. elegans*. Japan.
- † *L. Fargesii*. China.
- † *L. formosum*. China.
- † *L. giganteum*. Himalayas.
- † *L. Hansonii*. Japan.
- * *L. Heldreichii*. Greece.
- * *L. Henryi*. Japan.
- * *L. Jankæ*. Europe.
- † *L. japonicum*. Japan.
- † *L. Kramerii*. Japan.
- † *L. lankoungense*. China.
- † *L. Leichtlinii*. Japan.
- † *L. leucanthum*. China.
- † *L. longiflorum*. Japan.
- L. Lowii*. Burma.
- † *L. Martagon*. Europe.
- † *L. Maximowiczii*. Japan.
- † *L. mirabile*. China.
- † *L. monadelphum*. Caucasus.
- † *L. myriophyllum*. China.
- L. neilgherense*. India.
- L. nepalense*. Nepal.
- † *L. ochraceum*. China.
- † *L. oxypetalum*. Himalayas.
- † *L. papilliferum*. China.
- L. philippinense*. Philippines.
- † *L. polyphyllum*. Himalayas.
- * *L. pomponium*. Europe.
- L. primulinum*. Burma.
- * *L. pyrenaicum*. Europe.
- † *L. roseum*. Himalayas.
- † *L. Rosthernii*. China.
- * *L. rubellum*. Japan.
- † *L. speciosum*. Japan.
- L. sulphureum*. Himalayas.
- † *L. sutchuenense*. China.
- † *L. taliense*. China.
- † *L. tenuifolium*. Siberia.
- * *L. testaceum*. Europe.
- * *L. tigrinum*. Japan, China.
- * *L. umbellatum*. Europe.
- † *L. Wallacei*. Japan.
- † *L. Yoshidai*. Japan.
- † *L. yunnanense*. China.

(ii.) NEW-WORLD LILIUMS.

- M *L. Bakeri*. N. America.
- † *L. Bolanderi*. Oregon.
- M *L. canadense*. Canada.
- M *L. Catesbaei*. N.W. America.
- † *L. Columbianum*. Oregon, etc.
- M *L. Grayi*. N. Carolina.
- † *L. Humboldtii*. California.
- † *L. Kelloggi*. California.
- M *L. lucidum*. Oregon.
- M *L. maritimum*. California.
- † *L. nitidum*. California.
- † *L. occidentale*. California.
- † *L. pardalinum*. California.
- M *L. Parryi*. California.
- † *L. parvum*. California.
- † *L. purpureum*. Oregon.
- † *L. philadelphicum*. U.S.A.
- † *L. Roezli*. California.
- * *L. rubescens*. U.S.A.
- M *L. superbum*. U.S.A.
- * *L. Washingtonianum*. U.S.A.

From the cultivator's point of view all the Liliums mentioned above may be divided into three main groups so far as the soil is concerned. Those marked with an asterisk (*) may be looked upon as perfectly hardy in most parts of the United Kingdom, and as plants that will flourish in any good garden soil so long as it has been deeply dug or trenched, and enriched with a fair amount of well-rotted manure. If the soil should be naturally of rich loamy character with a certain amount of grit in it, so much the better.

The kinds marked with a dagger (†) are somewhat more fastidious, and yet they are excellent plants for the open air. The soil in which they are most likely to grow well should consist of sandy loam, peat, and leaf-soil in about equal proportions, and should be of course well drained.

The Liliums marked M are also fine garden plants but require special situations, either prepared or natural,

if they are to yield good results. The soil should be of sandy loam, peat, and leaf-soil in about equal proportions, as for the second group; but in addition there must be an abundance of moisture, but nothing in the way of stagnant water.

The border of a running stream, or brook, or on the edge of a lake or pond where the water is constantly being freshened, would therefore suit this particular group of American *Liliums* admirably.

With the exception of such kinds as *L. Lowi*, *L. nepalense*, *L. neilgherense*, *L. Wallichianum*, *L. Bakerianum*, *L. primulinum*, and *L. philippinense*—which are too tender for most parts of the United Kingdom, all the other kinds may be grown in the open air. Special cultural hints are given below in certain cases.

TIME TO PLANT.—Lilies may be planted in the open air in early autumn or in spring. Autumn, however, is the better season, as the roots from the base of bulbs become established in their action before the winter, and thus keep the bulbs well supplied with nourishment. When planted in spring—and bulbs imported then must necessarily be planted at that period—the bulb itself is already anxious to send up its leafy stem before basal roots have formed, and more or less at the expense of the reserve material in the fleshy scale-leaves. At this period, however, the autumn-planted bulbs are already well established, and in addition to basal roots from the bulbs a fresh supply of roots is being developed from the joints of the stems in many cases. This action is so well known to growers of *Liliums* in pots, that the bulbs are not at first covered with soil, but left exposed. In due course roots emerge from the

aërial stems, and handfuls of soil are added from time to time for them to work in. The two sets of roots thus absorb large quantities of food from the soil, and enable the plants to flower well in due course. Some kinds develop stem roots more readily than others.

DEPTH TO PLANT.—The bulbs of *Liliums* are not all of the same size—some being larger than others. In the case of autumn planting, a good rule to follow is to plant the bulbs in holes about three times deeper than their own diameter. This means that some bulbs will be from 6 ins. to 10 ins. deep, having from 4 ins. to 6 ins. of soil over the crowns. This deep planting is necessary, mainly as a protection against winter frosts, depredations of mice, etc., and also because the soil is several degrees warmer a few inches down than it is on the surface.

When planting bulbs in spring, the same methods may be adopted, if the bulbs are to remain in the soil during the winter, but it is not essential to bury the bulbs so deeply, if it is intended to lift them in autumn, as the weather gradually becomes more genial.

POSITION.—As a rule, *Liliums* should be planted in spots sheltered from cold biting winds, and where they may receive a little shade, cast from trees, during the hottest portion of the day. It is useless to plant them beneath trees with branches almost sweeping the ground; but between deciduous or evergreen shrubs, not too close together, *Liliums* often flourish and are protected at the base by the stems and leaves of their neighbours.

POT-CULTURE.—Many *Liliums* are cultivated in pots for the decoration of the greenhouse or conservatory, and also in thousands by market-

growers, the latter being particularly partial to such kinds as *L. longiflorum*, *L. speciosum* (or *lancifolium*), *L. tigrinum*, and *L. candidum*. The bulbs are placed in pots about twice their own diameter, the compost used being chiefly good turfy loam with a little peat or leaf-mould, and sand. Root action is established before much heat is applied, but afterwards the temperature is raised to hasten growth. When the plants have ceased to flower, they should be plunged outside in ashes or soil, and kept dryish, and when quite withered should be stored in a cool airy place till spring. The bulbs should then be shaken out of the old soil, and repotted in fresh compost. At the same time all offsets should be placed apart for increasing the stock if necessary.

There is now a very large trade done in imported bulbs by market-growers, and they never worry about propagation. The bulbs, however, are not all grown at one time. Sometimes they are forced into early growth by heat, if wanted during the winter months. At other times they are kept in check or "retarded" in refrigerators, and taken out in batches as required; while still another section may be grown on under what may be called natural conditions.

PROPAGATION. — Liliums may be propagated by (i.) offsets from the older bulbs; (ii.) by bulb scales; (iii.) by bulbils or vegetative seed-like bodies in the axils of the leaves of some species, e.g., *L. bulbiferum* and *L. tigrinum*; and (iv.) by seeds. The first three methods are easy enough. The offsets, scales, or bulbils should be placed in beds of rich sandy and well-drained soil, or in pots or pans if there are only small quantities. It will take the scales and bulbils

from two to three years to reach the flowering stage, but good offsets may develop more quickly.

As many species of *Lilium* deteriorate in our climate and are apt to die out altogether in time, it is a good practice to save seeds when possible, and raise plants from them. In this way a new and acclimatised race may be produced that would be likely to last longer than their progenitors. The seeds, when thoroughly ripe should be sown in pots or pans of rich gritty loam and leaf-soil, and covered with about $\frac{1}{2}$ in. of mould. They should be placed in a cold frame or greenhouse, and in due course, when the seedlings are large enough to handle easily, they may be carefully pricked out into similar pots or pans, or even into gritty soil in a cold frame. The soil must always be kept moist when the seedlings are growing, otherwise the newly forming bulblets may suffer beyond recall. It will take from five to ten or eleven years to obtain flowering bulbs from seed.

There are a few hybrid Liliums (noted below), but not so many as there might be. No doubt as time goes on, greater attention will be devoted to developing a new race.

Imported bulbs often arrive in a more or less injured or diseased condition. These should be overhauled immediately, separating the sound bulbs from the diseased or injured ones. All good bulbs may be planted immediately; shrivelled ones are best stored in dampish coconut fibre for some time, until they "plump up"; but all diseased portions should be burned.

The following is a list of Liliums in cultivation at present:—

L. Alexandræ (*L. Uke-Uri*).—Supposed to be a natural hybrid between *L. longiflorum* or *L. japonicum* and

L. auratum. Flowers 6 to 8 ins. across, pure white, in June and July. Japan.



FIG. 227.—*Lilium Alexandre*. (1.)

being more or less spotted with crimson; *tricolor*, very robust habit and large flowers without any brown dots, but with copious spots and papillæ.



FIG. 228.—*Lilium auratum*. (1.)

L. auratum.—This is the “Golden Lily of Japan.” It grows 2 to 6 ft. high, and has ivory-white flowers 9 to 12 ins. across, each petal having a broad bright yellow band down the centre, and numerous deep purple blotches on the inner surface, the basal portion being covered with stiffish purple hairs or papillæ. (*Bot. Mag.* t. 5338; *Pl. d. Serr.* 1528, 31; *Elves, Lil.* t. 15.)

There are many forms of *L. auratum*, the best known being *platyphyllum*, with richly-spotted broad-petalled flowers about 1 ft. across; *virginale*, very similar but spotless; *rubro-vittatum*, with a red band down the centre of the petals; *Wittei*, pure white, without spots, but banded with yellow, and sometimes tipped with reddish-brown; *pictum*, finely spotted crimson-tipped petals; *Parkmanni*, something like *rubro-vittatum*, but

L. Bakeri.—A native of the sandy woods of Washington Territory and S. British Columbia. It has ovoid bulbs exactly like those of *L. canadense*, about 5 ins. in circumference. The rather stout roundish stems are 2 to 6 ft. high, and the bright green lanceolate leaves are mostly in whorls. The orange-red flowers, about 1½ ins. long, are thickly spotted with maroon in the lower half.

L. Bakerianum.—This species is found at an elevation of 4000 ft. on the Shan Hills in Upper Burma, and at 6000 ft. in Yunnan, China. It grows 2 to 4 ft. high, and has narrow stalkless leaves, densely pubescent beneath. The broadly funnel-shaped flowers about 4 ins. long, are creamy-white, copiously spotted with brown inside towards the base. Best grown in a greenhouse.

L. Batemannii.—This is now

classed as a variety of *L. elegans*. It grows 3 to 5 ft. high, and has unspotted flowers 4 to 5 ins. across, of a glowing reddish-apricot tint.



FIG. 229.—*Lilium Bakerianum*. (3.)

L. Bolanderi.—A Californian species, $1\frac{1}{2}$ to 3 ft. high, with oblanceolate leaves mainly in four whorls of twelve to fifteen, and bearing deep crimson, dark spotted, funnel-shaped flowers, something like *L. Grayi* (*Garden*, Oct. 1890).

L. Browni.—A magnificent Japanese Liliium, 2 to 4 ft. high, with purple-spotted stems, and horizontal, tubular bell-shaped flowers 6 to 9 ins. long,

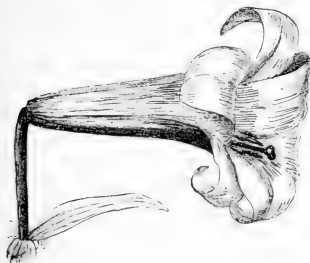


FIG. 230.—*Lilium Browni*. (3.)

pure white with a purple line down the centre of the three inner petals, the whole being suffused with purple outside (*Fl. d. Serr.* t. 47). There

are a few forms such as *chloraster*, *odorum*, *platyphyllum*, and *viridulum*.

L. bulbiferum.—A well-known species 2 to 4 ft. high, with erect crimson flowers spotted with brown, and shading off to orange-red. Shiny black bulbils are borne freely in the axils of the leaves. Europe. (*Bot. Mag.* tt. 36, 1018; *Elwes*, *Lil.* t. 23.)

L. Burbanki.—A hybrid between *L. pardalinum* and *L. Washingtonianum*, with orange-yellow flowers spotted with purple.

L. callosum.—A native of China and Japan. Flowers drooping, orange-scarlet, $1\frac{1}{2}$ ins. long, borne in clustered racemes on stems 2 to 3 ft. high. (*Fl. d. Serr.* t. 230; *Elwes*, *Lil.* t. 41.)

L. canadense (*L. penduliflorum*).—Flowers, drooping, funnel-shaped, varying in colour from bright orange-yellow to pale bright red, the upper half being heavily spotted with purple brown (*Bot. Mag.* t. 800). There are varieties known as *rubrum*, *parvum*, and *flavum*. Canada. (*Bot. Mag.* tt. 800, 6146; *Elwes*, *Lil.* t. 27.) *L. canadense* is often confused with *L. superbum*, but is quite distinct from it.

L. candidum.—This is the well-known pure white Madonna Lily of S. Europe, Asia Minor, etc. There are a few varieties not of much consequence. (*Bot. Mag.* t. 278.) This is best grown in soil not too rich, and it is also better to leave it undisturbed when well established. Otherwise the Lily disease may play havoc with the plants in a short time. (*Bot. Mag.* t. 278; *Elwes*, *Lil.* t. 9.) A good Lily for forcing. Fig. 231.

L. carniolicum.—Flowers drooping, recurved, $1\frac{1}{2}$ to 2 ins. deep, varying from bright orange-yellow to scarlet. S. Europe. (*Elwes*, *Lil.* t. 45.)

L. Catesbæi.—Flowers of a bright orange-red, heavily spotted with

purple, petals slightly recurved. An elegant species. N.W. America. (*Bot. Mag.* t. 259.)

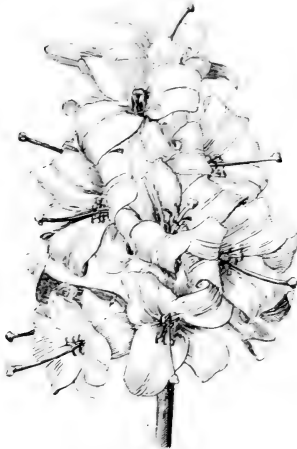


FIG. 231.—*Lilium candidum*. (1.)

L. chalcidonicum.—A well-known "Turk's Cap" Lily, 2 to 3 ft. high, with bright scarlet flowers having the petals rolled back (*Bot. Mag.* t. 30; *Elwes, Lil.* t. 43).

This species has been crossed with *L. excelsum*, and produced a hybrid called *Beerensi* (*Gard.* 1895, 11).

L. columbianum (*L. nitidum*).—This resembles a small *L. Humboldtii*. Flowers drooping, reddish-orange or yellow, with reflexed petals spotted with red purple. Oregon and British Columbia. (*Elwes, Lil.* t. 31.)

L. concolor (*L. sinicum*).—Flowers bright scarlet spotted with deep brown purple at the base. China and Japan. (*Bot. Mag.* t. 1165; *Elwes, Lil.* t. 185.)

There are several varieties, such as *Buschianum*, bright scarlet spotted with black; *Coridion*, bright yellow spotted with brown; *Partheneion*,

orange-yellow with faint spots; *pulchellum*, scarlet crimson, spotted black; *luteum*, yellow spotted purple-red.

L. cordifolium.—Flowers tubular, white spotted with purple brown at the base, and borne on stems 3 to 4 ft. high. Leaves broadly heart-shaped, ovate, with long stalks. This Japanese species is like a dwarf form of the Himalayan *L. giganteum*. (*Bot. Mag.* t. 6637; *Elwes, Lil.* t. 1.) *L. Glehni*, from the Island of Sachalin, is similar to *L. cordifolium*, but has more numerous and smaller flowers.

L. croceum.—This is the well-known orange or Saffron Lily of the



FIG. 232.—*Lilium croceum*.

European Alps. It has cobwebby stems 3 to 6 ft. high, golden orange funnel-shaped flowers, sometimes tinted with scarlet and spotted with purple at the base. (*Bot. Mag.* t. 36, as *L. bulbiferum*.)

L. Dalhousoni.—A hybrid between the European *L. dalmaticum* and the

Japanese *L. Hansonii*. Flowers dark brownish-purple, on stems 5 ft. high. (*Garden*, 1893, ii. 927.)

L. dauricum or *davuricum* (*L. pennsylvanicum*).—This is often confused with *L. umbellatum*. It has orange-scarlet flowers flushed with red and spotted with black. Siberia. (*Bot. Mag.* tt. 872, 1210; *Elwes, Lil.* t. 21.)

L. Delavayi.—A native of Yunnan, Western China, distinguished by its long slender rhizomes, slender downy stems 1 to 2 ft. high, rather narrow leaves $1\frac{1}{2}$ to 3 ins. long, and wine-red openly funnel-shaped flowers heavily dotted with brown inside.

L. Duchartrei.—A native of Eastern Tibet and the mountains of W. China. It has small bulbs borne at the end of a long slender root-stock. The very slender stems are 2 to 3 ft. high, sparsely furnished with thin lance-shaped leaves 2 to $2\frac{1}{2}$ ins. long. The flowers, $1\frac{1}{2}$ to 2 ins. long, are white, spotted inside with reddish-brown, especially near the edges of the segments. (*Bot. Mag.* t. 8072.)

L. elegans (*L. aurantiacum*; *L. Thunbergianum*).—Stems 1 to 2 ft. high, with scarlet-orange cup-shaped flowers 4 to 6 ins. across, slightly spotted with purple near the base. (*Bot. Reg.* 1839, t. 38.)

There are many fine varieties of *L. elegans*, all excellent for planting amongst low-growing shrubs or for pot-culture. Amongst the best are—*Alice Wilson*, clear lemon-yellow; *alutaceum*, bright apricot, spotted black; *atrosanguineum*, deep red, spotted black; *aurantiacum*, orange-yellow; *Batemanniæ*, clear apricot-red, unspotted; *Horsmanni*, rich crimson; *Wallacei*, rosy-apricot, heavily spotted; and many others, including *fore pleno*, a double-flowered form with deep red blossoms.

L. Fargesii.—This species was collected with many others in W. China by Father Farges, after whom it is named. It has small ovoid bulbs, slender stems about 1 ft. high, having linear leaves 6 to 7 ins. long, and yellow purple-spotted flowers with much-reflexed segments.

L. formosum.—A native of the mountains of Western China. It grows about 3 ft. high, and has lance-shaped leaves about 6 ins. long. The white flowers are broadly funnel-shaped, 6 to 7 ins. long, and the segments spreading only towards the tips.

L. giganteum.—A magnificent Lily from the high mountain forests of Hupeh and Yunnan, China. It has

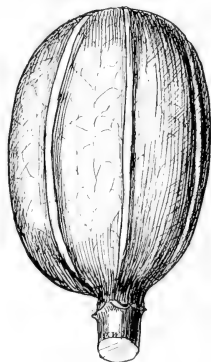


FIG. 233.—*Lilium giganteum*, seed-pod.

large bulbs, and stems from 6 to 14 ft. high, with heart-shaped ovate leaves, gradually becoming smaller as they ascend the stems. Flowers 5 to 6 ins. long, tubular, white, washed with violet-purple in the throat, and sweetly scented. (*Bot. Mag.* t. 4673; *Elwes, Lil.* t. 21.) The variety *yunnanense* is very hardy, and has larger

and better-coloured flowers than the type (*Gard.* 1904, lxv. 406).

The best time to plant the bulbs of *L. giganteum* is about the end of April or early in May, leaving the upper half uncovered with soil. It is safer to lift the bulbs in autumn and store them in frost-proof places during the winter, as they are not hardy except in the very mildest parts of the Kingdom, where the large seed-pods are also freely produced.

L. Grayi.—A native of the Alleghanies of Virginia and North Carolina, related to *L. canadense*. It has small roundish bulbs arising annually from a creeping root-stock. Stems 2 to 3 ft. high. Flowers drooping, rich crimson, funnel-shaped, heavily blotched with purple at the yellowish base of the reflexed petals. (*Bot. Mag.* t. 7234.)

L. Hansoni.—A fine Japanese Lily 3 to 4 ft. high, having bright orange-yellow flowers with reflexed petals, heavily spotted with blackish or brownish purple (*Elwes, Lil.* t. 34). A good Lily for forcing.

L. Heldreichi.—This species inhabits the mountains of Greece at an altitude of 6000 to 8000 ft. and is intermediate between *L. carniolicum* and *L. chalcidonicum*. It has ovoid bulbs, stoutish green stems spotted with purple, and 2 to 3 ft. high, each bearing a solitary bright reddish-yellow flower about 2 ins. long.

L. Henryi.—A strong and free-flowering species from the limestone gorges of Central China. Stems 3 to 6 ft. high, furnished with lance-shaped leaves 6 to 8 ins. long, and having rich orange-red flowers 3 to 4 ins. across, spotted with black, and having numerous raised papillæ near the base. (*Bot. Mag.* t. 7177; *Garden*, 1891, 830; *Gard. Chron.* 1899, viii. 380, fig. 75.)

L. Humboldtii.—A graceful Cali-

fornian Lily 4 to 8 ft. high, with oval lance-shaped leaves in whorls of ten to twenty. Flowers drooping, rich orange yellow, heavily spotted with purple on the lower half of the reflexed petals. (*Elwes, Lil.* t. 32.)



FIG. 234.—*Lilium Henryi*.

The variety *Bloomerianum* has golden-yellow flowers tipped with purple, and having large spots (*Fl. d. Serr.* tt. 1973-4); *ocellatum*, yellow, heavily blotched with purple; also *magnificum*, orange, spotted maroon, each spot ocellated with crimson.

L. Jankæ.—A native of the Transylvanian mountains, with bulbs about 2 ins. in diameter, and stout closely leafy stems 2 to 3 ft. high, bearing pale yellow unspotted flowers about 2 ins. long, the segments reflexing from below the middle.

L. japonicum (*L. odorum*).—A fine Japanese species 1 to 3 ft. high, with broadly funnel-shaped, sweet-scented flowers of a pure ivory-white, some-

times tinged with purple outside, 6 to 9 ins. across when fully open (*Bot. Mag.* t. 1591; *Elwes, Lil.* t. 14).



FIG. 235.—*Lilium japonicum*. (3.)

A somewhat delicate species requiring protection in winter in unfavourable localities. It is a good greenhouse Lily.

L. Kelloggi.—A pretty Californian Lily, 3 to 5 ft. high, resembling *L. Columbianum*. Flowers delicate, pinkish purple, becoming deeper with age, banded with yellow and finely dotted with maroon on the reflexed petals. From eight to twenty flowers are borne in a truss. (*Gard. Chron.* 1903, xxxiii. 422; *Garden*, 1901, i. f. 330.)

L. Kewense.—This is a hybrid between *L. Henryi* and *L. Browni chloraster* (*Gard.* 1900, lviii. 99, f.).

L. Krameri (*L. Elisabethæ*).—A distinct and free-flowering Japanese *Lilium* 3 to 4 ft. high, bearing sweet-scented pink flowers (*Bot. Mag.* t. 6058; *Elwes, Lil.* t. 14).

L. lankongense.—A species from Yunnan, West China (altitude 8000 to 9000 ft.), closely related to *L. polyphyllum*. The slender downy stems are 1 to 2 ft. high, with narrow leaves about 2½ ins. long, and drooping long-stalked flowers white or

purple, spotted with black, the segments being reflexed from low down.

L. Leichtlini.—A fine Japanese species 3 to 4 ft. high, with drooping citron-yellow flowers heavily spotted with purple, the petals being rolled back, as in the Turk's Cap forms (*Bot. Mag.* t. 5673; *Elwes, Lil.* t. 39).

There are a few forms, such as *majus*, like the type but larger; *platypetalum*, with broad petals; and *tigrinum*, heavily spotted.

L. leucanthum.—A fine West Chinese *Lilium* (altitude 4000 to 5000 ft.), closely related to *L. Browni*, and at one time considered to be a variety of it (see *Bot. Mag.* t. 6722). It has large roundish bulbs and sturdy stems 3 to 4 ft. high, clothed with numerous lance-shaped leaves about 3 ins. long. The funnel-shaped perianth about 6 ins. long, is milky-white, slightly tinged with green near the base outside, unspotted, and tinged with pale yellow towards the base inside.



FIG. 236.—*Lilium longiflorum*. (3.)

L. longiflorum.—A charming Japanese *Lilium*, 1 to 3 ft. high,

with pure white tubular sweetly scented flowers (*Bot. Reg.* t. 560).

This fine species is cultivated by hundreds of thousands in a forced, retarded, and natural state by market growers, and is always popular. There are several forms of it, some much better than others. Some of the best are *Harrisi*, *eximium* or *Wilsoni*, *Takesima grandiflorum*.

L. Lowi.—A native of Burma, 2 to 4 ft. high, with white bell-shaped flowers more or less heavily spotted with violet or crimson-purple (*Bot. Mag.* t. 7232; *Garden*, 1894, 953).

Dr A. Henry says this species is also very common on the bare grassy mountains near Mengtse, China, at elevations of 5000 to 7000 ft., and has pink or purple-pink flowers.

This is too tender for most parts of the Kingdom, and is best grown in pots in the greenhouse.

L. Marhan.—A hybrid between the white *L. Martagon album* and the golden-yellow *L. Hansonii*. It has stems 5 to 7 ft. high, and thick petalled orange-yellow flowers streaked with brownish-red.

L. maritimum.—A native of California, seldom growing more than three miles from the ocean. It has rhizomatous bulbs and stems 3 to 5 ft. high, with deep red bell-shaped flowers spotted with dark purple. It flourishes in a well-drained, cool, moist soil. (*Elwes, Lil.* t. 12.)

L. Martagon.—The well-known Turk's Cap Lily of South Europe. It grows 2 to 3 ft. high, and has drooping flowers in chandelier-like tiers, and with gracefully recurved petals of a dull purple-red or violet-rose, heavily spotted with carmine at the base. (*Bot. Mag.* tt. 893, 1634; *Red. Lil.* t. 146; *Elwes, Lil.* t. 33.)

There are several varieties, the best known being *album*, pure waxy white; *dalmaticum*, pale to deep

purple; and *Catani*, with very deep velvety crimson flowers.

L. Maximowiczii.—A Japanese *Lilium* closely related to *L. Leichtlinii*, but resembling *L. tigrinum* in its small bulbs and flowers. The latter are drooping, orange-red fading to yellow at the tips, and heavily blotched with deep purple. The variety *Bakeri* has narrower leaves with ciliated margins, and smaller but more highly coloured flowers. *Regeli* is similar to *Bakeri*, but has large blotches on the flowers, and the leaves are not ciliated on the margins. (*Elwes, Lil.* t. 40.)

L. mirabile.—A fine Lily, native of Western China, growing about 4 ft. high, the thin slender stems being furnished with papery, heart-shaped ovate leaves. The funnel-shaped flowers, each 5 to 7 ins. long, are in clusters of seven to fifteen, spreading



FIG. 237.—*Lilium myriophyllum*. (E. J.)

horizontally, and are white, tinted with violet towards the margin.

L. monadelphum (*L. Loddigesianum*).—A vigorous Caucasian Lily, 3 to 5 ft. high, with drooping, clear pale yellow flowers borne in pyramidal clusters. The variety *Szovitsianum* (also well-known as *colchicum*) has beautiful citron-yellow flowers

spotted with blackish-purple, as many as thirty often hanging like bells from the tops of the stems. (*Bot. Mag.* t. 1405; *Elwes, Lil.* t. 36.)

L. myriophyllum.—A fine Western Chinese Lily, 2½ to 5 ft. high, with numerous narrow, lance-shaped, closely-arranged leaves, and trumpet-shaped blossoms of great substance, with petals reflexed at the tips. The colour is white washed with brown or chocolate. (*Bot. Mag.* t. 8102; *Flora and Sylva*, December 1905.)

L. nelgherense (*L. tubiflorum*).—A fine Indian species too tender for open-air culture in the British Islands. It grows from 2 to 3 ft. high, and has sweet-scented, pale sulphur-yellow, tubular flowers. (*Garden*, 1885, ii. 488; *Elwes, Lil.* t. 65; *Bot. Mag.* t. 6332.)

L. nepalense.—A native of India, Burma, and China, being common at elevations of 5000 to 9000 ft. in the latter country. Stems 1 to 3 ft. high with nodding bell-shaped flowers of a beautiful soft yellow, the lower half

bearing lance-shaped leaves in whorls of twenty, more or less, and bright



FIG. 239.—*Lilium nepalense*. (4.)

yellow flowers copiously spotted with reddish-brown on the upper half of the segments.

L. occidentale.—A Californian Lilium with a short rhizomatous root-stock and stems 2 to 6 ft. high, having leaves in whorls of five to twelve or more. Flowers 1½ to 2½ ins. long, crimson towards the tips, orange-red with copious black spots lower down the segments.

L. ochraceum.—This Lily is closely allied to *L. monadelphum* (*Szovitsianum*), and comes from the mountains of Western China, at an altitude of 9000 to 10,000 ft. The smooth shining stems are 3 to 4 ft. high, furnished with scattered lance-shaped leaves about 2 ins. long, and bearing drooping, yellow, unspotted flowers with reflexed segments.



FIG. 238.—*Lilium nelgherense*. (1.)

of the recurved petals being washed and blotched with rich purple-brown (*Elwes, Lil.* t. 5; *Bot. Mag.* t. 7043). It is safer to grow this species in a greenhouse.

L. nitidum.—A Californian Lily with oblong bulbs, and green and purplish stems about 1½ ft. high,

L. oxypetalum.—A pretty little species from the Himalayas (altitude

8000 to 12,500 ft.), having narrow elongated bulbs, slender stems 1 to 1½ ft. high, linear lance-shaped leaves, and one to three flowers about 2 ins. across in June, soft mauve-purple in colour, spotted at the base of the segments with deep purple. (*Bot. Mag.* t. 4731; *Elves, Lil.* t. 5.)

L. papilliferum (*L. Biondi*).—Another Yunnan *Lilium* (altitude 5000 to 6000 ft.), related to *L. Maximowiczii*. It has small roundish bulbs, and slender stems about 1 ft. high, bearing linear leaves. The drooping bell-shaped flowers, with reflexed segments, are bright red.

L. pardalinum.—This is the Californian "Leopard Lily." It has horizontal creeping root-stocks, on which the bulbs are developed. The stems are 3 to 8 ft. high, and the drooping flowers are bright orange-red heavily



FIG. 240.—*Lilium pardalinum* bulb and rhizome. (4.)

spotted with dark purple at the base. There are many varieties, such as *Bourgaei*, with crimson-orange heavily-blotched flowers; *californicum*, deep orange-yellow spotted with maroon and tipped with bright scarlet; *luteum*, soft yellow suffused with orange and brown; *Johnsoni*, a highly coloured variety; *Michauxi*, like the type, but later; *minor*, an early-flowering form with rather small orange black-spotted flowers; *pallidiflorum*, pale in colour, but large; *Robinsoni*, a strong grower, with bright vermilion flowers fading to yellow, and densely spotted with purple-

brown; and *Warei*, with sweet-scented, clear yellow, unspotted flowers.

A fine Lily for massing and grouping in moist beds amongst shrubs, etc. Mr Carl Purdy says:—"There seems to be a misconception generally as to the habitat of *L. pardalinum*, the idea being that it is a bog Lily. This is by no means the case. Moisture it loves, and it sometimes grows in very wet places, but in bogs never, and the finest developed plants are not in wet places.

"Go with me in the Coast Range Mountains to where high in their bosom some living stream has formed a little vale deep with sandy loam and wash from the surrounding slopes, and there overtopping the tall grasses and weeds, which are stimulated to a luxurious growth, I will show you this beautiful Lily higher than a man, and glorious in its orange and red bloom, its bulb in a sharp well-drained soil, its roots running down to abundant moisture. In such spots it grew by acres before civilisation with its plough and hog came. I have often seen masses containing 200 to 300 bulbs solidly matted together. If it is on the bank of the stream in deep sandy loam, where the roots can run down to the water, it is still happier. It glories in air and sunshine, and where the stream banks are shaded never equals its stature in more exposed places. In cultivation, land that will grow good potatoes will suit it."

A noble Lily from the mountains of S. California and Arizona (altitude 6000 to 10,000 ft.).

L. Parryi.—Stems 2 to 6 ft. high, bearing sweet-scented citron-yellow flowers, usually spotted with pale chocolate or purple-brown (*Ill. Hort.* 1886, 595; *Elves, Lil.* t. 12). It likes sharp, cool, moist, peaty soil.

L. parvum.—A pretty Lily from the subalpine regions of the Sierra Nevadas of California (altitude 5000 ft.), where it grows "in a soil of granitic sand and leaf-mould, on the margins of lakes and on the banks of cold streams." It varies from 1 to 6 ft. high, has ovate lance-shaped leaves, some in whorls, and broadly funnel-shaped flowers with recurving tips, rich orange in the centre, the red tops being finely dotted.

L. philadelphicum.—A North American species, 1 to 3 ft. high, with cup-shaped flowers having the base of the petals yellow spotted with maroon and the tips bright scarlet (*Bot. Mag.* t. 519; *Red. Lil.* t. 104; *Bot. Reg.* t. 594; *Elwes, Lil.* t. 17). The variety *andinum* has narrower and fewer leaves.

L. philippinense.—A native of the Philippine Islands, 1½ to 2 ft. high, with large pure white, sweet-scented, tubular flowers (*Bot. Mag.* t. 6250; *Elwes, Lil.* t. 3). This species should be grown in a greenhouse.

L. polyphyllum.—A delicate but charming Himalayan species, 2 to 3 ft. high, with waxy-white drooping flowers 5 to 6 ins. long, heavily spotted and lined with purple (*Ill. Hort.* 1885, t. 565; *Elwes, Lil.* t. 48). Should be grown in a greenhouse. The bulbs are long and narrow.

L. pomponium.—A fine "Turk's Cap" Lily from Siberia. Stems 2 to 3 ft. high, bearing drooping bright red flowers tinted with orange, earlier in the season than *L. chalcidonicum* and *L. pyrenaicum*. There is much variation in the colour and odour of the blossoms. (*Bot. Mag.* t. 971; *Elwes, Lil.* t. 46.)

L. primulinum (*L. claptoniense*).—A species from Upper Burmah closely related to *L. neilgherense*. It has large roundish bulbs, and smooth erect stems 3 to 4 ft. high, clothed

with glossy green, narrow, stalkless leaves 4 to 5 ins. long. The funnel-shaped flowers, 5 to 6 ins. long, are pale yellow and unspotted, the segments beginning to reflex nearly half way. (*Bot. Mag.* t. 7227.)

L. purpureum.—This has hitherto been regarded as a form of *L. Washingtonianum*. Mr Carl Purdy, however, is of opinion that it deserves specific rank. It is widely distributed in California and Oregon, and grows not only at high altitudes but also as low as 600 ft. above sea-level, and at various places in the open valleys and half-wooded uplands. It has large bulbs, and the stems are furnished with broadly obovate leaves 3 to 4 ins. long, mostly in whorls of ten to fourteen. The flowers are in terminal umbels or racemes, and resemble those of the Madonna Lily (*L. candidum*) in outline, being broadly funnel-shaped, white dotted with purple.

L. pyrenaicum.—A Pyrenean species closely related to *L. pomponium*, and often confused with it. It grows from 2 to 4 ft. high, and has drooping bright yellow flowers, the interior of the fez-like base of the perianth-tube being spotted with red or deep purple. (*Elwes, Lil.* t. 47.)

L. Roezli.—The true species is a native of S. Oregon, California, etc., and has rhizomatous root-stocks. It grows 2 to 3 ft. high, has lance-shaped linear leaves partly scattered and in whorls, and drooping deep orange-red flowers 2 to 3 ins. across, more or less densely blotched with black towards the base. (*Gartenfl.* t. 667.) Fig. 241.

L. roseum (*L. Thomsonianum*; *Fritillaria macrophylla*).—A rare Himalayan species, 1½ to 2 ft. high, with tufts of narrow lance-shaped leaves, the lower ones being 12 to 18 ins. long. Flowers bell-shaped, rosy-lilac or flesh colour, often as many as

forty on a stem, and appearing in April and May. (*Bot. Mag.* t. 4725; *Bot. Reg.* 1845.) Should be grown in warm sheltered spots outside, or in the greenhouse.



FIG. 241.—*Lilium Roezlii*. (3.)

L. Rostherni.—A native of W. China, 1 to 1½ ft. high, with linear oblong leaves 3 to 4 ins. long, and yellowish, heavily spotted flowers about 2 ins. long, the segments being reflexed and crisped.

L. rubellum.—A distinct and attractive Japanese Lily, 1 to 2 ft. high. Flowers rosy-pink, tubular bell-shaped, quite unspotted, and sweet scented. (*Bot. Mag.* t. 7634.) A good Lily for forcing.

L. rubescens.—This has hitherto been regarded as a form of *L. Washingtonianum*, but Mr Carl Purdy considers it to be quite distinct. It has smaller, more compact, and more ovate bulbs than *L. Washingtonianum*. The leaves are narrowly

lance-shaped, and nearly all in distinct whorls on slender stems 6 to



FIG. 242.—*Lilium rubellum*.

8 ft. high. In good specimens from twenty-five to thirty-five flowers are borne in umbels or racemes, and are deliciously fragrant.

L. speciosum.—One of the most



FIG. 243.—*Lilium speciosum album*. (1.)

popular Japanese Liliums in cultivation (often known as *L. lancifolium*,

which is really synonymous with *L. elegans*). Stems 1 to 3 ft. high, bearing large open white flowers suffused with rose, the lower portion being blotched with rose or carmine-purple, and covered with irregular outgrowths. (*Bot. Mag.* t. 3785; *Bot. Reg.* t. 2000; *Elwes, Lil.* t. 12.)

There are many fine varieties, the best known being—*album*, pure white, with red outside; *gloriosoides* has much narrower leaves, much-reflexed crisped perianth segments, and scarlet rather than crimson spots and papillæ; *Krætzerei* has pure white flowers with a water-green centre; *macranthum*, deep rose; *Melpomene*, crimson-purple heavily spotted and edged with white; *cruentum*, a dwarf form of *Melpomene*, with highly coloured flowers; *punctatum*, white, spotted and shaded pink; *roseum*, white washed with rose; and several others not so well known.

L. sulphureum (*L. Wallichianum superbum*).—A fine Burmese Lily, 4 to 7 ft. high, with narrow leaves 6 to 9 ins. long, and large white funnel-shaped flowers 6 to 7 ins. long, tinted with yellow inside and rose outside. (*Bot. Mag.* t. 7275).

This species grows well in a greenhouse. It produces offsets at the base, and bulbils in the axils of the upper leaves freely.

L. superbum.—This is the "Swamp Lily" of N. America. It has creeping root-stocks, from which the older bulbs disappear after the development of the new ones. The stems are from 4 to 10 ft. high, with whorls of lance-shaped pointed leaves. From twenty to forty drooping orange-red flowers heavily spotted with purple are borne, the petals being reflexed as in the Turk's Cap Lilies. (*Bot. Mag.* t. 396; *Elwes, Lil.* t. 26.)

The variety *carolinianum* (also

known as *L. autumnale* and *L. Michauxianum*) is a dwarf form.



FIG. 244.—*Lilium superbum*. (3.)

L. sutchuenense.—A Chinese species, 2 to 3 ft. high, having flexible speckled stems and bright scarlet or orange-red flowers dotted inside with brown. *L. papilliferum* (or *Biondi*) and *L. chinense*, both with scarlet flowers, are closely related. (*Bot. Mag.* t. 7715; *Flora and Sylva*, December 1905.)

This species is still very rare, but may be easily raised from seeds. It is perhaps safer to grow it in a greenhouse, but would probably prove more vigorous in the open air in the mildest parts.

L. tallense.—This is intermediate between *L. Martagon* and *L. polyphyllum*, and comes from the mountains of Yunnan, W. China. The slender roughish stems are about 6 ft. high, and are furnished with lance-shaped leaves about 2 ins. long, the upper ones being more or less in circles. The flowers are whitish, about 2 ins. long, and are sometimes spotted.

L. tenuifolium.—A Siberian Lily,

1 to 1½ ft. high, with narrow grass-like leaves about 2 ins. long, and brilliant scarlet drooping flowers (*Elwes, Lil. t. 42*). A good Lily for early forcing.

L. testaceum (*L. excelsum*).—A fine Lily, supposed to be a hybrid between *L. chalcedonicum* and *L. candidum*. It

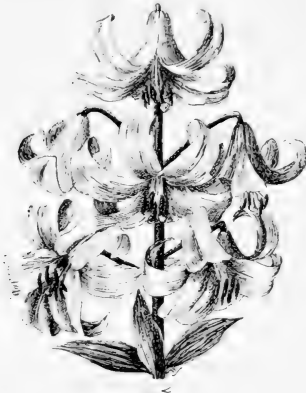


FIG. 245.—*Lilium testaceum*. (4.)

has stems 5 to 6 ft. high, and beautiful nankeen-yellow or apricot-coloured flowers, the reflexed segments of which are dotted with orange-red. (*Bot. Reg.* 1843, t. 11; *Elwes, Lil. t. 44*.) A good Lily for forcing in early spring.

L. tigrinum.—This is the well-known "Tiger Lily," a native of China and Japan. It grows 2 to 4 ft. high, and has deep orange-red flowers heavily blotched with blackish-purple. (*Bot. Mag. t. 1237*; *Elwes, Lil. t. 38*.)

The variety *splendens* often grows 7 ft. high, and bears numerous more highly coloured and heavier blotched flowers; *Fortunei* is somewhat similar; while *stove pleno* has from four to six circles of petals coloured and spotted.



FIG. 246.—*Lilium tigrinum*. (4.)



FIG. 247.—*Lilium umbellatum*, bulb and offsets.

L. umbellatum.—A Siberian species with large heads of erect orange-red flowers. Many lilies of garden origin are grouped under this, being probably hybrids between *L. croceum*, *L. elegans*, and *L. davuricum*. The colours vary from orange to orange-red, apricot and almost scarlet, special names being given to some forms, such as *aurantiacum*, *grandiflorum*, *punctatum*, *Cloth of Gold*, etc.

L. Wallacei.—A Japanese Lily intermediate between *L. elegans* and *L. Maximowiczii*. It has roundish bulbs, $1\frac{1}{2}$ to 2 ins. in diameter; densely leafy green stems about $1\frac{1}{2}$ ft. high, mottled with brown; and clear pale scarlet flowers about 3 ins. long, spotted with brown inside towards the base. (*Garden*, 1897, f. 1103.)

L. Washingtonianum.—A fine Californian Lily, 3 to 6 feet high, with long and narrow bulbs composed of loose scales, often measuring 7 to 15 ins. in circumference, but in a native state sometimes as much as 28 ins. The drooping funnel-shaped flowers are 3 to 4 ins. long, pure white, tinged with purple or lilac, and sweetly scented. (*Fl. d. Serr.* tt. 1975-6; *Gartenfl.* t. 170; *Elwes, Lil.* t. 10.)

Mr Carl Purdy mentions a variety called *minor*, from the base of Shasta Mountain. It has ovate compact bulbs, slender stems, rather narrow lance-shaped wavy leaves five to eight in a whorl.

L. Yoshidai.—This is said to be a new species, with sweet-scented flowers like those of *L. Brownii* (*Gard.* 1905, lxviii. 238, f.).

L. yunnanense.—A native of the mountains of Yunnan, W. China, at an elevation of 6000 ft. It has roundish bulbs about $1\frac{1}{2}$ ins. in diameter, smooth stems 1 to 2 ft. high, and narrow leaves $1\frac{1}{2}$ to 2 ins. long. The drooping pink and unspotted flowers are widely expanding,

and from $1\frac{1}{2}$ to 2 ins. long. It is a very distinct and pretty little species.

LILIUM DISEASES.—Sometimes a fungus known as *Botrytis cinerea* attacks the plants, forming orange-brown specks on the stems and leaves, etc., ultimately becoming covered with a delicate grey mould. Other fungoid diseases also attack the plants. Infected portions should be burned, the plants then being sprayed with a solution of liver of sulphur (2 oz. to 3 gals. of water), or heavily dusted over with flowers of sulphur after syringing or a heavy rain. When grown in greenhouses, the worst pest probably is the green-fly, which attacks and cripples the tips of the flowering shoots. By syringing the plants regularly with nicotine and quassia solutions, or by vaporising the houses from time to time, these pests can be kept in check.

LIMNOCHARIS (*limne*, a marsh; *chairo*, to delight in; in reference to its habitat). Nat. Ord. Alismaceæ.—The best-known members of the genus are described below:—

L. Humboldtii (*Hydrocleis Comersonii*).—A charming aquatic from Buenos Ayres, having whitish cylindrical root-stocks, broadly oval or roundish leaves which float on the surface of the water, and bright yellow flowers from July to September. Each bloom is over 2 ins. across, and consists of three roundish inner segments, three smaller green outer ones, and numerous orange-yellow stamens in the centre. (*Bot. Reg.* t. 1640.)

To keep this plant alive during the winter months outside, the rhizomes should be planted at least a foot below the water-level. They may, however, be grown in pots or tubs, and sunk in the water in June, and taken up again in October or Novem-

ber and placed in a greenhouse. The root-stocks may be divided in spring, when it is desired to increase the number of plants.

L. Plumieri, from Brazil, has oblong bluntish leaves with three-sided stalks, and from June to October the yellow flowers are borne in umbels on stems about 18 ins. high (*Bot. Mag.* t. 2525).

This species is more tender than *L. Humboldti*, and should therefore be grown in a greenhouse to secure the best results.

LITTONIA (after *Dr S. Litton*, a professor of Botany in Dublin). Nat. Ord. Liliaceæ.—A genus containing only two species, the best known being—

L. modesta.—A South African



FIG. 248.—*Littonia modesta*. (.)

tuberous-rooted plant with climbing stems 2 to 4 ft. long, furnished with lanceolate bright green stalkless leaves, ending in a tendril like *Gloriosa*. Flowers tulip-shaped, of

a clear orange-yellow. (*Bot. Mag.* t. 4723.) The variety *Keithi* is more vigorous and free-flowering than the type (*Gartenfl.* t. 1237).

This plant may be grown in the same way as *Gloriosa*, in a greenhouse in a compost of rich and well-drained sandy soil.

LLOYDIA (after *Mr Lloyd*, a botanist). Nat. Ord. Liliaceæ.—A genus with one species closely related to *Calochortus*.

L. alpina (*L. serotina*).—A pretty little native bulbous plant from the Snowdon range, and also found on the Alps. It has scaly bulbs and half-roundish leaves 6 to 10 ins. long, and about June produces its white or yellowish flowers, the segments of which are veined outside with green or purple. It flourishes in nooks in the rocky in cool and partially shaded spots in ordinary garden soil, and may be increased by offsets in autumn.

LOWIA. Nat. Ord. Scitamineæ.—The only species known is—

L. maxillarioides.—A ginger-like plant from the Malay Peninsula, having tufts of two-ranked lance-shaped leaves about 9 ins. long, and loose short panicles of flowers in which the three large purple sepals and the odd green lip-like petal are suggestive of an orchid (*Maxillaria*).

This plant may be grown in the same way as the *Kämpferias*—which see.

LYCORIS (the name of a woman in Roman history). Nat. Ord. Amaryllidæ.—A genus with about half a dozen species of tunicated bulbous plants having linear or strap-shaped leaves, and numerous funnel-shaped flowers with wavy segments, borne on top of a stout scape.

The species mentioned below are not quite hardy, except in the very mildest parts of the Kingdom. *L. squamigera* is the hardiest, and will flourish in the open air south of the Thames in warm, sheltered borders in well-drained gritty soil. The other species may be tried in similar situations, but they are on the whole safer grown in pots in the greenhouse. They like a sandy loam and a fair supply of moisture during the growth of the leaves; these, in most cases, wither before the appearance of the flower-stalks. The plants may be divided after flowering if necessary, the offsets being useful for increasing the stock. When established in the open air, it is better to leave the plants alone for a few years, so as to allow them to grow into bold and effective masses.

L. aurea (*Amaryllis* and *Nerine aurea*).—A pretty Chinese species with bright yellow scentless flowers about 3 ins. across, borne on scapes 1 to 2 ft. high in August (*Bot. Mag.* t. 409; *Bot. Reg.* t. 611; *Red. Lil.* t. 61).

L. incarnata.—A native of Central China, about 2 ft. high, the scape bearing six to twelve large open, pale flesh-coloured or rosy flowers, sweetly scented. The segments are only slightly wavy and not so reflexed as in *L. squamigera*.

L. radiata (*Amaryllis radiata*; *Nerine japonica*).—A native of China and Japan, whence it was introduced to English gardens in 1750. The bright red scentless flowers appear in summer or autumn on stems 1 to 1½ ft. high, and the leaves are developed during the winter months. (*And. Bot. Rep.* t. 25; *Bot. Reg.* t. 596.)

There is a form called *variegata* or *Terraciani*, with large crimson flowers the segments of which become margined with white when fading.

The variety *pumila* is much dwarfer than the type.

L. sanguinea.—A Japanese species with bright red flowers, having segments that are neither crisped nor reflexed.

L. Sprengeri.—A distinct species, presumably from Japan, having short ovate spathe valves, and long-stalked rose-pink or purple-rose flowers without any distinct tube above the ovary (*Gard. Chron.* 1902, xxxii. 469).

L. squamigera.—A striking Japanese species with large sweet-scented rosy-lilac flowers on scapes 2 to 3 ft. high in August, after the narrow strap-shaped leaves have withered and vanished. This species may be grown outside in the same way as the Belladonna Lily (*Amaryllis Belladonna*).

L. straminea.—This Chinese plant is closely related to *L. aurea*, but has pale yellow or straw-coloured flowers, with a pink keel and a few scattered red dots.

LYSICHITUM (*lysis*, loosing; *chiton*, a coat). Nat. Ord. Aroideæ.—This genus contains only one species, viz.—

L. camtschatense.—A remarkable and noble-looking Aroid, widely-distributed over North-eastern Asia and North-western America. It is a stemless plant with a thick root-stock, and tufts of large oblong lance-shaped acute leaves 12 to 30 ins. long, and from 5 to 10 ins. wide, the surface being more or less conspicuously spotted or mottled. The stout cylindrical flower-stalk is from 6 to 12 ins. high, and bears a pointed boat-shaped bright yellow spathe 4 to 6 ins. long and 3 to 5 ins. across, sheltering a dark green spadix 3 to 6 ins. long, bearing numerous flowers which emit a very disagreeable odour when mature about April or May.

This rare plant is only likely to assume its proper proportions out of doors in the most genial parts of the Kingdom. For a few years it was grown in the rock-garden at Kew in boggy soil, but failed to thrive. When transferred to the Himalayan House, however, and planted in



FIG. 249.—*Lystchitum camtschatsense*. (3.)

swampy soil, it soon began to flourish. The best way to increase the plant is by division of the root-stocks; but it may be also raised from seeds.

MAIANTHEMUM (*maios*, May; *antheon*, a flower). Nat. Ord. Liliaceae.—A genus with one species, viz.—

M. Convallaria (*M. bifolium*; *Convallaria bifolia*; *Smitacina bifolia*; *S. canadensis*).—A charming little plant, native of the North temperate regions, including Britain. It has slender creeping root-stocks and flexuous stems furnished with two

broadly ovate heart-shaped leaves, 2 to 3 ins. long, deeply lobed at the base. The small white sweet-scented flowers appear in May and June on dense erect racemes. They are remarkable for having only four segments and four stamens. (*Bot. Mag.* t. 510.)

This is a good plant for the rock-garden. It flourishes in ordinary garden soil in semi-shaded places, and may be increased by division in early autumn.

MARANTA (after *B. Maranti*, an Italian botanist) Nat. Ord. Scitamineae.—A genus containing about a dozen species of ornamental herbaceous plants, having more or less tuberous or creeping root-stocks and broad ornamental leaves on zigzag stems. The flowers are small and of no great beauty.

Being mostly natives of Tropical America, the Marantas like plenty of heat and moisture, and should therefore be grown in a stove in which the night temperature in winter does not sink below 65° or 60° F. During the summer months the plants should be placed in shaded spots. They flourish in rich sandy soil (loam and peat), and may be grown either in pots or planted in borders or stove rockeries. Plenty of water is required during growth, and the plants should be frequently syringed to keep the foliage clean and bright. The best time to divide the plants is in spring.

M. argentea has large oblong, pointed, silvery grey leaves marked with narrow curved lines of deep green. Brazil.

M. arundinacea.—This is the plant that supplies the Indian Arrowroot. It grows 5 to 6 ft. high, and has large oval, lance-shaped leaves, slightly hairy beneath. (*Bot. Mag.* t. 2307.)

The variegated form (*variegata*) is probably better known in gardens as *Phrynium variegatum*. It is an ornamental plant, with leaves elegantly variegated with oblique bands of green and yellow.

M. bicolor.—A pretty species, with roundish leaves of a pale blue-green with irregular blotches of deep and shining green about half-way between the midrib and edges, the under-surface being rose-purple. (*Bot. Reg.* t. 786; *Lodd. Bot. Cat.* t. 921.)

There are several varieties of this, the best being *Devosiana*, *Kerchovcana*, *Makoyana*, and *Mossangeana*.

M. musaica.—A very distinct species, with obliquely heart-shaped leaves of a deep and shining green, decorated with numerous whitish transverse lines, which give a mosaic appearance.

M. Sagoreana has very pale green oblong leaves marked on each side of the midrib with deep green, oblong, oblique stripes.

M. speciosa.—Leaves obliquely elliptic, oblong, pointed, bright green decorated with greenish-white bands.

M. striata.—A dwarf kind about 6 ins. high, having pale green leaves conspicuously striped and marked with white and pale yellow.

Several other plants called Marantas are really Calatheas. **M. major** now belongs to the genus *ISCHNOSIPHON*. It has pretty, erect, green leaves.

MARICA (*maraino*, to flag or wilt; referring to the fleeting nature of the flowers). Nat. Ord. Iridæ.—A genus with about a dozen species of herbaceous plants having short thickish root-stocks, sword-shaped leathery leaves arising fan-like in two rows, and fleeting flowers of white, blue, or yellow, somewhat resembling those of some species of Iris in appearance.

The Maricas (which now include

the plants formerly known as *CYPELLA*) are best grown in a greenhouse, and flourish in a compost of sandy loam, peat, and leaf-mould in equal proportions. They are easily increased by division of the root-stocks, but seeds may also be sown in gentle heat in spring.

M. brachypus.—A beautiful West Indian species having yellow flowers transversely striped with reddish-brown at the base. (*Bot. Mag.* t. 6380.)

M. cœrulea.—A Brazilian plant about 3 ft. high, having blue or lilac flowers striped with brown, yellow, and white at the base, and produced in May and June. (*Bot. Mag.* t. 5612.)

M. gracilis.—This species from Central America grows about 2 ft. high, and has white flowers striped with yellow and brown at the base, the inner segments being reflexed and blue in colour. (*Bot. Mag.* t. 3713.)

M. Helenæ.—A Brazilian species near *M. cœrulea*, with blue and white flowers nearly 5 ins. across.

M. humilis.—A Brazilian plant, 1 to 2 ft. high, with whitish flowers having four reddish-brown stripes on the claw. (*Lodd. Bot. Cab.* t. 1801.)

M. longifolia.—A native of Rio de Janeiro, with yellow flowers striped with brown.

M. lutea.—A native of Brazil, resembling *M. humilis*, but with bright yellow flowers having five deep red stripes on the claw. (*Bot. Mag.* t. 3809.)

M. Northiana (*Moræa Northiana*).—A fine Brazilian plant over a yard high, with large pure white flowers variegated with yellow and brown on the claw. (*Bot. Mag.* t. 654; *Flora and Sylva*, February 1905.)

M. occidentalis.—A Peruvian species, having fan-shaped tufts of leaves, and white flowers, the inner

segments of which are mottled with brown and tipped with violet.

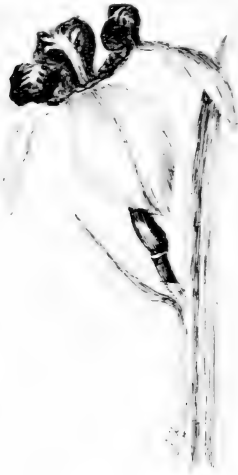


FIG. 259.—*Marica Northiana*.

M. paludosa (*Cipura paludosa*).—A native of Tropical America, having roundish corms, narrow plaited leaves 1 to 1½ ft. long, and lilac flowers, the inner segments of which have one or two yellow blotches near the base. (*Bot. Mag.* t. 646.)

MASSONIA (after *F. Masson* (1741-1805), a botanical traveller in S. Africa). Nat. Ord. Liliaceæ.—This genus contains about twenty-five species of small bulbous plants all natives of S. Africa. The numerous white or greenish and almost stalkless flowers are borne in umbel-like clusters between the two almost opposite leaves, the flower-stem being either very short or altogether absent.

Like most of the Cape bulbous plants the Massonias flourish in a gritty compost of loam with a little

peat and leaf-soil, and may be grown in a greenhouse, or frame, or in the open border in sheltered situations during the summer. They are of no great beauty or value as garden plants, and are confined chiefly to botanical collections. Some of the best-known kinds are:—

M. amygdalina, with oval leaves and almond-scented flowers.

M. angustifolia, with lance-shaped pointed leaves. (*Bot. Mag.* t. 736.)

M. candida, with round smooth fleshy leaves. (*Bot. Reg.* t. 694.)

M. jasminiflora.—Leaves two, spreading on the ground, and umbels of white green-tipped flowers. (*Bot. Mag.* t. 7465.)

M. muricata, with roundish heart-shaped, fleshy leaves. (*Bot. Mag.* t. 559.)

M. pustulata, having smooth, oval, rounded, fleshy leaves, sometimes three instead of the usual two, heavily covered with whitish pustules. (*Bot. Mag.* t. 642.)

M. sanguinea, with roundish, heart-shaped, pointed leaves, and flowers having reddish filaments to the stamens. (*Bot. Mag.* t. 848.)

MEDEOLA (named after the sorceress *Medea*). Nat. Ord. Liliaceæ.—The only species in this genus is:—

M. virginica.—A native of N. America with thickish white rhizomes having a cucumber-like smell, and whorls of stalkless obovate lance-shaped leaves on the erect stems, which grow about 9 ins. high. The small yellowish flowers appear in June in sessile umbels. (*Bot. Mag.* t. 1316.)

This plant is quite hardy, and flourishes in ordinary light garden soil. It is easily increased by division of the root-stocks.

The plant known either as *Medeola asparagoides* or *Myrsiphyllum aspara-*

goides is described in this work as *Asparagus medeoloides*.

MEGARHIZA (*megas*, large; *rhiza*, a root; referring to the large tuberous root-stock). Nat. Ord. Cucurbitaceæ.

M. californica.—This is a curious Californian plant with large tuberous roots often weighing 20 to 40 lbs., and annual trailing stems 18 to 20 ft. long, bearing shining silvery, palmately lobed leaves. The staminate (male) and pistillate (female) flowers are borne separately, the latter being solitary at the base of the male clusters, and in due course giving rise to a roundish or oblong spiny fruit resembling a sweet chestnut.

This curiosity will grow in warm sunny spots in good garden soil, and may be increased from seed sown in gentle heat in spring.

MELANTHIUM (*melas*, black; *anthos*, a flower; referring to the dark blossoms). Nat. Ord. Liliaceæ.—A small genus of North American herbs with very short thickened or bulbous root-stocks, from which arise smooth and membranous, narrow or lance-shaped leaves, and panicles of yellowish or greenish-white polygamous flowers.

M. virginicum (*Helonias virginica*).—The "Bunch Flower" of Virginia. It grows from 3 to 5 ft. high, having narrow grass-like leaves larger at the base, and creamy-yellow flowers in July, fading to dark brown. (*Bot. Mag.* t. 985.)

This plant grows well in ordinary garden soil or in a mixture of loam and peat, in somewhat shaded positions, and may be increased in autumn or spring by division.

MELASPHERULA (*melas*, black; *sphærulea*, a little ball or sphere; in

allusion to the form and colour of the small blackish bulbs). Nat. Ord. Iridæ.—The only species is—

M. graminea (*M. parviflora*; *Gladiolus gramineus*).—A pretty little bulbous plant from S. Africa, having bright green grass-like leaves 6 to 12 ins. long, and whitish flowers in April striped with purple, and borne in a large branching and flexuose panicle. (*Bot. Mag.* t. 615.)

This species is only hardy in the very mildest parts of the Kingdom, and is generally grown in green-houses or frames; or in well-sheltered borders facing south, in rich and gritty soil, much in the same way as recommended for the *Ixias*. Increased by offsets or seeds.

MERENDERA (the Spanish name for *Colchicum*). Nat. Ord. Liliaceæ.—A small genus of bulbous plants closely related to *Bulbocodium* and *Colchicum*, having tunicated bulbs or corms, narrow leaves, and funnel-shaped flowers.

The species mentioned flourish in a light rich sandy soil in rather moist situations, and are rather handsome grown in large batches. They may be increased by offsets and seeds.

M. Bulbocodium (*Bulbocodium autumnale*).—A pretty Pyrenean plant resembling *Bulbocodium vernum* in appearance, but produces its rosy-lilac flowers in autumn on stems 3 to 4 ins. high. The narrow sickle-shaped leaves appear after the flowers have faded, and remain fresh and green throughout the winter.

M. caucasica (*Bulbocodium trigynum*).—A native of the Caucasus, 3 to 4 ins. high, with delicate rosy flowers in April and May (*Bot. Mag.* t. 3690).

M. persica (*Bulbocodium Aitchisoni*).—From Persia and India; has

pale lilac sweet-scented flowers keeled with red, in October and November (*Bot. Mag.* t. 6012).

M. sobolifera (*Colchicum procurrens*) is a curious little plant from Smyrna, with irregular bulbs mottled with purple and yellow, and bearing white flowers tinted with pale pink in autumn.

MILLA (after *J. Milla*, a gardener at the Court of Madrid). Nat. Ord. Liliaceæ.—The only species at present in the genus is—

M. biflora.—A pretty little Mexican plant with small bulbs, narrow blue-green grassy leaves, and pure white salver-shaped flowers borne on stems about 6 ins. high about August (*Bot. Reg.* t. 1555).

This plant may be considered as only half-hardy in most parts of the Kingdom, but hardy in favoured spots. It likes rich sandy loam, and should be grown in quantity either in the open air or greenhouse for effect. It is chiefly increased by offsets detached when the bulbs are dormant, or just before starting into growth. Many other plants formerly called *Milla* are now known under the name of *BRODIAEA*—which see.

MIRABILIS (*mirabilis*, wonderful; as everything was so considered when first introduced from America). Nat. Ord. Nyctagineæ.—This genus contains about ten species of tuberous-rooted herbs, having two to three-forked branches bearing opposite leaves and long tubular flowers with salver-shaped lobes.

The best-known species are mentioned below. If grown in the open air, the simplest way to treat them is as if they were Dahlias. They flourish in any good well-drained garden soil, and make fine bushy plants if given plenty of space. They may be

raised in the first place from a packet of seeds sown in gentle heat about February or March, the young plants being pricked out and grown on till about the end of May under glass. If given plenty of air and light and not too much heat, they will be well hardened off for the open air by that time. In autumn the tuberous roots may be lifted, cleaned, and stored away in a frost-proof cellar until the following year.

M. Jalapa.—This is the "Marvel of Peru," a beautiful Peruvian bushy plant 2 to 4 ft. high, having tuberous roots; large entire, oval, pointed leaves, rounded at the base; and terminal clusters of sweet-scented funnel-shaped flowers about 2 ins. long, and variously coloured with red, white, or yellow, or striped and blotched with two or more colours (*Bot. Mag.* t. 371).

There are numerous seedling forms, some being only 12 to 18 ins. high.

M. longiflora.—A clammy Mexican species, 2 to 3 ft. high, with black turnip-shaped roots, and broadly heart-shaped tapering leaves. The fragrant long-tubed flowers appear in July and August, varying in colour from white and pink to violet.

M. multiflora.—A downy species 1 to 2 ft. high, found wild between Mexico and California. The bright purple flowers, about 2 ins. long, appear in late summer, borne in terminal clusters having a cup-like involucre.

Hybrid forms in which the three species mentioned above have played a part are now in cultivation, and will probably produce finer garden forms as time goes on.

MONOCHILUS (*monos*, one; *cheilos*, a lip; in reference to the form of the flowers). Nat. Ord. Verbenaceæ.—The only species in the genus is—

M. gloxiniaefolius.—A pretty herbaceous plant from Brazil, having tuberous root-stocks, slightly stalked rather broad coarsely toothed leaves, and white flowers in clusters at the ends of the shoots, and singly in the axils of the leaves or bracts lower down the stems. The corolla has a cylindrical tube, oblique on the upper side, split down the centre, and with a very oblique limb.

This little-known plant requires the heat and moisture of a stove house, and may be grown in sandy loam, leaf-mould, and peat in equal proportions. It may be propagated by cuttings of the half-ripened non-flowering shoots inserted in very sandy soil under a hand-light or bell-glass. The tubers may also be divided just as growth is commencing.

MORÆA (after *R. Moore*, a British botanist). Nat. Ord. Iridææ.—This genus (which now includes *DIETES*, *HELIXYRA*, and *VIUSSEUXIA*) contains about sixty species of plants with roundish corms, narrow sword-like leaves, and somewhat fleeting lilac, yellow, or red flowers, having three outer segments larger than the three inner ones.

Most of the Moræas are natives of S. Africa, and may be grown in the British Islands under almost identical conditions with the *IXIAS*—which see—and other South African bulbs. They like rich gritty soil, warm, sunny, and sheltered spots, and protection from cold, miserable rains in winter. In bleak localities it is safer to grow the plants in pots or pans in cold frames or greenhouses. Propagation is effected by offsets, division, or more slowly by seeds. Amongst the many species the following may be noted:—

M. angusta.—A plant about 9 ins. high with lilac-coloured flowers (*Bot. Mag.* t. 1276).

M. bicolor.—This was formerly known as *Iris* and *Dietes*. It has citron-yellow blossoms. (*Bot. Reg.* t. 1404.)

M. bituminosa.—Grows about 1 ft. high, and has yellow flowers (*Bot. Mag.* t. 1045).

M. catenulata, from Mauritius, has white and blue flowers (*Bot. Reg.* t. 1074.) Considered to be a form of *M. iridoides*.

M. ciliata.—A very dwarf species with ciliated leaves and yellow flowers (*Bot. Mag.* t. 1061).

M. crispa.—Flowers lilac-blue with yellow blotches (*Bot. Mag.* tt. 759, 1284).

M. edulis.—This grows 3 to 4 ft. high, and has sweet-scented lilac flowers blotched with yellow at the base (*Bot. Mag.* t. 613).

M. glaucopis.—Flowers white with a blue-black blotch at the base of the outer segments (*Bot. Mag.* t. 168; *Red. Lil.* t. 42).

M. iridoides.—One of the best-known species, having a short creeping root-stock, clusters of narrow sword-like leaves, and white flowers having a yellow blotch at the base, and a hairy or downy claw (*Bot. Mag.* tt. 693, 1407). The variety *Johnsoni* differs from the type in having longer leaves, 2½ ft. long, erect, and flowers 4 ins. across (*Gard. Chron.* 1907, xli. 296, f.).

M. papilionacea.—Flowers bright lilac or red spotted with yellow (*Bot. Mag.* t. 750).

M. pavonia.—A variable species having red, purple, or yellow flowers, usually blotched with blue-black (*Bot. Mag.* t. 1247; and vars. *villosa* and *lutea* at tt. 571, 772). Fig. 251.

M. ramosa (*M. bulbifera*).—Flowers bright golden yellow blotched with brown (*Bot. Mag.* tt. 771, 5785).

M. Robinsoniana (*Iris Robinsoniana*).—Popularly known as the

"Wedding Flower." It is a native of Australia and Lord Howe's Island, and resembles a large German Iris or Green New Zealand Flax Plant (*Phormium tenax*) in appear-

M. Thomsoni.—A native of E. Tropical Africa, about 1 ft. high, with stiffish rush-like habit, the round leaves being furrowed, and about 7 ins. long. The flowers, about



FIG. 251.—*Moræa paronia*.



FIG. 252.—*Moræa Robinsoniana*.

ance. It grows 4 to 6 ft. high, and produces large pure white flattish flowers. (*Bot. Mag.* t. 7212.)

This species is best grown in a cool greenhouse planted out in a border of gritty soil, and well exposed to the sunshine.

M. spathacea (*Diets Huttoni*).—A rhizomatous species with bright yellow sweet-scented flowers with purple lines on the claws (*Bot. Mag.* tt. 1103, 6174; *Garden*, 1889, t. 715).

M. sulphurea.—This species has small round corms, slender erect stems, with linear leaves 4 ins. long, and a single terminal cluster of sulphur-yellow flowers 1 in. across, with orange and brown markings (*Bot. Mag.* t. 765).

2 ins. across, appear in spiked clusters and are pale lilac, yellow at the base, and spotted with brown. (*Bot. Mag.* t. 7976.) Tender.

M. tricuspis.—Flowers pale lilac blotched with purple (*Bot. Mag.* t. 696).

M. tripetala.—Flowers usually lilac, but sometimes lilac or reddish (*Bot. Mag.* t. 702).

M. tristis.—Flowers dull purple, blotched with yellow at the base of the segments (*Bot. Mag.* t. 577).

M. unguiculata.—Flowers white, the outer segments spotted with red along the claw (*Bot. Mag.* t. 593).

MUSCARI (*moschos*, musk; in reference to the scent of the flowers).

Nat. Ord. Liliaceæ.—A genus of distinct and pretty bulbous plants, popularly known as "Grape Hyacinths" or "Tassel Hyacinths," easily recognised by the dense racemes of urn-shaped globular, or oblong flowers borne on the upright scapes.

The Grape Hyacinths, which are mostly natives of S. Europe, Asia Minor, and N. Africa, flourish in any good and deeply dug garden soil of a gritty nature that is enriched with well-decayed manure. The bulbs being small should be planted in September, October, or November, about 3 ins. deep, and 3 or 4 ins. apart, in hundreds and thousands, to secure a bold display of blossom in spring. Being dwarf in growth—from 6 to 12 ins. high—they look particularly charming beneath deciduous early-flowering trees, and are also useful for edgings to borders, nooks in the rockery, or on the edges of ponds or streams. The plants increase naturally by offsets, which may be detached at planting time. Seeds are also produced freely in most cases, and may be sown in spring in a light gritty compost in a cold frame. Flowering plants are produced in three or four years from seeds. Most of the Grape Hyacinths bloom between March and May.

For early flowering in a cold greenhouse, the Muscaris may be grown in pots or pans, and are valuable for this kind of decoration.

M. æstivale.—A native of Asia Minor, 6 to 9 ins. high, with oblong tubular yellow flowers ribbed with green, the upper ones being tinted with purple (*Bot. Mag.* t. 6269).

M. botryoides.—A charming Italian species, with dense roundish clusters of deep sky-blue blossoms having six small white toothed segments. There are forms known as *album*, a

charming white variety, and *pallidum*, pale blue.

M. comosum (*Hyacinthus comosus*).—A native of S. Europe, with narrow strap-shaped leaves 12 to 18 ins. long, and loose clusters of blue flowers (*Bot. Mag.* t. 133).

The variety *monstrosum* is much better known than the species. It is the well-known "Feather Hyacinth," in which all the flowers are sterile, and of a soft bluish-violet, the individual blossoms having been transformed into a mass of slender, twisted, and wavy thread-like filaments, the whole giving a "fluffy" or feathery appearance.

M. conicum.—A fine species from Trebizond, having sweet-scented

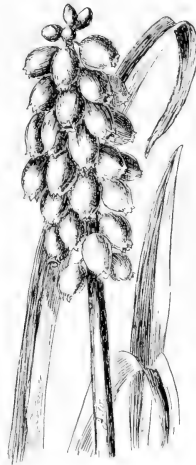


FIG. 253.—*Muscari conicum*.

bright blue fertile and pale blue sterile blossoms on scapes about 9 ins. high from March to May. There are several fine varieties.

M. Heldreichi.—A native of

Greece, with clusters of blue flowers like *M. botryoides*, only being much larger, and appearing rather later in spring (*Ref. Bot.* t. 172; *Gartenfl.* t. 1199, A.).

M. Maweanum.—An Armenian Grape Hyacinth, with dense clusters of clear light blue flowers on stalks less than 6 ins. high.

M. moschatum (*M. suaveolens*).—This pretty little species from Asia Minor is known as the "Musk Hyacinth." It has large roundish clusters of sweet-scented flowers, changing from purple to greenish-yellow tinted with violet. (*Bot. Mag.* t. 734.)

The variety *flavum* (or *M. macrocarpum*) is recognised by its larger and looser clusters of yellowish flowers with purple-tipped segments (*Bot. Mag.* t. 1565).

M. neglectum.—A species with rather large bulbs, native of S. Europe, and bearing dense clusters of deep blue sweet-scented flowers (*Garden*, August 1884).

M. racemosum (*Hyacinthus racemosus*).—A native of England as well as Europe and Asia Minor. It has small bulbs, slender channelled leaves 6 to 9 ins. long, and short cylindrical spikes of deep blue plum-scented flowers. (*Bot. Mag.* t. 122.)

M. Szovitsianum.—A rather large-bulbed Caucasian species, having dense clusters of faintly scented bright blue fertile and pale blue sterile blossoms (*Bot. Mag.* t. 6855).

MYROSMA (*myrron*, fragrant; *osme*, smell). Nat. Ord. Scitamineæ.—A small genus of tuberous-rooted hot-house plants, natives chiefly of Tropical America, and closely related to the Marantas and Calatheas, and may be treated like those plants. **M. nana** is remarkable for its dwarf habit and very hairy leaves, with a yellowish band down the midribs.

The small white flowers are borne in dense distichous spikes. (*Gard. Chron.* 1894, xv. 652.)

NÆGELIA (after *Karl Nægeli*, an eminent German botanist). Nat. Ord. Gesneraceæ.—A small genus closely related to *Achimenes* and *Isoloma*, and like them having rhizomes with scaly catkin-like tubers, softly hairy leaves, and tubular flowers borne in large trusses.

The *Nægelias* have been crossed and intercrossed with the *Isolomas* (including the *Tydæas*) and *Achimenes*, so much so that it has become impossible to say to which genus the garden forms belong. They are very ornamental when in blossom, and are useful for pot or basket culture. The treatment is precisely the same as described for *Achimenes*—which see. Apart from the hybrid forms, the following have been described and figured as distinct species. They are all natives of Central America, Brazil, and Mexico.

N. achimenoides.—Flowers yellowish-rose spotted with red.

N. cinnabarina (Gesnera).—Flowers scarlet (*Bot. Mag.* t. 5036).

N. multiflora.—Flowers white or creamy-yellow (*Bot. Mag.* t. 5083).

N. zebrina.—Flowers bright orange-scarlet (*Bot. Mag.* t. 3940).

NARCISSUS (named by Linnæus after a Greek youth, who was changed into the flower). Nat. Ord. Amaryllideæ.—The plants popularly known as "Daffodils" belong to this genus, but the name seems to be confined generally to the large trumpet-flowered varieties, while the small-cupped forms like the Poet's *Narciss* (*N. poeticus*) are usually called *Narcissus*.

The plants belonging to the genus are recognised by their tunicated

bulbs of varying sizes, by their long narrow strap-shaped, or pipe-like (fistular) leaves, and by the white or yellow flowers having six spreading segments, with a central corona or trumpet, varying in size from a shallow saucer-like organ to a large tubular bell-shaped or cylindrical body.

From a botanical point of view the genus *Narcissus* has been brought into a state of hopeless confusion by the hybridising operations of the gardener. Formerly there were fairly well-marked sections, and the veteran botanist, Mr J. G. Baker, in his *Handbook on the Amoryllideæ*, endeavoured to bring order out of chaos by dividing the members of the genus into three main groups as follows:—

1. MAGNI-CORONATI, in which the corona was funnel-shaped or cylindrical, and as long as the perianth segments.
2. MEDIO-CORONATI, in which the corona was cup-shaped, and about half as long as the perianth segments.
3. PARVI-CORONATI, in which the corona was small, obconic, or saucer-shaped.

With the innumerable hybrids and garden forms that have been evolved during the past twenty years, the above classification no longer holds good except for the species and varieties which gave rise to it. One may, however, take the Mogador Narciss (*N. Broussoneti*) as representing one extreme of the "Parvi-coronati" group, and the best varieties of the Ajax or Pseudonarcissus group as the extreme on the side of the "Magni-coronati" section. Between these two extremes there are countless variations, not only in the size and shape of the corona, but also in the flowers them-

selves. At one time it was possible to divide the Narcissi into two more or less natural groups, namely—(i.) those having only *one* flower on a stem, and (ii.) those having two or more flowers on a stem. But even this division has been broken down by the hybridist, and the two sections have been successfully crossed and intercrossed. Indeed, one of the most charming and distinct groups raised in this way is the one to which the name "Poetaz" has been given. The name is most appropriate, as it conveys information in regard to the origin of these plants which have arisen by crossing forms of the Poet's Narciss (*Narcissus poeticus*) with forms of the Bunch or Polyanthus Narciss (*N. Tazetta*). More is said of this group farther on.

Another new and charming group is that which is now known under the name of "Englehearti" Daffodils. This commemorates the careful work and breeding on scientific lines that have been carried on for quite a quarter of a century by Mr G. H. Engleheart. He has paid special attention to the improvement of the forms of *N. poeticus*, and as stated in my *Practical Guide to Garden Plants* ten years ago, "his labours have been rewarded with some of the finest, purest, and most charming varieties."

The annexed diagrams of five distinct types of *Narcissus* will show at a glance the differences between the size and shape of the corona (C), the length and width of the perianth-tube, and the way in which the stamens are attached. In the Poet's *Narcissus* it will be noticed that the corona is very small and shallow, while the tube is long and cylindrical. The nearest approach to this type is to be found in the Bunch or Polyanthus *Narcissus*, *N. Tazetta*, of which

the diagram of the variety "Grand Monarque" is given. In the other diagrams the corona (shaded in all diagrams) is shown to be getting gradually larger, while the "tube" varies from narrowly funnel-shaped in the *N. incomparabilis* *Stella* to broadly obconic in *N. bicolor* *Horsfieldi*—the latter being representative

wise similar to *N. poeticus*. In "Stella" the filaments are present, but are united to the tube for the greater part of their length, the anthers just peeping beyond the end of the tube. In "Sir Watkin" the filaments are also attached to the tube for about one-third of their length, the upper two-thirds being free, and having the anthers further



FIG. 254.—*Narcissus tazetta* *Grand Monarque*, section.

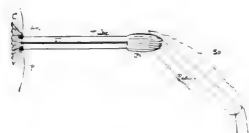


FIG. 255.—*Narcissus poeticus*, section.

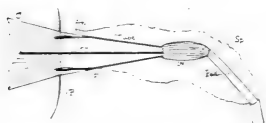


FIG. 256.—*Narcissus incomparabilis* *Stella*, section.

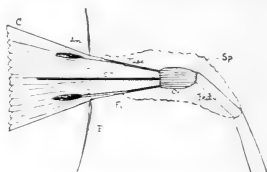


FIG. 257.—*Narcissus incomparabilis* *Sir Watkin*, section.

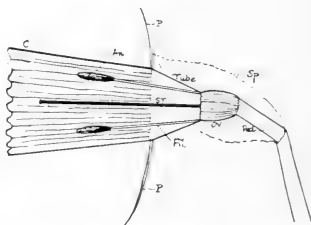


FIG. 258.—*Narcissus bicolor* *Horsfieldi*, section.

Figs. 254 to 258 show the relative sizes of five different sections of the genus *Narcissus*, and the variation in the parts.

EXPLANATION.—C, corona; P, perianth; An, anthers; Fil, filament; St, style; Ov, ovary; Ped, pedicel; Sp, spathe.

of all the large trumpet forms. In regard to the stamens, it will be noticed that there are no filaments in *N. poeticus*, and the anthers are therefore sessile at the mouth of the cylindrical tube. In "Grand Monarque" there is the vestige of a filament about 1 mm. long, but other-

out from the top of the tube. In "Horsfieldi" and the other varieties with large coronas, the filaments are quite free for their entire length, and the anthers are pushed well beyond the mouth of the tube. The style (St) is just the same length as the tube in *N. poeticus*, and a little longer

in "Grand Monarque," but is much longer than the tube in the other cases, being longest of all in the large trumpet section. The diagrams being drawn to a similar scale will give the reader an accurate idea as to the

proportions between one organ and another in the different groups. The following measurements (in millimetres) taken from actual but ordinary specimens may also be interesting for comparison:—

	CORONA.			TUBE.			OVARY.		PEDICEL.		STYLE.	FILAMENTS.	
	Width across.		Depth.	Width.		Length.	Length.	Width.	Length.	Width.	Length.	Adhering.	Free.
	Mouth.	Base.		Top.	Base.								
			mm.			mm.	mm.	mm.	mm.	mm.	mm.	mm.	
Grand Monarque	10	—	4	4	4	16	8	4	20	12	18	—	1
N. Poeticus	12	—	3	3.5	3.5	29	10	5	29	8	30	—	—
N. Stella	20	12	15	12	3	29	13	5	20	12.5	40	10	20
N. Sir Watkin	30	14	23	14	5	20	10	5	15	8	35	20	10
N. Horsfieldi	30	20	40	20	8	14	10	8	14	4	45	—	35

Between these five types there are innumerable gradations, so that anything like a scientific classification of Narcissi is practically out of the question. Artificial groupings will, however, be made by specialists from time to time to meet temporary emergencies; but such groupings are likely to succeed each other pretty frequently.

CULTIVATION.—Amongst bulbous plants perhaps there are none so popular as the Daffodils and Narcissi for cultivation in the open air, or for forcing into early blossom in greenhouses during the first months of the year. With few exceptions they are all very hardy, and once planted are able to look after themselves. Some species and varieties of course are much scarcer, and therefore more valuable than others. Special attention is given to these until the stock becomes large enough to plant out in quantity. This applies perhaps more especially to the large trumpet-flowered varieties, both single and double, but many of the smaller-flowered kinds are also delightful if grown in the same way.

The soil most suitable for Daffodils

and Narcissi should be, if possible, a rich and rather heavy loam with a fair amount of grit and well-



FIG. 250.—Narcissus, 1-year seedling.

decayed manure in it. It should be deeply dug or trenched in the first case, to ensure perfect drainage and increased warmth during the

winter months when the bulbs are vegetating.

So far as position is concerned the bulbs may be planted almost anywhere, so long as the soil is reasonably good—either in the open fully exposed, or beneath deciduous trees through which sufficient sunlight finds its way before the leaves appear. In the market gardens a few kinds are planted in narrow beds between the rows of fruit-trees, and are left for several years to their own devices. From an ornamental point of view, however, Daffodils and Narcissi may be utilised effectually as spring flowers in the borders, shrubberies, grassland, and also on the banks of lakes, streams, ponds, etc.; or, as the poet Wordsworth has expressed it, Daffodils may be planted

“Beside the lake, beneath the trees,
Fluttering and dancing in the breeze.”

TIME TO PLANT.—This is best done at any time between the end of August and the end of November. The bulbs differ greatly in size according to the variety, some being less than an inch in diameter and not more than an inch or inch and a half in length, while others are two or three times larger. For open-air planting the safest rule to follow is to cover each bulb with twice its own depth of soil. The depth of planting will therefore vary from 3 to 6 ins. or more, according to the size of the bulbs.

When grown in pots or boxes for the decoration of the greenhouse, or for market purposes, the tops of the bulbs are left about level with the surface of the soil. When it is intended to force certain varieties into early blossom, they are left in the open air for a few weeks covered over with a few inches of soil, ashes, or fibre, until root action has become

well established. They may then be taken indoors as required. By this means even a greenhouse without any heat may be embellished in the early spring.

LIFTING THE BULBS.—In the formal garden this is generally necessary in early summer, to make room for the Zonal Pelargoniums, Marguerites, Fuchsias, Calceolarias, Lobelias, Echeverias, Cannas, Begonias, and numerous other plants used for “bedding out.” This work is generally done about the end of May or early in June. By that time most of the Daffodils and Narcissi with the exception perhaps of the double-flowered *N. poeticus*, will be over, although the foliage may still be green. By lifting the plants and placing out in semi-shady spots, the leaves soon shrivel and die without injury to the bulbs. The latter should then be cleaned and stored away in single layers on shelves, in a cool and well-ventilated shed or cellar, until the planting season again arrives.

PROPAGATION.—In most cases this is simplicity itself, and in many parts of England and Ireland a great trade has developed in raising quantities of Daffodils. Offsets are produced freely, one old bulb often producing two others. These offsets should always be planted by themselves, as most of them require the growth of another season before they blossom.

Hybrid Narcissi.

These of course can only be produced by fertilising the pistils in one flower with the pollen from another, and afterwards sowing the seeds in rich gritty soil as soon as perfectly ripe. As already stated, many fine forms have been raised in this way by specialists, and

some very fine prices are recorded for varieties of exceptional merit.

The following is a selection of the best kinds of Narcissi and Daffodils. The principal kinds or sections are arranged in alphabetical order, but under them will be found some of the best forms or sub-varieties, also arranged alphabetically.

N. Backhousei (*P. Pseudo-narcissus* × *P. incomparabilis*).—Flowers solitary, with long lemon-yellow corona and sulphur-yellow petals. The best forms are *Woolley Dod*, deep yellow and primrose; *W. Wilks*, orange-yellow and primrose; and *Joseph Lakin*, deep yellow and primrose.

N. Barri (*N. incomparabilis* × *N. poeticus*).—A distinct hybrid with



FIG. 260.—*Narcissus Barri conspicuus*. (3.)

sulphur-yellow petals and an obconic corona, lemon-yellow at the base passing into orange-yellow.

There are many varieties of the "Barri" Daffodils, amongst the best

being:—*Cicely Hill*, primrose, corona flushed cinnabar-red; *conspicuus*, orange-yellow cup deeply stained with orange-scarlet; *Crown Prince*, white, large cup stained scarlet; *Dorothy E. Weymss*, petals white, corona canary-yellow edged with scarlet; *Dr Fell*, white, with orange-scarlet corona; *Flora Wilson*, pure white, with lemon cup edged orange-scarlet; *Golden Mary*, bright golden-yellow; *Maurice Vilmorin*, pale sulphur, large cup of deep orange or orange-scarlet; *Miriam Barton*, delicate primrose-yellow; *Mrs C. Bowley*, white, with orange-red cup; *Mrs Dyer*, yellow, orange cup; *Orphee*, primrose-coloured, cup scarlet margined; *Sensation*, pure white, with bright yellow corona margined with orange-scarlet; *Siddington*, yellow, with open corona broadly edged with orange-red.

N. Bernardi.—This is probably a natural hybrid between *N. poeticus* and *N. muticus*, and has been found growing wild in the Pyrenees. It has white petals and an orange or lemon-yellow corona. *H. E. Buxton* is a form with white petals and a bright orange-scarlet corona.

N. bicolor.—A charming variety of the Ajax or Common Trumpet Daffodil or Lent Lily (*N. Pseudo-narcissus*). The broad spreading segments or petals are white, while the large trumpet or corona is of a bright lemon-yellow. There are numerous forms, amongst the best being:—*Ada Brooke*, white, trumpet rich orange-yellow; *Cygnets*, broad white elegant petals, and canary-yellow trumpet; *Chloe* (raised from *Emperor* and *triandrus albus*), broad creamy-white petals, and soft canary-yellow cup; *Dean Herbert*, full primrose changing to sulphur, large rich yellow trumpet; *Dorothy Kingsmill* (a cross between *Grandee* and *cala-*

thinus), pure white, with long straight lemon-yellow drooping trumpet; *Duke of Bedford*, pure white, with clear soft yellow trumpet, like *Horsfieldi*, but much larger and better;



FIG. 261.—*Narcissus bicolor* Ellen Willmott. (1.)

Ellen Willmott, creamy-white, trumpet lemon-yellow; *Empress*, flowers similar in colour to *Horsfieldi*, but of greater substance; *Glory of Noordwijk*, similar to *Empress*, but much larger and finer; *Grandee (maximus)*, pure white, trumpet large, lemon colour; *Horsfieldi*, white, trumpet rich golden-yellow; *James Walker (albidus)*, sulphury white, golden trumpet; *John Davidson*, creamy-white, trumpet clear yellow; *Judge Bird*, a magnificent form with pure white petals, and bright yellow trumpet; *Madame Plomp*, broad white segments, large golden-yellow trumpet; *Michael Foster (sulphurens)*, sulphur, large yellow trumpet; *Mrs J. B. M. Camm*, pure white,



FIG. 262.—*Narcissus bicolor* Horsfieldi. (1.)



FIG. 263.—*Narcissus bicolor* Victoria. (1.)

creamy-white trumpet; *Mrs Morland Crossfield*, pure white, clear yellow trumpet; *Mrs Walter T. Ware*, white golden trumpet; *Portia*, soft primrose, with yellow trumpet; *Prince Colibri*, creamy-white, broad thick-set yellow trumpet; *Princeps (Irish Giant)*, immense pale sulphur trumpet, and sulphur or creamy-white segments; *Princess Ena*, creamy white, with sulphur perianth; *Sentinel*, pure white petals, trumpet yellow; *T. A. Dorrien-Smith*, sulphur-white, rich yellow trumpet; *Victoria*, pure white, trumpet clear yellow; *Weardale Perfection*, large white segments, bold pale primrose trumpet.



FIG. 264.—*Narcissus Bulbocodium*. ($\frac{1}{2}$.)

N. biflorus (*N. poeticus* \times *N. Tazetta*).—A natural hybrid between the two species named, often having two, rarely one or three, flowers on a scape. Petals pure white; corona obconic, pale yellow, with crisped margin. (*Bot. Mag.* t. 197.)

N. Broussoneti.—A distinct Moroc-

can species, having narrow twisted leaves $1\frac{1}{2}$ to 2 ft. long, and from six to nine pure white sweetly scented flowers on the scapes, each bloom being about 1 in. across, and remarkable for having a very small or rudimentary corona.

This species is a shy bloomer, and also flowers at the end of the year. It is best grown under glass in most places.

N. Bulbocodium (*N. turgidus*; *Corbularia Bulbocodium*; *C. serotina*).—This is popularly known as the "Hooped Petticoat" or "Medusa Trumpet" Daffodil. It is a distinct and pretty species from S. Europe



FIG. 265.—*Narcissus Bulbocodium monophyllus*. ($\frac{1}{2}$.)

and N. Africa, having bulbs about $\frac{3}{4}$ in. through, from which arise three to four roundish leaves, channelled on the upper surface, and from 3 to 12 ins. long. The solitary bright yellow flowers have narrow lance-shaped segments, and a very large broadly funnel-shaped corona in the centre. (*Bot. Mag.* t. 88.)

There are several varieties, amongst the best being *citrinus*, pale lemon-yellow; *conspicuus*, rich golden-yellow; *Graellsii*, sulphur or primrose yellow (*Bot. Mag.* t. 6473, B.); *hedræantha*, remarkable for having a solitary leaf and small yellow flower; *monophyllus* (or *Clusi*), usually with a solitary leaf and snow-white flowers, produced quite early in the year; *nivalis*, from the snowy Spanish mountains, orange-yellow; and *tenuifolius*, with long rush-like leaves and golden-yellow flowers, having a corona more or less six-lobed.

The Hooped Petticoat Narcissi are charming in nooks in the rockery, or for pot-culture.

N. Burbidgei (*N. incomparabilis* × *N. poeticus*).—A beautiful Star Daffodil, having pure white spreading petals and a yellow bell-shaped corona edged with deep cinnabar-red. The following are variations:—

Agnes Barr, creamy-white; cup yellow, stained orange. *Baroness Heath*, yellow; cup suffused with orange-scarlet. *Beatrice Heseltine*, creamy-white; cup edged with orange-scarlet. *Constance*, sulphury-white; cup beautifully edged orange-scarlet. *Crown Princess*, pure white; cup yellow, margined orange. *Ellen Barr*, snow-white; citron cup stained orange-scarlet. *Falstaff*, pure white; lemon cup, margined orange. *John Bain*, white; citron cup. *Little Dirk*, pale yellow, with orange cup. *Mary*, white; citron cup stained orange. *Mercy Foster*, white; canary-yellow cup beautifully frilled. *Model*, pure white, cup stained orange, beautifully frilled. *Ossian*, white; cup orange-scarlet. *Princess Louise*, very large, pure white; cup much expanded, orange-scarlet changing to apricot. *Robin Hood*, creamy-white; cup stained orange. *St John's Beauty*, sulphur-yellow, with cup

edged orange-scarlet. *Sequin*, snowy-white, with large, broad, flattened, golden-yellow corona.

N. cyclamineus.—A distinct and charming little Portuguese Daffodil, 6 to 8 ins. high, with lemon-yellow, abruptly reflexed segments, and an orange-yellow cylindrical corona with a serrated edge (*Bot. Mag.* t. 6950).



FIG. 266.—*Narcissus cyclamineus*.

There is a larger-flowered variety called *major*. Hybrids have been raised between *N. Horsfieldi* and *N. cyclamineus*.

N. Englehearti.—This name has been more or less generally accepted for the beautiful and distinct varieties that have been raised by the Rev. G. H. Engleheart. The flowers may be said to show distinct traces of *N. poeticus* blood, and are remarkable for a regular circular outline, filled in by broad rounded petals of great substance, with a large flattish circular and disc-like corona in the centre. The following are some of the choicest varieties in this group; many of them are very costly, a

single bulb costing anything from 2s. 6d. to £8.

Amyas Leigh, pure white, nearly 3 ins. across; corona rich orange edged with deep crimson. *Armeline*, creamy-sulphur, of great substance; corona bright yellow edged with orange. *Armored*, white, with overlapping petals; corona crinkled, edged with apricot. *Astrardente*, pure white; corona salmon with a darker edge. *Astrophel*, pure white; corona



FIG. 267.—*Narcissus Englehearti*, "Cirlet." (4.)

crinkled, pale canary-yellow. *Cirlet*, a magnificent flower with broad, pure white, rounded petals; corona yellowish with orange-scarlet rim. *Concord*, a beautiful and perfectly circular white flower tinted with buff, and having a saffron-buff or dark coppery corona. *Coreen*, creamy-white, 3 ins. across; rich yellow corona suffused with deep orange. *Derwent*, sulphur-yellow; corona suffused with orange. *Dorothy Pearson*, creamy-white, with bright orange corona. *Harold Finn*, pure white, with flat scarlet corona. *In-*

cognita, white, with distinct orange-apricot corona. *Inga*, glistening white, with deep orange-apricot corona; a kind of improved *Incognita*. *Mariette*, pure clear white, 2 ins. across; deep orange corona, edged brilliant scarlet. *Pole Star*, white, with fluted corona of a soft pale canary-yellow. *Salamander*, soft sulphur-yellow, with broad ovate petals, and a shallow bright yellow corona $1\frac{1}{4}$ ins. across, banded with brilliant orange. *Semiramis*, white, with large yellow corona edged bright scarlet.

N. gracilis.—A native of Bordeaux, bearing from three to five pure yellow sweet-scented flowers on a scape, the corona being shallow and obconic. Probably a cross between *N. juncifolius* and *N. Tazetta*. (*Bot. Reg.* t. 816.)

N. Humei (*N. poculiformis* × *N. Pseudo-narcissus*).—Raised by Dr Leeds of Manchester. Flowers sulphur-yellow, drooping, with a lemon-yellow corona. The best-known forms are *albidus*, milk-white, with a lemon-yellow corona; *concolor*, of a uniform yellow; and *Hume's Giant*, yellow changing to primrose.

N. incomparabilis.—This is known as the "Star" or "Chalice-cupped Daffodil," owing to the spreading starry segments of the perianth, and the cup-shaped corona. It is a native of Central and S.W. Europe, and is now naturalised in parts of the United Kingdom. The bulbs are about $1\frac{1}{2}$ ins. thick, and the star-shaped solitary flowers are 2 to 3 ins. across, pale yellow in colour, with an obconic lemon-yellow corona. (*Bot. Mag.* t. 121.)

In the variety *albus* the petals are white, and the corona lemon-yellow. The variety known as *Orange Phoenix*, with double flowers, has arisen from this. In the variety *aurantius* the

flowers are pale yellow, but the corona is suffused with orange. The double-flowered form known as *Butter and Eggs* comes from this.

As may be seen from the chief kinds mentioned, *N. incomparabilis* has been largely used by the hybridist in the production of new varieties. Thus:—

N. incomparabilis × *N. Pseudo-narcissus* = P. BACKHOUSEI.

N. incomparabilis × *N. poeticus* = N. BARRI.

N. incomparabilis × *N. poeticus* = N. BURBIDGEI.

N. incomparabilis × *N. poculiformis* = N. LEEDSI.

N. incomparabilis × *N. Tazetta* = N. ORIENTALIS.

Owing to its robust habit and freedom, *N. incomparabilis* and its derivatives are all useful garden plants, and thousands of them are used for naturalising in the grass in large parks and gardens. There are many excellent forms, such as:—

Albert Victor, sulphur-white, with a deep yellow cup. *Annie Baden*, pale sulphur-white, with a white orange-stained corona. *Autocrat*, full self-yellow, with expanded yellow corona. *Beauty*, sulphur-yellow, with yellow bar; corona large, and margined orange-scarlet. *Bertie*, creamy-white; cup yellow, edged orange. *C. J. Backhouse*, yellow; cup long, and of a rich orange-red colour. *Commander*, pale sulphur; large yellow cup stained orange-red. *Cynosure*, primrose changing to white; cup stained orange-scarlet. *Dr Gorman*, pure white; pale yellow cup. *Edward Hart*, perianth and cup deep yellow. *Figaro*, yellow; cup edged with orange. *Frank Miles*, soft clear yellow. *George Nicholson*, pure white; cup clear yellow. *Gloria Mundi*, clear rich yellow perianth; large cup much expanded and very

heavily stained orange-scarlet. *Goliath*, large white perianth barred yellow; large yellow corona. *Gwyther*, yellow; cup suffused orange. *Hogarth*, full yellow goffered cup, very large and expanded; perianth twisted. *James Bateman*, pure white; clear yellow cup. *King of the Netherlands*, sulphur-yellow; cup, very large, stained orange. *Leedsii*, yellow; cup stained rich orange-scarlet. *Lorenzo*, soft primrose, changing to white; cup yellow. *Lulworth*, pure white; cup bright orange-red. *Mabel Cowan*, white; cup broadly margined orange-scarlet. *Magog*, sulphur; large yellow cup. *Mary Anderson*, pure white; cup bright orange-scarlet. *Poiteau*, white; cup yellow. *Prince of Wales*, sulphur-yellow; cup stained orange-scarlet. *Prince Teck*, creamy-white; cup yellow, large and expanded. *Princess Mary*, creamy-white perianth; large cup, suffused orange. *Queen Bess*, pure white, with large light yellow much-expanded cup. *Queen Sophia*, sulphur-yellow; frilled cup, heavily stained orange-scarlet. *Red Coat*, orange-yellow, with orange-red corona frilled on the margin. *Red Star*, creamy-white; corona stained red. *Semi-partitus*, soft pale primrose; cup primrose, deeply lobed. *Sir Watkin* (probably a hybrid between a form of *Pseudo-narcissus* and *poeticus*), rich sulphur; cup yellow, slightly tinged with orange. *Stella*, white, with yellow crown; the form known as *Stella superba*, being a great improvement in size. *Splendens*, sulphur-yellow; corona edged orange-scarlet.

These are several double-flowered forms of *N. incomparabilis*, the best being *Butter and Eggs*, large yellow, with deep orange centre; *Codlins and Cream* (or *Sulphur Phoenix*), pure white, with a sulphur-yellow centre; *Eggs and Bacon* (or *Orange Phoenix*),

white, with a rich orange centre; *Primrose Queen*, primrose-yellow, shading to orange in centre; and *White Queen*, like *Sulphur Phoenix*, but of a purer white.

yellow; and *Snowdrop*, pale sulphur-yellow or white, two flowers usually drooping from the stem.



FIG. 268.—*Narcissus incomparabilis* Sir Watkin. (3.)



FIG. 269.—*Narcissus Johnstoni* Queen of Spain. (2.)

N. intermedius.—This is considered to be a natural hybrid between *N. Tazetta* and *N. Jonquilla*. From four to ten flowers are borne on a scape, the segments being bright lemon-yellow, and the cup-shaped corona orange-yellow. It is a native of the Pyrenees. (*Red. Lil.* t. 427.)

N. Johnstoni.—A beautiful Portuguese Daffodil, considered to be a natural hybrid between *N. bicolor Horsfieldi* and *N. triandrus*. The typical form has clear, soft, sulphur-yellow flowers. There are several forms, amongst them the *Queen of Spain*, soft clear yellow, with gracefully reflexed petals; *King of Spain*, similar, but with shorter, broader corona; *Mrs Geo. Cammell*, soft clear

N. Jonquilla.—This is the sweet-scented Jonquil of S. Europe and Algeria, with roundish leaves 8 to 12 ins. long, deeply channelled down the face. From two to six rich yellow and highly fragrant flowers, with a cup-shaped corona, are borne on the scapes. (*Bot. Mag.* t. 15.)

Amongst the varieties are *flore pleno*, a rich golden-yellow, double-flowered form known as “Queen Anne’s Jonquil”; *jonquilloides*, a more robust form than the type; and *minor*, a dwarf form, with flowers much smaller than in the type.

N. juncifolius.—The Rush-leaved Jonquil, as this is called, is a native of the Pyrenees, having small bulbs, slender roundish leaves 4 to 6 ins. long, and small umbels of bright

yellow flowers with ovate segments about $\frac{1}{2}$ in. long, and a cup-shaped corona. There are several varieties, among them being *rupicola* (or *N. apodanthus*), which has a corona distinctly six-lobed (*Bot. Mag.* t. 6473, c.). *N. scaberulus* is closely related to this.

N. Leedsi (*N. poculiformis* × *N. incomparabilis*).—A beautiful hybrid, having rather drooping milk-white flowers, with a sulphur-yellow cup-shaped corona about $\frac{1}{2}$ in. deep and wide, the oblong acute petals being over 1 in. long. Amongst the forms of the *Leedsi* Daffodils may be noted:—*Acis*, large, white, with orange-stained cup. *Albion*, large, white, with sulphur cup. *Amabilis*, white divisions, large and spreading; cup long and conspicuous, changing from primrose to white. *Beatrice*, flowers pure white, elegantly shaped cup. *Duchess of Brabant*, white; cup canary-yellow, changing to white. *Duchess of Connaught*, large expanded cup, pearly-white. *Duchess of Westminster*, pure white; long canary-yellow cup tinted orange. *Elegans*, drooping white perianth; corona sometimes stained apricot. *Fanny Mason*, white, canary-yellow cup. *Gem*, white. *Grand Duchess*, white; cup stained orange. *Hon. Mrs Barton*, glistening white; cup changing from primrose to white. *Ianthe*, sulphur changing to white; cup canary-yellow. *Katherine Spurrell*, white of a beautiful lustre; cup bright yellow. *Madame Magdalene de Graaff*, usually two-flowered, creamy-white; crown orange. *Madge Matthew*, large white; well-formed cup. *Maggie May* (*Edmond's White*), flowers very large, white; cup pale citron-yellow, frilled. *Minnie Hume*, pure white; cup large, canary-yellow, changing to white. *Mrs Langtry*, pure white; cup margined with

golden-yellow. *Modesty*, silver-white segments drooping over and much longer than the white corona. *Palmerston*, sweet-scented white flowers with a canary-yellow corona. *Princess of Wales*, pure white; large, expanded, beautifully frilled cup. *Superbus*, divisions large and drooping, pure white; cup changing from primrose to white. *Una*, large, creamy-white; cup citron-yellow, tinged apricot.

N. Macleayi.—A charming little Daffodil, with scentless flowers, having ovate oblong milk-white segments, and a bright yellow corona about $\frac{1}{2}$ in. long and broad (*Bot. Reg.* t. 987). *N. Sabini* is similar, but a more vigorous plant with larger flowers (*Bot. Reg.* t. 762).

N. major (*N. hispanicus*).—This, the great Spanish Daffodil, is a form of



FIG. 270.—*Narcissus major obvallaris*. (1.)

N. Pseudo-narcissus. It has bright lemon-yellow flowers, the corona being

deeply lobed and much crisped on the margin.

Distinct forms of *N. major* (often placed under *N. Pseudo-narcissus*) are *obvallaris*, well known as the "Tenby Daffodil," a distinct early form with uniform yellow flowers; *spurius*, with broad imbricating petals and expanded corona, fine self-yellow; *spurius coronatus* has pale yellow petals; *Telamonius* (or Single *Van Sion*), sulphur-yellow, with a deeper yellow trumpet; *Telamonius plenus* (perhaps better known as the Double *Van Sion*), a fine double golden-yellow flower grown almost everywhere.

N. minor.—A distinct little Spanish Daffodil, resembling *N. Pseudo-narcissus* in appearance, but very much smaller in every way. The leaves are only 3 to 4 ins. long and about $\frac{1}{2}$ in. broad, and the flowers are 1 to $1\frac{1}{4}$ in. long, with gracefully twisted sulphur-yellow segments, and a deeper yellow trumpet or corona. The variety *minimus* is the smallest of the "trumpet" Daffodils, and has flowers much smaller and of a deeper yellow than the typical *minor*. The variety *nanus* has bright yellow flowers, and a corona not so deeply lobed. There is also a double form, called *plenus* or *Rip Van Winkle*, with deep yellow flowers.

N. moschatus (*N. candidissimus*).—A Pyrenean Daffodil with pure white flowers when fully open, having twisted petals 1 to $1\frac{1}{4}$ ins. long, and a plaited corona about 1 in. across (*Bot. Mag.* t. 1300).

The variety *albicans* has larger flowers, with a more recurved rim to the corona; *cernuus* has silvery white drooping flowers; while *cernuus pulcher* has a larger and more spreading corona, passing from primrose-yellow to white with age. The variety *tortuosus* (also known as *Leda* and *Sarnian Belle*) has pure white twisted

petals, at first sulphur-yellow but afterwards white.

N. muticus (*N. abscessus*).—A Pyrenean Daffodil with sulphur-yellow flowers, having a deep yellow corona about 3 ins. across. There are several forms. (*Floral Mag.* t. 224.)

N. Nelsoni.—A pretty Daffodil closely related to *N. Macleayi*, having creamy-white flowers and a lemon-yellow corona about $\frac{3}{4}$ in. long. Amongst the best forms are:—*Aurantius* (*Nelson's Orange*), white, with broad, straight, bright yellow corona, edged with orange-scarlet. *Border Maid*, pure white; clear yellow trumpet. *Major*, white; bright yellow trumpet tinged with orange. *Minor*, pure white; yellow corona. *Mrs C. J. Backhouse*, pure white; corona broad yellow, spreading. *Mrs E. G. Knights*, white; cup stiff bright yellow. *Pulchellus*, drooping, white; cup yellow. *Wm. Backhouse*, broad white petals; corona clear yellow.



FIG. 271.—*Narcissus odorus*.

N. odorus (*The Campernelle Jonquil*).—A native of S. Europe, and

probably a hybrid between *N. Jonquilla* and *N. Pseudo-narcissus*. It has bulbs over an inch through, and narrow, bright green, rush-like leaves deeply channelled down the face. From two to four sweetly scented bright yellow flowers with a shallow cup-shaped corona are borne on the scapes. (*Red. Lil.* t. 157.)

The variety *heminalis* has smaller golden-yellow flowers; *rugulosus* has deep yellow flowers with a crinkled corona; *plenus* is a sweet-scented double-flowered form of deep yellow, often known as "Queen Anne's Jonquil." The variety *minor* has flowers about 1 in. across, and is smaller in every way than the type.

N. orientalis.—This is considered to be a hybrid between *N. incomparabilis* and *N. Tazetta*, and bears three to four sulphur-yellow flowers with a cup-shaped orange-yellow corona on a stem.

N. poculiformis (*N. montanus*).—A native of the Pyrenees, and considered to be a natural hybrid between the Paper-white Narcissus (*N. Tazetta papyracea*) and *N. moschatus*. The stems bear one or two fragrant pure white flowers with spreading petals about 1 in long, and a cup-shaped corona. (*Bot. Reg.* t. 123.)

N. Poetaz.—This name—a felicitous combination of the two parent names—has been given and is now generally accepted for the hybrids obtained by crossing *N. poeticus ornatus* with the finest varieties of *N. Tazetta*. The individual blossoms resemble the *poeticus* parents strongly in appearance, but several (instead of one) are borne on a stem, and in addition they have inherited the fragrance of the *Tazetta* parents. They are also quite hardy, and may be grown in the open border as well as in pots. Some good forms are:—*Alsace*, pure white, with yellow cup

edged with red when opening. *Aspasia*, pure white, with yellow cup; true *poeticus* type, three to four flowers on stem 2 ft. high. *Elvira*, large white flowers with yellow eye, *Ideal*, white with dark orange eye; large truss. *Irene*, pale primrose, with prettily fluted orange cup; eight to nine flowers in truss. *Jaune à Merveille*, exquisite soft yellow, with



FIG. 272.—*Narcissus Poetaz.* (3.)

deep golden cup. *Klondyke*, yellow, with deep golden cup. *Lucia*, yellow, with golden-yellow cup. *Scarlet Gem*, flowers 2 ins. across, rich apricot yellow; cup flat and crinkled, bright brick-red. *Sunset*, soft yellow, with rich orange cup.

There are now many growers of Daffodils and Narcissi, and the reader would do well to consult current catalogues for the newer creations.

N. poeticus.—This is the well-known Poet's or Pheasant's Eye Narcissus. It is a native of S. Europe,

and has bulbs about 1 in. through, and narrow blue-green leaves about 1 ft. long. The beautiful white solitary flowers, $1\frac{1}{2}$ to 2 ins. across, have spreading petals, and a very shallow saucer-shaped corona distinctly edged with red or orange. (*Red. Lil. t. 160.*)

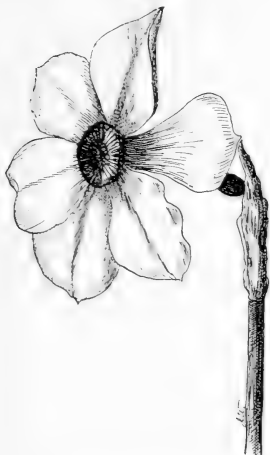


FIG. 273.—*Narcissus poeticus*.

There are several varieties, amongst the best known being:—*Albatross*, white; citron-yellow cup edged orange-red. *Almira* (or *King Edward VII.*), snow-white, with canary-yellow cup rimmed with red. *Biflorus*, creamy-white; pale yellow cup. *Grandiflora præcox*, white; cup edged crimson. *Ornatus*, broad pure white petals; cup edged scarlet; sweet-scented. A fine early variety grown in thousands by market gardeners. *Poetarum*, an improved early form like the type. *Recurvus*, a late-flowering variety with petals somewhat reflexed.

In addition to these single-flowered

varieties mention must be made of the pure double-white form, called *alba plena odorata*, or the "Gardenia-flowered Narcissus," as the rosettes of pure white overlapping petals suggest this flower. This variety is the last of all the *poeticus* to flower—often well into June. It has been developed from a variety called *patellaris*, and when it flowers freely is one of the best varieties for selling. Unfortunately it often comes "blind," that is to say, the flower-stems appear, but the blossom never emerges from the papery spathe at the top. The only cure for this defect seems to be to move the bulbs every year to a fresh place, selecting well-drained soil of a rich loamy nature. The ways in which *N. poeticus* and varieties may be used are numerous—borders, rockeries, grassland, woodlands, by the sides of lakes, ponds, or streams, and as pot plants, are a few.

N. Pseudo-narcissus.—This is the Common Trumpet, Ajax, or Lent Lily, a native of the copses and pastures in parts of England. The bulbs are 1 to $1\frac{1}{2}$ ins. through, and the narrow blue-green leaves are about 1 ft. long. The solitary flowers appear in March and April on stems over a foot high, the oblong petals being pale sulphur-yellow and over 1 in. long, while the plaited corona or trumpet is lemon-yellow and about 1 in. across the irregularly crenated mouth.

There are several wild varieties of the Lent Lily, such as *cambricus*, sulphur-white, with a yellow trumpet; *lobularis*, a uniform lemon-yellow, with a six-lobed trumpet; *pallidus præcox*, an early Pyrenean form, with flowers varying from pale lemon-yellow to white; *rugilobus*, primrose-yellow, with large yellow trumpet; *scoticus*, known as the "Garland Lily," similar to the type, but earlier;

variiformis (or *nobilis*), a Pyrenean form intermediate between *N. moschatus* and the type, white, with canary-yellow trumpet.

There are also many choice hybrid or garden forms, which may be divided into two colour groups as follows:—

GOLDEN AND SHADES OF YELLOW.

Ard Righ (*Yellow King*), golden-yellow self. *Countess of Annesley*, sulphur; trumpet rich yellow. *Eliza*



FIG. 274.—*Narcissus Pseudo-narcissus* Golden Spur. (3.)

Turck, dwarf, beautiful lemon-yellow. *Emperor*, primrose; long and wide yellow trumpet. *Fred Moore*, primrose; large golden trumpet. *Glory of Leiden*, dark yellow trumpet; perianth of a slightly lighter shade. *Golden Spur*, yellow; trumpet rich golden yellow, large and distinctly lobed. *Henry Irving*, golden yellow. *King Alfred*, a giant golden Daffodil. *King's Norton*, a very large rich deep yellow. *Lady Willes*, prim-

rose-yellow; bold yellow trumpet. *M. J. Berkeley*, rich yellow; large expanded trumpet. *Maximus*, rich golden yellow; trumpet large and spreading. *P. R. Barr*, primrose; trumpet rich yellow. *Princeps*, sulphur; trumpet yellow. *Rugilobus*, trumpet yellow, segments paler. *Shirley Hibberd*, light yellow; trumpet deep yellow. *Spurius*, distinct, large expanded trumpet; early, and forces well. *Van Waveren's Giant*, a gigantic primrose flower, with bright



FIG. 275.—*Narcissus Pseudo-narcissus* King Alfred. (4.)

yellow bell-shaped trumpet. *Willly Barr*, clear soft yellow; trumpet rich deep yellow. And many others.

WHITE VARIETIES.

C. W. Cowan, white; trumpet canary colour. *Corrie Plomp*, white; trumpet light primrose passing to white. *Duchess of Connaught*, perianth and trumpet primrose and white. *Madame de Graaf*, fine white trumpet. *Mrs J. B. M. Camm*, white; trumpet sulphur-white. *Mrs Thomson*, pure white. *Princess Ida*, white; trumpet

white, edged golden. *Rowena*, large trumpet, silvery white flushed peach. *Snowflake*, white; trumpet tinged apricot.

The forms of *N. Pseudo-narcissus* are much confused, and many of them are placed under various headings by different growers. The reader will find those not mentioned above under such headings as *N. bicolor*, *N. major*, *N. moschatus*, and *N. muticus*.

To the above single-flowered forms must be added the following double-flowered ones:—

Capax (or *eystettensis*), soft lemon-yellow, with numerous starry petals; *grandiplenus*, deep yellow; *plenissimus*, the old double; *scoticus plenus*, the double-flowered "Garland Lily"; and *plenus*, the Double Lent Lily, or Gerarde's White and Double Yellow Daffodil.

N. Tazetta.—This is the "Polyanthus" or "Bunch" Narcissus, and is the species referred to by the ancient Greek and Roman poets, not *N. poeticus*, as many imagine. It is a widely distributed species, and although largely existing in Italy and Southern France, it is also found in the Canary Islands and Portugal, and from Syria to Cashmere, China, and Japan. Its geographical distribution would therefore account largely for its great variation. The typical *N. Tazetta* has bulbs $1\frac{1}{2}$ to 2 ins. in diameter, four to six narrow and somewhat grey-green leaves 12 to 18 ins. long, $\frac{1}{2}$ to $\frac{3}{4}$ in. broad, and the somewhat flattened scape bears an umbel of four to eight flowers 1 to $1\frac{1}{4}$ ins. across. The obovate petals are pure white, and the shallow cup-shaped corona is lemon-yellow, and from $\frac{1}{4}$ to $\frac{1}{2}$ in. across.

The Polyanthus Narcissus is perhaps better grown in pots under glass, but it may be grown quite

well in the open in the mildest parts of the Kingdom; and also in less favoured spots if protected with a little bracken or litter in severe winters. Enormous numbers of some varieties such as the "Scilly White" (*ochroleucus*), "Grand Soleil d'or"



FIG. 276.—*Narcissus Tazetta Grand Monarque*. ($\frac{1}{2}$.)

(*aureus*), "Grand Monarque," and "Paper White," are grown in the Scilly Islands, off Cornwall, as marketable crops, and tons of flowers are sent to the London and provincial markets every spring.

There are three distinct groups of *N. Tazetta*, viz. :—

1. Flowers white, with a yellow or orange corona, represented by *Bazelman Major*, *Couronne Blanche*, *Gloriosa*, *Grand Monarque*, *Grand Primo*, *Her Majesty*, *Laura*, *Maestro*, *Mont Cenis*, *Queen of the Netherlands*, *Scilly White*, *Staaten General*, and *White Perfection*.

2. Flowers all white, represented

by *Early Snowflake*, *Paper White* (*papyraceus*), *White Pearl*.

3. Flowers all yellow, represented by *Apollo*, *aureus*, *Bertolini*, *Bathurst*, *Charles Dickens*, *cupularis*, *Jaune Suprême*, *Lord Canning*, *Soleil d'or*, etc.

The variety known as *Bazelman minor* is a natural hybrid between *N. Tazetta* and *N. poeticus*, and is something like *N. biflorus*, but smaller and with more flowers on the stem.

The Double Roman Narcissus (*Tazetta romanus*) has white flowers with a little yellow in the cup. It flowers freely and forces well.



FIG. 277.—*Narcissus Tazetta*, variety (Chinese Sacred Lily). ($\frac{1}{2}$.)

What is known as the "Chinese Sacred Lily" or "Joss Flower" is an Eastern form of *N. Tazetta*, with large bulbs, and five to nine sweet-scented white flowers with a yellow cup on a stem. Well-ripened bulbs may be grown easily in pots, pans, or bowls filled with pebbles and water, in a sunny window in a dwelling-room.

N. triandrus.—This beautiful

Narcissus from the Peninsula (Spain and Portugal) is known as "Ganymede's Cup." The bulbs are less than 1 in. in diameter, and the very slender roundish leaves are channelled on the upper surface. The drooping flowers are pure white, up to nine in a cluster, and are remarkable for the petals being sharply bent backwards as in *N. cyclamineus*, *N. Johnstoni*, *Queen of Spain*. There are several varieties, such as:—

Albus, a charming white form known as "Angel's Tears." *Calathinus*, snowy white to pale sulphur-yellow. *Concolor*, pale soft yellow;



FIG. 278.—*Narcissus triandrus*.

rare. *Pallidulus*, primrose-yellow. *Pulchellus*, primrose-yellow, with a white cup.

N. triandrus and its charming forms are safer grown in pots or pans, or in sheltered nooks in the rockery where they will not be likely to disappear. The stock may be increased

by offsets, and also by sowing as many seeds as possible when ripe.

N. triandrus has been largely used by the hybridist, and some very fine forms have been raised by its means.

N. tridymus.—Under this name several fine hybrids from the large and single-flowered trumpet, *N. Pseudo-narcissus*, and the many-flowered small *N. Tazetta* are known, most of them having more than one flower on a stem. Some good ones are:—

A. Rawson, large, bold, yellow. *Duchess of Albany*, sulphur-yellow, with yellow cup. *Duke of Albany*, sulphur; cup orange. *S. A. de Graaf*, large, uniform yellow. *Miss White*, silvery white; three to four flowers on stem.

N. viridiflorus.—An interesting species from Morocco and Gibraltar; remarkable for producing its flowers usually in November and December instead of in spring. The bulbs are roundish, about 1 in. through, and the roundish leaves are not produced with the flowers. These are borne two to four on a slender stalk 1 to 1½ ft. high, and are of a green colour, the lance-shaped acute segments being reflexed. (*Bot. Mag.* t. 1687.)

DISEASES.—It often happens that Narcissus bulbs are attacked with the grub of the Narcissus Fly (*Merodon equestris*), an insect like a small and slender bumble-bee. The grub eats its way into the bulbs during the summer and autumn months and destroys the tissues by the end of November, when it becomes a chrysalis and buries itself in the soil. They may be recognised by their dull brown colour, egg-like shape, and rough and wrinkled skin. All badly injured bulbs should be burned, and in July and August the stock should be examined, and any bulbs affected should be steeped in

water for about a week, to drown the maggots. The insects themselves when on the wing in summer should be enticed to drown themselves in saucers of sugary solutions.

NELUMBUM (from *nelumbo*, the Indian name), WATER BEAN. Nat. Ord. Nymphæaceæ.—This genus contains only the two species mentioned below. They are both aquatic plants, having thick fleshy root-stocks, from which arise long stalks surmounted by a huge circular peltate leaf depressed in the centre. The large solitary flowers are thrown up well above the leaves, and are composed of numerous petals and numerous stamens surrounding an obconical or flat top-shaped ovary in the centre. When ripe the ovary is pierced with holes, and very much resembles the coarse rose of a watering can.

N. luteum.—This is the “Yellow Lotus” of the S. United States and Jamaica. It has blue-green leaves 1 to 1½ ft. across, and pale yellow sweet-scented flowers about a foot across when fully expanded. (*Bot. Mag.* t. 3753.)

This species may be grown in rich loam and well-rotted manure in tanks of water, or in tubs or pots sunk in water. Although hardier than *N. speciosum*, it nevertheless requires some attention to flower it successfully in the open air, and even under glass.

N. speciosum (the Sacred Bean of India).—A charmingly beautiful water plant, 6 to 8 ft. high, with blue-green leaves often nearly 2 ft. across, and large sweet-scented rose and white blossoms 6 to 12 ins. across (*Bot. Mag.* tt. 903, 3916, 3917; *Garden*, 1893, i. 912).

There are several varieties of *N. speciosum*, not unnatural considering

it exists in a wild state from India and Ceylon to China and Japan. In the last-named country several forms have been raised, such as *album fl. pl.*, with pure white double flowers; *album striatum*, flowers white, edged and streaked with crimson; *grandiflorum album*, flowers pure white, very large; *Kermesinum*, deep rosy carmine; *Osiris*, rosy crimson; *pekinense rubrum*, rich reddish-purple; *roseum fl. pl.*, pale rose, very double; *Shiroman*, fine double, creamy white to pure white.



FIG. 279.—*Nelumbium speciosum*. (½.)

Although in Southern France *N. speciosum* and its varieties may be grown in the open air in lakes, etc., they are too tender for that purpose in the British Islands. It is better to grow them in warm and moist houses the rhizomes being embedded in rich loam and manure. A peculiarity of the *Nelumbiums* is the fact that it is impossible in the ordinary way to wet the huge leaves. Water when applied immediately forms large globules which roll off the surface like big drops of quicksilver.

NEMASTYLIS (*nema*, a thread; *stylos*, a column; in reference to the slender style). Nat. Ord. Iridæ.—A small genus of bulbous plants with narrow or roundish sword-like sheathing leaves and small flowers. They are natives chiefly of Mexico and N. America, and are fairly hardy in the milder parts of the Kingdom. If grown in a well-drained gritty soil enriched with well-decayed manure, they will do well. The only species of any note appear to be *N. cœlestina*, with bright blue flowers on stems about 2 ft. high in May and June (*Gartenfl.* t. 1081, fig. 1); and *N. geminiflora* (or *N. acuta*), which somewhat resembles a *Tigridia*. It has narrow leaves, grows about 2 ft. high, and in May and June produces its rather fleeting purplish-blue flowers from twin spathes (*Bot. Mag.* t. 6666). *N. Pringlei* grows only about 8 or 9 ins. high, and has sky-blue flowers.

NERINE (after *Nerine*, a water-nymph). Nat. Ord. Amaryllidæ.—A genus of ornamental bulbous plants with long narrow leaves often produced after the flowers have faded. The flowers are borne in umbels on top of erect slender scapes, and are funnel-shaped with more or less spreading oblong lance-shaped, more or less wavy segments, which are often recurved.

The *Nerines* are all natives of S. Africa, and are generally grown in pots in cool greenhouses. They like a compost of sandy loam with a little peat or leaf-mould, and flower better if not given too much space. Indeed, several bulbs may be placed close together, and in this way, according to the size of the pot, a better floral display will be produced. A peculiarity about *Nerines* is that they vegetate during the winter months;

that is, the leaves are in a growing and assimilating condition, and finish their work about April or May. During this period of activity the plants should be kept on shelves in the greenhouse close to the glass, to secure as much light as possible; and the temperature at night should not fall below 50° F., certainly not below 45° F. Plenty of fresh air should be given on all favourable occasions to avoid a "stuffy" atmosphere. When the leaves have withered, the bulbs should be given a period of rest. This is one of the most important features in the cultivation of Nerines. It will benefit the plants during this resting period to place them in a dry, sunny position, and no water whatever should be given. The flower-spikes begin to appear in June, and from then onwards till October and November, and in some cases even till January, a supply of blossom may be expected during the dullest months of the year.

PROPAGATION.—Nerines are easily propagated by offsets from the older bulbs, detached after the flowers have faded. Seeds may be ripened in most cases, and if sown in gentle heat in spring will germinate readily in rich gritty soil. In about three years they will make flowering bulbs. The ease with which Nerines may be raised from seeds has naturally attracted the hybridist, and some very fine forms have been evolved.

The species most used at present are, *curvifolia*, *flexuosa*, *pubica*, and *sarniensis*.

The following are some of the best Nerines grown :—

N. amabilis (*N. pudica* × *N. humilis*), bright pink on stems 12 ins. high.

N. appendiculata.—This species is remarkable for having a strap-shaped

process with two to four long apical teeth at the base of each filament. Flowers pale pink. (*Gard. Chron.* 1894, xvi, 336.)

N. atrosanguinea (*N. Planti* × *N. flexuosa*), deep salmon rose, 2 ins. wide, wavy petals; stem 12 to 18 ins. high.

N. Bowdeni.—This is closely related to *N. flexuosa*. It has glossy green



FIG. 280.—*Nerine Bowdeni*. (3.)

thickish leaves over 1 ft. long and $\frac{1}{2}$ in. broad. From six to twelve flowers are borne in an umbel on scapes about 18 ins. high. They are very large, and of a pale pink colour with a darker line down the centre of each of the recurved segments, which are $2\frac{1}{2}$ to 3 ins. long. (*Gard. Chron.* 1904, xxxvi, 365, f. 164; *Flora and Sylva*, May 1905.)

N. Cami (*N. curvifolia* × *N. undulata*), rosy scarlet, stems 12 ins. high.

N. curvifolia.—A fine species with large umbels of glistening scarlet flowers, each $1\frac{1}{2}$ ins. across, with broad reflexed segments, and borne on stems 18 ins. high (*Bot. Mag.* t. 725; *Red. Lil.* t. 274).

The variety *Fothergilli* is stronger

than the type and has more flowers in the umbels (*And. Bot. Rep. t. 163*). It is undoubtedly one of the finest and most free-flowering Nerines in cultivation, and should prove to be a valuable plant for market work if grown in large numbers.

N. elegans (*N. flexuosa* × *N. rosea*).—A fine hybrid with crimson flowers. The variety *cœrulea* has crimson flowers tinted with blue, while *alba* has pure white blossoms.

N. filifolia.—Flowers eight to ten in an umbel, on scapes 1 ft. high. Petals deflexed, bright red, 1 in. long. (*Bot. Mag. t. 6547*.)

N. flexuosa.—In this species the bright green leaves about 1 ft. long, and sometimes roughened with pustules on the face, appear at the same time as the flowers, about September. The flexuose scape is sometimes 2 to 3 ft. high, and bears an umbel of ten to twenty pale pink flowers with wavy petals $1\frac{1}{4}$ ins. long. (*Bot. Reg. t. 172*.)

There are several varieties, such as *angustifolia*, having very narrow leaves (*Ref. Bot. t. 329*); *pulchella*, leaves firmer in texture than in the type, scape not flexuose, and flowers pale pink with a rose-red keel to the segments (*Bot. Mag. t. 2407*); *alba*, with white flowers; and *Sandersoni*, with broader leaves and less wavy petals.

N. humilis.—This comes near *N. flexuosa*, but is dwarfer in growth and has narrower and more deeply channelled leaves. About ten to twenty pink or rose-red flowers with deflexed petals are borne on slender scapes 6 to 18 ins. high. (*Bot. Mag. t. 726*; *Red. Lil. t. 449*.)

N. Manselli (*N. flexuosa* × *N. Fothergilli*).—This fine hybrid commemorates Mr Mansell, a hybridist of Guernsey. It has broader leaves than other kinds, produced at the same

time as the bright rosy flowers, in November and December. The scapes are about 2 ft. high, and the umbels 6 ins. through, having from twelve to eighteen blossoms with recurved segments. (*Gard., November 1899*.)

N. Meadowbanki (*N. sarniensis* × *N. Fothergilli*).—This seems to be merely a form of *N. Fothergilli*.

N. Moorei.—Closely related to *N. curvifolia*, but distinguished by its bright green (not blue-green), slightly twisted leaves, 9 to 12 ins. long and $\frac{1}{2}$ to $\frac{3}{4}$ in. broad. Flowers bright scarlet with wavy segments, and borne six to nine in an umbel on flattened scapes about 9 ins. high.

N. pancratioides.—This species has long narrow leaves, roundish in the lower half. The scapes are about 2 ft. high, and bear umbels of twelve to twenty white flowers, which have small square bifid scales between each of the filaments, as in *Pancreatum*. (*Gard. Chron. 1891, x. 576*.)

N. pudica.—This species has narrow blue-green leaves 8 to 9 ins. long, and slender scapes 1 to $1\frac{1}{2}$ ft. high, bearing umbels of ivory-white flowers sometimes keeled with pink, the petals being very slightly wavy (*Bot. Mag. t. 5901*). The variety *Elwesi* has broader leaves, more compact umbels, and pale rose flowers of a more substantial texture, and *alba* has snow-white blossoms. *N. Stricklandi* is a hybrid between *N. pudica* and *N. curvifolia*.

N. sarniensis.—This is the "Guernsey Lily" which has been cultivated in the Channel Islands for two hundred years. It has ovoid bulbs $1\frac{1}{2}$ to 2 ins. in diameter, and bright green narrow leaves developed after the flowers. From ten to twenty of these are borne in an umbel on slender scapes 1 to $1\frac{1}{2}$ ft. high in September. They are bright

crimson in colour, about $1\frac{1}{2}$ ins. across, the sickle-shaped segments being scarcely crisped; filaments bright red. (*Bot. Mag.* t. 294; *Red. Lil.* t. 35.)

The variety *corusca* has broader leaves and large bright scarlet flowers (*Bot. Mag.* t. 1089); *Planti* has longer scapes and flowers of a duller crimson; *profusa*, bright scarlet flowers produced late in August; *rosea*, rose-red (*Bot. Mag.* t. 2124); and *venusta*, with pale green leaves and bright scarlet flowers with rather wavy petals (*Bot. Mag.* t. 1090). *N. Alleni* is a cross between *corusca major* and *N. sarniensis*.

N. undulata (*N. crispa*).—Flowers pale pink with very wavy segments, eight to twelve in an umbel, on slender scapes 1 to $1\frac{1}{2}$ ft. high (*Bot. Mag.* t. 369; *Red. Lil.* t. 115).

NIPHÆA (*niphos*, snow; in reference to the white flowers). Nat. Ord. Gesneraceæ.—A genus containing three species of softly hairy herbaceous hothouse plants, from Mexico to Cuba, having creeping root-stocks, oval, toothed leaves, and clusters of white flowers in the axils of the leaves. Corolla rotate, with a very short tube and five broad lobes. The best-known species is **N. oblonga**, a native of Guatemala, about 1 ft. high, having oblong heart-shaped, toothed, and wrinkled leaves, and drooping white flowers in winter. (*Bot. Reg.* 1842, t. 5.)

This plant flourishes in rich sandy loam and peat or leaf-soil, and requires a night temperature of 60° to 65° F. during active growth, but 45° to 50° when at rest. It may be propagated by division of the root-stocks in spring in the same way as **ACHIMENES**.

NOTHOSCORDUM (*nothes*, spurious; *scordon*, garlic; in allusion to

its affinity with Garlic). Nat. Ord. Liliaceæ.—A genus related to *Allium*, containing about ten species of hardy or half-hardy bulbous plants, having flat narrow leaves, and flowers in umbels on top of erect scapes. They are not particularly fine garden plants, and are only fit for botanical collections. They grow in ordinary good garden soil in warm sheltered spots, or in bleak localities may be sheltered in a frame. They are propagated by offsets or seeds.

N. fragrans is a strong-growing and hardy North American species 1 to 2 ft. high, with umbels of white sweet-scented flowers keeled with lilac (*Bot. Reg.* t. 898; *Red. Lil.* t. 68).

N. inodorum has whitish flowers keeled with brownish-purple, and grows about 18 ins. high (*Bot. Mag.* t. 1129, as *Allium*).

N. neriniflorum produces its pink flowers in June and July (*Bot. Reg.* 1847, t. 5).

N. striatellum has greenish-yellow flowers (*Bot. Mag.* t. 2419, as *Ornithogalum gramineum*).

N. striatum has white flowers in

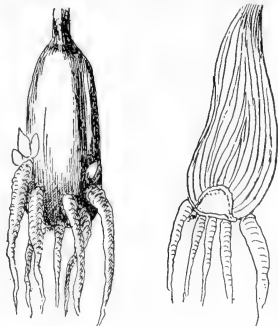


FIG. 281.—*Nothoscordum striatum*. ($\frac{1}{2}$.)

May (*Bot. Mag.* tt. 1035, 1524, as *Allium*).

NUPHAR (from *naufar*, the Arabic for Water Lily). Nat. Ord. Nymphæaceæ.—A small genus of aquatic plants closely related to the Water Lilies proper (*Nymphaea*), having thick fleshy root-stocks, roundish heart-shaped leaves deeply lobed at the base, and large yellow flowers with numerous petals and stamens surrounding a peltate rayed stigma in the centre. The culture is exactly the same as described below for NYMPHÆA.

N. advenum.—A native of the lakes, ponds, and ditches of N. America, having large yellow flowers with red anthers to the stamens (*Bot. Mag.* t. 684, as *Nymphaea*).

N. luteum.—This is the Yellow Water Lily or "Brandy Bottle" of Britain. It has roundish deeply

N. pumilum (*Nymphaea Kalmiana*).—This species is found wild not only in Britain, but also over Arctic and Central Europe and Asia. It is like *N. luteum*, but is smaller in all parts, and has eight to ten rays to the stigma instead of ten to thirty. (*Bot. Mag.* t. 1243.)

NYMPHÆA (from *nymphæ*, a water-nymph), WATER LILY. Nat. Ord. Nymphæaceæ.—A genus containing between forty and fifty species of water-plants, with thickish fleshy roots, roundish leaves lobed at the base, and solitary flowers on fleshy stalks, on, or some little distance above, the surface of the water. The flowers have four sepals, numerous petals gradually becoming smaller from the outside inwards and passing into stamens. Carpels numerous, sunk in a fleshy disc forming a many-celled ovary surmounted by radiating stigmas, and ultimately ripening into a spongy berry under water.

The Water Lilies must be divided into hardy, half-hardy, and tender kinds, but they all require water and a rich muddy soil to flourish. Loam and old cow-manure make a good compost. The hardy kinds grow in the open air in lakes, ponds, or streams, the best-known representative being the common white-flowered British Water Lily (*N. alba*). The half-hardy ones—generally hybrids between the hardy and tender kinds—grow well enough in the open air during the summer months, but they are usually placed in tanks of water in which arrangements have been made to supply artificial heat if necessary by hot-water pipes. The root-stocks for open-air work are usually placed in wicker baskets, embedded in the stiffish loam and manure, and carefully dropped into the bottom of the lake, pond, or



FIG. 282.—*Nuphar luteum*.

lobed leaves 8 to 12 ins. across, and produces its sweet-scented yellow flowers from June to August slightly above the surface of the water.

stream, either near the margin or from a boat or punt in deep water. Very often, however, the rhizomes are just tied to a big stone and sunk into the mud at the bottom. In some cases, as at Mr Robinson's place at Gravetye Manor, in Sussex, they will flourish in water from 16 to 20 ft. deep, and send up their leaves and flowers from that great depth. The tender or hothouse kinds are easily managed in warm-water tanks, and may be sunk in pots or baskets a foot or two beneath the surface of the water.

PROPAGATION.—Water Lilies (including the NUPHARS) are easily increased by dividing the root-stocks with a strong knife in spring, and re-planting. They may either be left in the mud during the winter, or taken up and stored in sand in a cool but frost-proof place during the winter. Seeds may also be sown either when ripe or in spring, but it will be necessary to pay some attention to saving them, as the pods ripen *under* water, and run the risk of being lost or destroyed by waterfowl in the open air. The seeds should be sown in flattish pots or pans in rich, gritty soil, and sunk in water. When the small round seed-leaves are seen floating on the water, each plantlet may be given a little pot to itself in the usual rich compost, and again placed under water.

Apart from the decoration of lakes, ponds, streams, water-tanks, etc., the flowers of Water Lilies—now of all shades of colour, embracing red, white, blue, yellow, rose, crimson, and salmon—are excellent when cut, and last quite a long time in a bowl of water in rooms. By cutting off half an inch or two of the stalks every third or fourth day, the period of freshness may be prolonged.

The following are some of the best-

known kinds of Water Lilies, the words hardy, half-hardy, or tender being added to give an idea as to whether the plants are best grown without heat in the open air, or in open air with heated water, or under glass altogether in heat in a temperature of 70° to 90° when in full growth:—

N. alba.—The common white British Water Lily. There are several varieties, such as *candidissima*, one

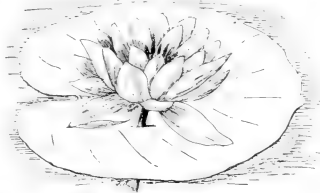


FIG. 283.—*Nymphaea alba*. (†.)

of the best, and broad-petalled; *rosea* (also known as *N. Caspary*), a beautiful pink form; and *plenissima*, in which there are an extra number of petals filling up the centre. All quite hardy. There are several other forms to which distinctive names like *maxima*, *minor*, *rubra*, *delicata*, etc., have been given.

N. amazonum.—Flowers yellowish-white, sweet-scented, 3 to 4 ins. across. Native of Jamaica. Tender. (*Bot. Mag.* t. 4823.) This species and *N. ampla* appear to be the same.

N. ampla speciosa.—Flowers yellowish-white. Native of Jamaica. Tender. (*Bot. Mag.* t. 4469.) The variety *Gerardiana* has leaves 2 ft. across, red-brown above, blue-red and strongly veined beneath; and very large white or cream flowers.

N. aurora.—Pale rose, with golden stamens. Half-hardy. See *N. Laydekeri*.

N. Baumi.—This species from S.W. Tropical Africa is the smallest

known. It has roundish heart-shaped leaves about 1 in. across, and slightly scented white flowers scarcely 1 in. wide. Tender.

N. blanda.—White. Native of Trinidad. Tender.

N. candida (*N. semialptera*).—A Bohemian species like *N. alba*, but with much smaller snowy-white flowers. Hardy.

N. Casparyi.—This is the name now adopted for the plant grown for many years under the name of *N. gigantea*. It differs from the true *N. gigantea* in having smaller and paler blue flowers with less deeply cup-shaped petals. The thinnish leaves are blue-violet beneath, deeply indented and toothed on the margins. Tender.

N. Daubenyanæ.—This has large sweetly-scented pale blue flowers, remaining open all day but closing at night. The leaves are remarkable for producing little plants in the basal sinus. Tender.

N. devoniensis.—A beautiful hybrid between *N. Lotus* and *N. rubra*, with bright rose or red flowers, often over 6 ins. across, from March till November. Tender. (*Bot. Mag.* t. 4665.)

N. edulis (*Castalia edulis*).—White. E. Indies. Tender.

N. elegans.—A native of New Mexico. Flowers fragrant, yellowish-white tinged with lilac or purplish-blue. Tender. (*Bot. Mag.* t. 4604.)

N. fennica.—A native of E. Finland, with small white flowers having ten to fifteen narrow lance-shaped petals. The stigmas are five to nine, pointed with yellow or violet-tipped lobes. (*Gard. Chron.* 1899, xxv. 139.) Hardy.

N. flava.—A native of S. United States, with canary-yellow flowers. Half-hardy. (*Bot. Mag.* t. 6917.)

N. Frœbeli.—A hybrid with sweet-

scented deep crimson-purple flowers. Quite hardy.

N. gigantea.—Flowers 6 to 8 ins. across, blue with golden stamens. Native of Australia. Tender. (*Bot. Mag.* t. 4647.)

N. Gladstonei.—An American seedling with highly fragrant flowers 8 ins. across, and pure white. Hardy.

N. Henkeliana.—This is closely related to *N. stellata*, but “differs in having the leaves sinuate on the margin, and in the colour of the small flowers, which are white or pale rose.” Tender.

N. Holtzei.—An Australian species readily recognised by its flat flowers, which are pale blue, 4 to 5 ins. across, and violet-scented. The thin leaves are oval or roundish, without teeth, and about 10 ins. long and 8 ins. broad. The variety *Eleonore* or *albiflora*, from Melville Island, has pure white flowers. Tender.

N. James Gurney.—Another American seedling, with flowers 6 ins. across, opening pink, but becoming deeper with age. Hardy.

N. Kewensis.—A Kew hybrid between *N. devoniensis* and *N. Lotus*, with rosy-carmine flowers (*Bot. Mag.* t. 6988). Tender.

N. Laydekeri.—This name is given to a group of hybrids (probably between *N. pygmæa* and some other species) raised by M. Marliac, of Temple-sur-Lot, France. The flowers are pale rose, becoming deeper tinted with age. There are many variations to which names have been given. Amongst them may be noted:—*Andreana*, brick-red, shaded with yellow ochre; stamens orange, leaf-stalks spotted with chestnut and streaked with red-brown on the back. *Aurora* may be called the Chameleon Water Lily, as its exquisite flowers change in colour from day to day, being at first rose-yellow, then orange-

red, ultimately becoming deep red. *Blanda*, pure white, 4 to 6 ins. across. *Caroliniana nivea*, flowers pure white, very large and double, very fragrant; stamens rich yellow. *C. perfecta* has salmon-red flowers, very double; petals blunt and perfectly regular. *Ellisiana*, brilliant carmine-purple. *Fulgens*, with dark green outer sepals and crimson-magenta petals. *Fulva* has creamy-yellow flowers tinted and lined with bright red, the stamens being golden-yellow, and the leaves blotched with brown above and spotted with red beneath. *Gloriosa*, a lovely scented flower 7 ins. across, very double, bright red, rosy white at the tips of the lower petals; stamens rich red. *Lilacea*, has lilac-rose flowers scented like Tea Roses. *Lucida*, soft vermilion, with orange stamens, and large chestnut-spotted leaves. *Purpurata*, deep rosy crimson and vivid orange-red stamens. *Robinsoni*, deep rose-coloured flowers, deeper towards the centre, dotted with white, and with orange-red stamens. *Rosea*, flowers medium-sized, tender pink to carmine; stamens orange-red. *Sanguinea*, rich carmine-amaranth or clear carmine; stamens orange-red. *Seignoureti*, delicate creamy-yellow tinted with pale rose and carmine.

N. Lotus (*N. rubra*).—This is the "Sacred Lotus" of the ancient Egyptians. The rhizomes and fruits used to be eaten. It is a beautiful aquatic with large red or white flowers, the sepals being edged with red. (*Bot. Mag.* tt. 1280, 1364.)

The variety *dentata*, from Sierra Leone, has white flowers 6 to 15 ins. across (*Bot. Mag.* t. 4257). The variety *Krumbiegelii* has large bright red flowers with dark red stamens; leaves green above, red beneath. Tender.

N. Marliacea.—This represents

another group of lovely hybrid Water Lilies raised by M. Marliac, and the following forms may be noted:—*alba*, perhaps the largest and best white Water Lily, the flowers being fragrant and freely produced; *carnea*, flesh tinted, with a delicate blush, and scented like vanilla; *chromatella*, with brown mottled leaves when young, and large fragrant flowers of clear yellow, produced from early spring till late autumn; *flummea*, white and reddish-purple, the outer petals pink, deepening in colour towards the centre; *igneae* has flowers about 5 ins. across, of a deep bright rosy crimson surrounding the vivid orange-red stamens; *rosea* is the choicest of the hardy pink Water Lilies, with large cup-shaped flowers of an exquisite soft rose tint much deeper than the variety *carnea*; *rubro-punctata* has flowers 4 ins. across, deep mauve-purple delicately dotted with carmine.

N. micrantha.—A West African Water Lily, having roundish elliptical leaves, purple-brown beneath, and white or creamy flowers, smaller than those of *N. alba*. Tender. (*Bot. Mag.* t. 4535.)

N. Moorianum.—An Australian species with yellow flowers. Tender. (*Gard.* 1903, lxiv. 90.)

N. nitida.—A Siberian species with white scentless flowers 3 to 4 ins. across. Hardy. (*Bot. Mag.* t. 1359.)

N. odorata.—A beautiful North American Water Lily like *N. alba*, with white sweet-scented flowers, but smaller, from June to September. They are sometimes tinted with rose, and are open in the morning, but closed in the afternoon. Hardy. (*Bot. Mag.* t. 819.)

There are several varieties, the best being *exquisita*, deep rosy-carmine; *gigantea*, very large flowers; *grandiflora*, yellow, sweet-scented, leaves

mottled with brown above and spotted red beneath; *rosea*, clear soft pink; *rubra*, dark rose; *sulphurea*, sulphur-yellow, 8 ins. across, leaves marbled.

N. Parkeriana, from British Guiana, resembles *N. odorata*, and has large pure white fragrant flowers with yellow stamens.

N. pygmæa.—This beautiful North Asiatic species is, next to *N. Baumi*, the smallest of the Water Lilies—hardy or tender. Its heart-shaped leaves are 3 to 4 ins. broad, and the sweet-scented white flowers are about 2 ins. across. Quite hardy. (*Bot. Mag.* t. 1525.)

N. scutifolia.—A South African species resembling *N. stellata*, but having broader and blunter petals to its sweet-scented bright blue flowers. Tender. (*Fl. d. Serr.* vi. t. 645.)

N. stellata (*N. cærulea*).—A native of Tropical Africa, with unspotted leaves and delicately scented sky-blue flowers during the summer months (*Bot. Mag.* t. 552).

The variety *cyanea* is a pale blue Indian form (*Bot. Mag.* t. 2058); *versicolor* has white flowers flushed with red (*Bot. Mag.* t. 1189); and *zanzibarensis* has rich purple-blue flowers about 7 ins. across (*Bot. Mag.* t. 6843).

N. stellata and its varieties may be grown in open sunny tanks during the summer months; but they are usually regarded as tender.

N. Sturtevanti is a seedling from *N. devoniensis*, with large flowers of a clear pale rosy-red.

N. tetragona.—A native of N. Asia and parts of N. America, having leaves 4 to 5 ins. across, green above, red beneath. The flowers are pure white with yellow stamens, and measure only 1½ to 2 ins. across. This little Water Lily

does not increase freely from root-stocks, but may be easily raised from seeds. The variety *Helvola* has pale yellow flowers 2 ins. across, while *himalayensis* has white flowers only 1 in. across.

N. thermalis.—The Hungarian Lotus, found in Hungary in the warm river named Pecze. It has sharply toothed leaves, and pure white flowers with a wine-like odour. (*Bot. Mag.* t. 797, as *N. Lotus*.)

N. tuberosa.—A fine free-growing North American species remarkable for its creeping root-stock bearing oblong tubers. The faintly scented white flowers appear in July and August, and are from 4 to 7 ins. across. Hardy. (*Bot. Mag.* t. 6536.)

The variety *rosea* has deliciously fragrant pink flowers; and *Richardsoni* has pure white double flowers.

N. Wm. Doogue.—An American seedling with broad-petalled flowers of a clear shell-pink colour. Hardy.

N. Wm. Falconer.—Another American seedling intermediate between *N. Laydekeri* and *N. Martiacea*. The leaves are reddish when young, but turn to olive-green with red veins, and the ruby-crimson flowers with orange-yellow anthers are about 6 ins. across. Hardy.

N. Zenkeri.—A native of the Cameroons, with small conical rhizomes, long-stalked, deep heart-shaped, lobed and toothed leaves, and white flowers tinged with red, 2 to 3 ins. across (*Gartenfl.* 1906, 519). Tender.

ORNITHOGALUM (*ornis*, a bird; *gala*, milk; application mysterious), STAR OF BETHLEHEM. Nat. Ord. Liliaceæ.—A large genus of plants with tunicated bulbs, radical leaves, and leafless scapes ending in clusters of starry six-petalled flowers.

The hardy species flourish in any

good and well-drained garden soil, and should be planted in bold masses for effect. They are easily increased by offsets. The more tender kinds are grown in sheltered spots or in greenhouses; or they may be grown in the open air during the summer months, after which the bulbs may be lifted and stored in sand or soil until the following spring.

Amongst the most useful kinds for garden purposes mention may be made of the following:—

O. arabicum.—A fine species from S. Europe and N. Africa, having large white pear-shaped bulbs, thickish narrow leaves 12 to 18



FIG. 284.—*Ornithogalum arabicum*. (½.)

ins. long, and clusters of large creamy-white flowers on stems 1 to 2 ft. high in June and July. The bright yellow anthers and the shining black ovary are conspicuous features (*Bot. Mag.* t. 728.) As this is rather tender, it is safer to lift the bulbs in winter in bleak localities. It is an effective plant when grown for conservatory decoration.

The species called **O. corymbosum**,

having white flowers keeled with green, is very closely related (*Bot. Mag.* t. 3179; *Bot. Reg.* t. 906).

O. aureum, from the Cape of Good Hope, has yellow flowers, often orange-tinted, in summer (*Bot. Mag.* t. 190; *Red. Lil.* t. 439). **O. flavissimum** is very similar (*Jacq. Ic.* t. 436). Rather tender.

O. capitatum.—Another South African species with large trusses of white flowers (*Bot. Mag.* t. 5388).

O. lacteum.—A very old South African species, having from twenty to fifty white flowers in dense clusters (*Bot. Mag.* t. 1134; *Bot. Reg.* t. 274; *Red. Lil.* t. 418).

The variety *conicum* has narrower leaves and petals, and the flowers are borne in looser clusters (*Bot. Mag.* t. 3538). Tender.

O. nutans.—This is a free-growing



FIG. 285.—*Ornithogalum nutans*. (½.)

and perfectly hardy species, which produces its loose racemes of droop-

ing white flowers, veined outside with green, about April and May (*Bot. Mag.* t. 269). The variety *Boucheanum* has larger and finer flowers than the type.

O. pyramidale.—A pretty species from S.W. Europe, having bright green lance-shaped leaves, and pyramidal trusses of pure white flowers striped outside with green (*Jacq. Ic.* t. 425; *Red. Lil.* t. 422). Flourishes almost anywhere.

O. pyrenaicum.—A Pyrenean species now naturalised in parts of Britain. Its flowers vary in colour from yellowish-green to greenish-white, and are borne on stalks 2 ft. or more high. (*Red. Lil.* t. 234.) Like *O. pyramidale*, this species flourishes anywhere in shade or sunshine.

O. Saundersiæ.—A native of the Transvaal, related to *O. arabicum*. The scapes are about 3 ft. high, bearing umbels of about twenty flowers, each an inch across, white tinged outside with green. (*Gard. Chron.* 1891, x. 452.)

O. umbellatum.—This is the common "Star of Bethlehem," native of S. Europe, but now naturalised in parts of Britain, in copses and meadows. The narrow leaves, 6 to 12 ins. long, have a white stripe down the centre, and the umbel-like or corymbose clusters of white flowers striped behind with green appear in May and June. (*Red. Lil.* t. 143.) Flourishes anywhere, but the flowers are remarkable for opening an hour or so before midday and closing about 4 P.M.

OSTROWSKIA (after *Ostrowski*, a Russian botanist). Nat. Ord. Campanulacæ.—The only representative of the genus at present is—

O. magnifica.—A splendid hardy herbaceous perennial 4 to 5 ft. high,

from the mountains of Eastern Bokhara, in Central Asia. It has large tuberous roots about 2 ft. long when fully grown, and the lance-shaped acute leaves with toothed margins are borne in whorls or circles on the stems. The charming bell-shaped



FIG. 286.—*Ostrowskia magnifica*. ($\frac{1}{2}$.)

flowers, 4 to 6 ins. across, and with five to nine rounded lobes, appear about July, and are ivory-white in colour, washed and veined with lilac-purple, but some come pure white. In the centre of the flowers the club-like stigma is very conspicuous. The seed-pods are remarkable in appearance: they are top-shaped, with six to eight stiffish radiating projections (the dried calyx teeth), 1 to 1½ ins. long.

This magnificent and gigantic Bell-flower is quite hardy, and flourishes in any good garden soil that is well and deeply dug and enriched with a little manure. It is obvious that

shallow cultivation is useless to a plant that has such large tuberous roots; therefore trenching 3 ft. deep will not be too much, if the best results are desired. Perfect drainage—a most important item considering our cold winter rains—is also thus assured. The simplest way to increase the *Ostrowskia* is from seed. These are ripened freely, and should be sown in cold frames in autumn or spring. The young plants when about 6 ins. high are large enough to place in the open air, but they will not reach the flowering stage for three or four seasons.

OTHONNA (*othone*, linen; in reference to the soft downy clothing of the leaves). Nat. Ord. Compositæ.—There are two or three tuberous-rooted species in this genus, the best-known probably being—

O. tuberosa.—A tuberous-rooted Ragwort from S. Africa, having broadly oval stalked leaves, gradually becoming smaller up the stems. The yellow flower-heads appear about August at the ends of the shoots. (*Bot. Mag.* t. 4038.)

This species requires the protection of a greenhouse in winter, although it may be grown in the open air during the summer months. It may be increased by division of the roots, or by cuttings arising from them.

OXALIS (*oxys*, acid; referring to the taste of the leaves), WOOD-SORREL. Nat. Ord. Geraniaceæ.—A genus containing over two hundred species, mostly herbaceous plants, many of which have fleshy, bulb-like, or tuberous root-stocks, usually three-lobed clover-like leaves (*O. enneaphylla* has nine to twenty leaflets),

and regular tubular or bell-shaped flowers, which are twisted in bud, and only open well in the sunshine, closing in the evening. Stamens ten, five short and five long. Stigmas usually papillose.

The genus *Oxalis* is remarkable, and interesting botanically for having styles and stamens of three different lengths—what have been termed long-styled, short-styled, and mid-styled forms existing. Darwin called attention to this feature in his volume on *The Different Forms of*

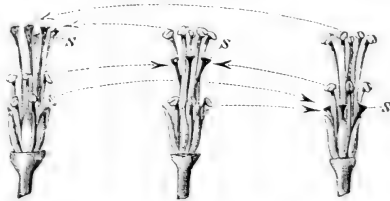


FIG. 287.—*Oxalis* flowers with petals removed, showing long-styled, mid-styled, and short-styled forms. The dotted lines with arrows show the stamens that should supply pollen to the stigmas (S) to ensure legitimate fertilisation.

Flowers on Plants of the Same Species, from which the accompanying figure (Fig. 287) is taken. The dotted lines with arrows show from which stamens the pollen should be taken to properly fertilise the stigmas (S) of other flowers. Styles and stamens of different lengths may and do occur in the various species of *Oxalis*, but individual plants of the same species may have either all long-, short-, or mid-styled blossoms. This peculiarity of the genus has been known for over a century, and numerous examples are to be found in Nicholas Joseph Jacquin's *Monograph of the Oxalis*, a quarto volume with eighty-one plates (mostly coloured), published at Vienna in 1794.

Very few of the Wood-Sorrels, tuberous or otherwise, are really

hardy, although nearly so. Most of them, however, are easily grown in a sunny frame or greenhouse, and when at rest require no attention beyond protection from frost. Some kinds, perhaps more especially the fibrous-rooted ones, which are not dealt with in this volume, increase with great freedom, and often become troublesome, as they encroach upon space required by other plants. In most cases, it is easy to propagate the plants either by dividing the tuberous root-stocks and detaching the offsets, or by sowing seeds. They are effectively grown as edgings to plant stages in the greenhouse, or, when hardy, in nooks in the rock-garden, or as an edging. Light rich sandy soil is suitable in most cases. The following are some of the best tuberous-rooted kinds:—

O. adenophylla.—This species, with bulb-like root-stocks covered with matted fibres, resembles *O. enneaphylla*, but is larger in every way, and the flowers are pink or rose-purple with a darker zone at the base (*Bot. Mag.* t. 8054; *Gard. Chron.* 1906, xl. 14).

This is a very rare species, and one that seems to be difficult to grow—possibly because it is coddled too much. Treated like *O. enneaphylla* it would probably flourish.

O. arenaria.—A Chilian species about 4 ins. high, having scaly rhizomes forming an ovoid tuber as large as a hazel nut, and leaves with three to four deeply heart-shaped leaflets, and bright violet-purple flowers over 1 in. across, three to ten on a stalk, produced in March. Almost quite hardy. (*Bot. Mag.* t. 6193.)

O. articulata.—A distinct Brazilian Wood-Sorrel, with bulb-like root-stocks, grey-green three-foliolate leaves, and umbels of sweet-scented

pale lilac flowers in June and July (*Bot. Mag.* t. 6748). Greenhouse or frame.

O. Bowiei.—A fine bulbous-rooted perennial from S. Africa, having the leaves divided into three bluntly heart-shaped leaflets, slightly downy beneath. About a dozen rich rosy-red flowers, each $1\frac{1}{2}$ ins. across, with a yellowish base, are produced during July and August. (*Lodd. Bot. Cab.* t. 1782; *Bot. Reg.* t. 1585; *Garden*, 1890, i. 755.) This species is often used for bedding-out during the summer months.

O. brasiliensis.—A fine Brazilian species, with brilliant crimson-purple flowers, on stems 6 to 9 ins. high in May and June (*Lodd. Bot. Cab.* t. 1962). Frame or greenhouse.

O. cernua.—A South African species with bulb-like root-stocks, three-lobed leaves, and umbels of yellow flowers about $1\frac{1}{2}$ ins. across (*Lodd. Bot. Cab.* t. 1154). The variety *flore pleno* has double flowers.

O. crenata.—A Peruvian plant with top-like tuberous and scaly



FIG. 288.—*Oxalis crenata*, bulb.

root-stocks, three-lobed leaves, and large yellow flowers striped with purple, the petals being crenulate.

O. Deppel.—A Mexican plant having scaly tuberous root-stocks, four-lobed leaves blotched with purple at the base of the leaflets, and umbels having ten to twenty coppery-red flowers yellowish at the base (*Lodd. Bot. Cab.* t. 1500). Frame. The root-stocks of this plant are cultivated as an article of diet abroad.

O. elegans.—A pretty Peruvian species about 6 ins. high, with broad three-lobed leaves, purple or violet underneath, and large purple flowers in summer (*Bot. Mag.* t. 4490).

O. enneaphylla.—A distinct Wood-Sorrel from the Falkland Islands, with top-shaped tuberous root-stocks sometimes 2 ins. long, and leaves divided into from nine to twenty grey-green leaflets. The white or pale rose flowers, nearly 1½ ins. across, appear in June (but often earlier and later in the year), and are sometimes faintly veined with purple. (*Bot. Mag.* t. 6256.)

This is an excellent plant for moist and shady nooks in the rock-garden. It grows well in rich and well-drained sandy loam.

O. imbricata.—A South African species with three-lobed velvety leaves and rosy flowers. The double-flowered variety (*flore pleno*) is pretty.

O. incarnata.—A South African plant about 6 ins. high, with spindle-shaped root-stocks, and pale rosy flowers. Quite hardy.

O. lasiopetala.—A native of Buenos Ayres, with knotted tuberous root-stocks, and many-flowered clusters of deep rosy flowers (*Bot. Mag.* t. 3932). Frame or greenhouse.

O. lobata.—A tuberous-rooted species from Chili. Leaves grey-green, and flowers yellow spotted with red, produced at various times (*Bot. Mag.* t. 2386). Hardy.

O. luteola.—A South African species with bulb-like root-stocks and yellow flowers nearly all the year round. Hardy.

O. monophylla.—Root-stocks tuberous. Leaves entire lance-shaped and not divided into leaflets. Flowers pale purple with a yellowish base, borne singly on the stems.

O. tetraphylla.—A Mexican species with top-shaped root-stocks. Leaves

composed of four leaflets, and clear violet or lilac-purple flowers. (*Lodd. Bot. Cab.* t. 790.) Hardy. *O. Deppii* is closely related, and is probably only a variety.

O. variabilis.—This South African plant has large bulbous root-stocks, three-lobed dark green hairy leaves, and cup-like flowers 2 ins. across, varying in colour from purple to rosy-lilac, white, and yellow—hence the specific name (*Bot. Reg.* t. 1505; *Bot. Mag.* t. 1683, as *O. grandiflora*; *id.* t. 1712, var. *rubra*). Hardy.

O. violacea.—A North American species about 3 ins. high, having blackish, spindle-shaped root-stocks, three-lobed leaves reddish beneath, and three to nine pink or rose flowers on a stem (*Bot. Mag.* t. 2215). Hardy.

PACHYRHIZUS (*pachys*, thick; *rhiza*, a root). Nat. Ord. Leguminosæ.—The only species of note is *P. angulatus*, a native of the West Indies, with long fleshy tuberous roots, climbing stems 3 to 6 ft. long, furnished with three-lobed sharp-toothed leaves, and bearing spikes of violet pea-like flowers in July and August. *P. tuberosus*, with white flowers, appears to be a variety.

This plant may be grown in the open air in summer, but requires the protection of a greenhouse in winter. It may be increased by seeds, cuttings, or division of the root-stocks. In the West Indies the green seed-pods and the fleshy roots are eaten by the natives.

PÆONIA (after *Pæon*, a physician, who, according to legend, was the first to employ the plant medicinally), PÆONY, PEONY, or PIONY. Nat. Ord. Ranunculaceæ.—A genus consisting chiefly of herbaceous plants, having spindle-shaped, Dahlia-like roots,

much-divided ornamental leaves, and large beautiful flowers, which in the natural single varieties have five sepals, five to ten petals, and two to five carpels, seated on a fleshy disc.

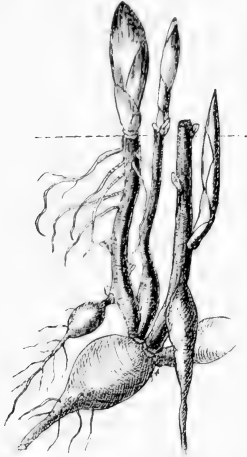


FIG. 259.—Pæony, showing tuberous roots, stems, and buds. (4.)

With the exception of the woody or shrubby Tree Pæony (*P. Moutan*), and perhaps the yellow-flowered *P. lutea*, all other kinds of Pæonies are herbaceous in character; that is to say, the flower-stems are not woody and persistent, but soft or herbaceous, and die down each winter.

There are several natural species of Pæonia referred to below, but they are quite eclipsed by the numerous gorgeous garden varieties that have been raised by crossing and inter-crossing forms of *P. albiflora* and *P. officinalis*, *P. peregrina*, and *P. tenuifolia*, by British and continental growers. Herbaceous Pæonies are excellent plants for the borders, beds,

shrubberies, rockeries, and are not only prized for their magnificent blossoms but also for their foliage, which early in the year assumes brilliant coppery-crimson and purple hues. Some of the commoner varieties are grown extensively in the market-gardens round London beneath the fruit-trees, and the cut flowers sometimes realise good prices. Herbaceous Pæonies are easily grown. They like a rich and rather heavy soil that has been deeply dug or trenched and well enriched with decayed manure. The ground should be kept free from weeds by hoeing, and every autumn a top-dressing of well-rotted manure will be beneficial.

The best time to plant or transplant herbaceous Pæonies is in early autumn—September or October. As growth takes place early in the year, that is a bad time to move the plants unless they are lifted carefully and with a ball of soil round the roots. To secure fine clumps, 3 or 4 feet should separate one plant from another. Freshly moved plants are benefited by having any flower-buds removed the first year. Besides dividing the roots, Pæonies may also be increased from seeds. These should be sown in rich light soil, and if grown on from year to year will eventually produce flowers at the end of five, six, or seven years.

So far as varieties are concerned, the reader is recommended to consult current catalogues for the names. These are always changing with the development of new forms, and it would be therefore a needless waste of space to give a list here. It may, however, be mentioned that all shades of colour are to be found amongst the Pæonies except blue. Yellow is practically confined to *P. lutea*, *P. Wittmanniana*, *P. macrophylla*, *P. Mlokosewitschi*, and *P. Delavayi*, the

latter being a woody species like *Moutan* and *lutea*. It is possible, however, in the course of time that these varieties will come under the sway of the ubiquitous hybridist, and new shades of colour may be anticipated.

Amongst natural or wild species of *Pæonia* the following may be noted:—

P. albiflora (*P. edulis*).—A Siberian species, 2 to 3 ft. high, with fragrant white or pinkish flowers in May and June.

There are numerous varieties, amongst the best being *fragrans*, *sinensis*, or *Humei*, and *atarica*, *uniflora*, *vestalis*, *Whitleyi*, etc. (*Bot. Reg.* tt. 42, 485, 630; *Bot. Mag.* tt. 1768, 1756).

P. anomala (*P. Fischeri*).—A native of N. Europe, Siberia, etc., 2 to 3 ft. high, the leaves being cut into thirty to forty segments. The bright crimson flowers are about 4 ins. across. (*Bot. Mag.* t. 1754.)

P. arietina, from South Europe, grows 2 to 3 ft. high, and has deep red flowers about 4 ins. across, the leaves being downy beneath (*Bot. Reg.* t. 819).

P. Bakeri.—A distinct species about 2 ft. high, with red flexuose stems, twice-ternate leaves, and deep rose flowers over 4 ins. across.

P. Barri.—A species described by Mr Lynch of Cambridge as having leaflets about five times as long as broad, and brilliant red flowers. It is figured in the *Bot. Mag.* t. 2664, and erroneously called *P. Russi*.

P. Broteri.—A native of Spain and Portugal, about 2 ft. high, having reddish stems, smooth ovate leaflets, and rosy-red or whitish flowers.

P. Browni.—A rare North American species, having ternately divided leaves and dull red flowers, paler on the margins and about 1 in. across (*Bot. Reg.* 1839, t. 30).

P. Cambessedesi.—A native of the Balearic Isles and Corsica, with ternate leaves deeply cut into oblong acute segments, purple beneath. The flowers are solitary, deep rosy-pink, and about $3\frac{1}{2}$ ins. across. (*Bot. Mag.* t. 8061.)

P. corallina.—A native of South Europe to Asia Minor, 2 to 3 ft. high, with red-veined, smooth, deep-green leaves, and crimson or rose-red flowers, having six to eight rounded petals 2 to 3 ins. long.

P. coriacea.—This species, with large bright crimson flowers, comes from S. Spain and N. Africa, and has somewhat leathery leaves cut into broadly ovate segments.

P. decora.—A Servian species, with much-divided leaves and crimson flowers with six to eight petals. The variety *Palassi* has narrow oblong leaves and purple flowers; *elatior* has broader leaves, and *alba* has satin white flowers flushed with pink.

P. Emodi.—A fine Himalayan species, 2 to 3 ft. high, with white flowers 3 to 4 ins. across (*Bot. Mag.* t. 5719; *Garden*, 1894, i. 946). This is best grown in warm sheltered spots.

P. humilis.—A French and Spanish species, $1\frac{1}{2}$ to 2 ft. high, with finely divided leaves and bright red flowers (*Bot. Mag.* t. 1422). *P. microcarpa* is closely related.

P. macrophylla.—A rare Caucasian species of the corallina group, and closely related to *P. Wittmanniana*. It has large, biternate, shining, green leaves and very large yellowish-white flowers.

P. Mlokosewitschi.—A Caucasian *Pæony* of vigorous habit, having biternate leaves cut into broadly oblong segments with reddish veins and edges. The flowers are yellow, 4 to 5 ins. across, with deeper yellow stamens and purple stigmas. (*Bot.*

Mag. t. 8173; Gard. Chron. 1908, xlv. 70, f.)

P. mollis.—This grows about 1 ft. high, and has hairy stems and leaves and purple red flowers (*Bot. Reg. t. 474*).

P. officinalis.—This is the Pæony most commonly met with in gardens. It is a native of S. Europe, and grows 2 to 3 ft. high, the smooth deep-green leaves being cut into numerous lance-shaped segments. The flowers are usually red or crimson, but in many cases shade away to white with age. (*Bot. Mag. t. 1784*.)

There are numerous varieties such as *purpurea* (also known as *fulgens* and *splendens*), *incarnata*, *alba*, and one called *anemone-flora plena*, in which the centre petals are united and elevated into a tuft.

P. paradoxa.—A native of Central and S. Europe, 1 to 1½ ft. high, with dense tufts of red-edged leaves and purple-red flowers.

P. peregrina.—A well-known South European plant, 1½ to 2 ft. high, having dull green leaves smooth above, hairy beneath, and bright crimson flowers with five to ten petals (*Bot. Mag. t. 1050*). *P. pubens* is a hairy-stemmed variety (*Bot. Mag. t. 2664*).

P. Russi.—A native of N. Africa, Corsica, etc., 1 to 1½ ft. high, with thinnish leaves and bright crimson flowers (*Bot. Mag. t. 3431*).

P. tenuifolia.—A very distinct Pæony from S.E. Europe, 1 to 1½ ft. high, with creeping root-stocks, and leaves cut into narrow thread-like segments. The flowers are deep crimson, with golden stamens in the centre. (*Bot. Mag. t. 226*.) There are several handsome double-flowered forms.

P. triternata.—Native of S.E. Europe and Asia Minor, 1½ to 2 ft. high, with smooth leaves pale green

above, grey beneath, and rose-red flowers (*Bot. Mag. t. 1441*).

P. Veitchi.—A Chinese species, closely related to *P. anomala*, but has branching stems with several purplish-crimson flowers borne on slightly drooping or arching stems. The plant emits a peculiar odour.

P. Wittmanniana.—A distinct species from the Caucasus and Persia, about 2 ft. high, having twice-ternate leaves, downy beneath, and pale yellow flowers borne on short stalks (*Bot. Mag. t. 6645; Garden*, 1890, ii. 201).

PANCRATIUM (*pan*, all; *kratys*, powerful; in reference to the supposed medicinal virtues). Nat. Ord. Amaryllideæ.—A genus containing about a dozen species of bulbous plants with tufts of ornamental strap-like leaves, and umbels of funnel-shaped flowers, remarkable for having a central cup-shaped corona something like in the Narcissi, but formed from the dilated bases of the stamen filaments.

The Pancratiums are very closely related to the Hymenocallis, and have been much confused with them. With the exception of *P. illyricum* and *P. maritimum* (which are practically hardy south of the Thames), most of the Pancratiums require stove or at least warm greenhouse treatment. They flourish in a compost of sandy loam, fibrous peat, or leaf-mould, and well-rotted cow-manure in about equal proportions, and may be grown in pots, pans, or tubs, or planted in borders in the stove or greenhouse. During growth plenty of moisture is necessary, and the night temperature should not fall below 60° to 65° F. Propagation is chiefly managed by detaching the offsets and growing them on.

Except where otherwise noted, the

flowers of the species mentioned below are all white.

P. canariense.—Bulbs round, 2 ins. through, leaves $1\frac{1}{2}$ to 2 ft. long, 1 to $1\frac{1}{2}$ ins. broad, grey-green. Flower-stalk $1\frac{1}{2}$ to 2 ft. high, with six to ten flowers in an umbel. (*Bot. Req. t. 174.*)

P. guianense.—This plant is now referred to *Hymenocallis tubiflora*—which see.



FIG. 290.—*Pancratium guianense*. (1.)

P. illyricum.—A native of S. Europe, with large pear-shaped tapering bulbs, grey-green leaves, and six to twelve sweet-scented flowers in an umbel in June, on a stem 1 to 2 ft. high (*Red. Lil. t. 153; Bot. Mag. t. 718*).

This handsome plant flourishes in warm sheltered spots in the open air. It should be grown in bold masses to be effective in June.

P. maritimum.—A native of the Mediterranean region, with round bulbs 2 to 3 ins. through, narrow



FIG. 291.—*Pancratium illyricum*. (1.)



FIG. 292.—*Pancratium maritimum*. (1.)

grey-green leaves 2 to 2½ ft. long, and four to eight sweet-scented flowers from July to September, on stalks about 1 ft. high (*Red. Lil.* t. 8; *Bot. Reg.* t. 161). May be grown like *P. illyricum*.

P. trianthum.—A species from Tropical Africa, having a roundish bulb 1 to 2 ins. through, and a long neck with six to eight straight narrow leaves about a foot long. From one to three white flowers are borne on a short slender scape.

P. verecundum.—A warm-house species from N. India, with bulbs about 2 ins. through, and a long cylindrical neck. Leaves 1 to 1½ ft. long, and from two to six flowers on a scape about 1 ft. high. (*Bot. Reg.* t. 413; *Wight, Ic.* t. 2023.)

P. zeylanicum.—A native of Tropical Asia, with round bulbs 1½ to 2 ins. in diameter, and thin lance-shaped glossy green leaves less than 1 ft. long. A single white flower is borne on the slender scapes about 1 ft. high. (*Bot. Reg.* t. 479; *Bot. Mag.* t. 2548.)

PHÆDRANASSA (*phaidros*, gay; *anassa*, a queen). Nat. Ord. Amaryllidæ. — A genus containing five species of bulbous plants with stalked, oblong, or lance-shaped leaves produced after the blossoms. The more or less cylindrical flowers are usually bright red or scarlet, the segments being often tipped with green.

Being natives of the Andes of Ecuador and Columbia, and one from Costa Rica, the Phædranassas are almost hardy enough for growing in the open air in the warmest parts of the Kingdom. They are, however, generally treated as cool greenhouse plants, and grown in pots in a compost of rich yellow loam to which a little coarse sand and leaf-

soil may be added. The bulbs go to rest in winter, during which period of course practically no water is required.

P. Carmioli.—A native of Costa Rica, with round brown-coated bulbs 2 to 3 ins. through, and bright green oblong lance-shaped leaves about 3 ins. broad in the middle, and a foot in length without the stalk. Flowers bright red, edged with pale green, about a dozen being borne on a round scape about 2 ft. high. (*Ref. Bot.* t. 46.)

This species is more tender than the others, and should be grown in the stove or warm greenhouse.

P. chloracea.—This grows wild at an altitude of 12,000 ft. on the Andes of Ecuador. It has bulbs 2 to 3 ins. thick, oblong lance-shaped leaves 8 to 12 ins. long without the stalk, and six to twelve drooping scarlet flowers tipped with green, borne on top of a scape 2 to 3 ft. high during the summer months. (*Bot. Reg.* 1845, t. 17.)

P. Lehmanni.—This comes from the western slopes of the Columbian Andes, at an altitude of 7000 ft. The ovoid bulbs are about 2 ins. thick, and the bright green oblong lance-shaped leaves are 6 to 8 ins. long without the stalk. Flowers bell-shaped, with a green tube, and bright segments not tipped with green. (*Gartenfl.* t. 1138.)

P. schizantha.—A native of the Andes of Ecuador, at an altitude of 10,000 ft. Bulbs ovoid, 1 in. thick. Leaves bright green, 6 to 8 ins. long, appearing at same time (October) as the bright red bell-shaped flowers, which are tipped with salmon colour.

P. viridiflora.—According to Mr Baker this may be only a colour variety of *P. chloracea*. It has, however, smaller bulbs, narrower leaves, shorter flower scapes, and

fewer flowers in an umbel. The blooms are greenish-yellow, becoming a deeper green towards the tips, but without any trace of red.

PHLOMIS (*phlomos*, woolly). Nat. Ord. Labiatae.—There are several more or less ornamental plants belonging to this genus, all remarkable for their woolly or hairy appearance and somewhat wrinkled foliage. The only tuberous-rooted species worth notice is—

P. tuberosa, a native of Eastern Europe, 3 to 5 ft. high, having purplish stems, broadly oval coarsely toothed leaves deeply lobed at the base, and bearing erect spikes, having woolly whorls of rose-purple flowers in June (*Bot. Mag.* t. 1556).

This species will flourish in any good garden soil, and may be grown in borders or shrubberies where there is plenty of space for development. Easily increased by division in autumn or spring; by seeds, or by cuttings of the young non-flowering shoots about July.

PHYTOLACCA (*phyton*, a plant; *lacca*, lac; in allusion to the crimson juice of the fruits). Nat. Ord. Phytolaccaceae.—There are about a dozen species in this genus, but the only one with large, thick, fleshy, turnip-like roots is—

P. decandra.—This is variously known as the "Red Ink Plant," the "Virginian Poke Weed," the "Pigeon Berry," etc. It is a beautiful-looking but rather unpleasant smelling North American perennial, 3 to 10 ft. high, with fleshy poisonous roots, erect purplish stems, and ovate leaves about 6 ins. long, at first green, but changing to beautiful purple tints in autumn. The white flowers, each with ten stamens, appear in erect spikes in summer, and are succeeded

in autumn with spikes of deep purple berries filled with crimson juice, which has been likened to red ink. (*Bot. Mag.* t. 931.)

There is a beautiful variegated form having the leaves striped with white; and another called *luteola*, in which the leaves are heavily striped and mottled with yellow, almost obliterating the green.

Flourishes in any good garden soil, and may be increased by division of the root-stocks or from seeds.

PLACEA (said to be the native Chilian name). Nat. Ord. Amaryllideae.—A genus containing about half a dozen species of tunicated bulbous plants, having few narrow leaves, and somewhat irregular funnel-shaped flowers, having a funnel-shaped membranous cup or corona seated at the base of the oblong segments.

The Placeas are too tender for the open air, except perhaps in the very mildest parts, and even then they would require protection in winter. They do not like being confined in pots, and should therefore be planted in cool greenhouse borders, or in frames from which frost can be excluded. They generally go to rest about August, and commence to grow again in December, and flower about May. The most suitable compost appears to be very sandy loam with plenty of old cow-manure. The plants may be increased by offsets from the old bulbs. They are all natives of Chili.

P. Arzæ.—This has bulbs about 2½ ins. through, and two narrow grey-green leaves under a foot long. The pale yellow flowers tinged and conspicuously striped with claret-purple are borne on scapes about 1½ ft. high.

P. grandiflora.—A fine species with bulbs 1 in. thick, three very pointed

linear leaves $1\frac{1}{2}$ ft. long, and white flowers striped with bright red (*Ill. Hort.* t. 574).

P. ornata.—This has ovoid bulbs about 1 in. thick, two narrow leaves, and peduncles about 6 to 9 ins. high, bearing four to six white flowers conspicuously striped with reddish-purple, the segments being distinctly clawed (*Bot. Reg.* 27, t. 50).

PLAGIOLIRION (*plagios*, oblique; *leirion*, a lily; the flowers being oblique). Nat. Ord. Amaryllidæ.—A genus containing only one species—

P. Horsmanni.—A native of the Columbian Andes whence it was introduced by the late F. Horsman, of Colchester, in 1883. The brown-coated roundish bulbs are about $1\frac{1}{2}$ ins. thick, and the oblong acute leaves (which are developed after the flowers) are 8 to 9 ins. long, and 3 to 4 ins. broad, having a stalk 6 ins. or more long. The white oblique flowers are borne in umbels on stalks from 6 to 12 ins. high in the summer months.

This is still a rare bulbous plant. It may be grown without difficulty in pots or borders, in the stove or warm greenhouse, in a compost of rich sandy loam with a little leaf-mould or old cow-manure. Increased by offsets.

PODOPHYLLUM (*podos*, foot; *phyllon*, leaf; in allusion to the imagined resemblance of the leaves to the feet of certain animals), DUCK'S FOOT, MAY APPLE. Nat. Ord. Berberidæ.—A small genus of hardy perennial herbs with creeping root-stocks and thickish roots. The peltate leaves are palmately nerved and lobed, one or two on a stem. The flowers are white and drooping, have six petal-like sepals; six to nine larger petals, and free stamens

as many or twice as many as the petals.

The species mentioned below all flourish in moist peaty soil in warm sheltered spots, slightly shaded from the sun during the hottest part of the day. They are easily increased by dividing the root-stocks in autumn or in spring; or seeds may be sown when ripe in pots or pans, and sheltered in a cold frame.

P. Emodi.—A Himalayan plant 6 to 12 ins. high, with three to five-lobed leaves 6 to 10 ins. across, the lobes being wedge-shaped, sharply toothed, the whole surface being heavily spotted or washed with purple. Flowers in May white, about 2 ins. across, succeeded in due course by elliptic edible berries 1 to 2 ins. long.

P. peltatum.—Known as the N. American Mandrake, this species grows 6 to 12 ins. high, and has poisonous root-stocks and leaves—the latter being glossy green, wrinkled and divided into five to nine sharply-toothed lobes. The wavy white flowers 2 ins. or more across appear in May, and are succeeded by green crab-like edible fruits 1 to 2 ins. long, assuming a yellowish tint when ripe. (*Bot. Mag.* t. 1819.)

P. pleianthum.—A distinct Chinese species 1 to 2 ft. high, with roundish peltate leaves divided into six to eight toothed lobes. The purple flowers are drooping and are succeeded by blue-green berries which are purple when ripe.

POLIANTHES (*polis*, a city; *anthos*, a flower), TUBEROSE. Nat. Ord. Amaryllidæ.—There is only one species in this genus, namely:—

P. tuberosa.—A beautiful Mexican plant, having a bulb-like tuberous root-stock covered with the broadened bases of the old leaves. These are

12 to 18 ins. long, deeply channelled in the lower half and more or less spotted with reddish-brown on the back. The flowering-stems grow 2 to 3 ft. high, and bear numerous funnel-shaped waxy-white flowers emitting (according to many) a delicious fragrance. (*Red. Lil.* t. 147; *Bot. Mag.* t. 1817; *Bot. Reg.* t. 63.)

Tuberose flourish in rich sandy loam, to which a little leaf-mould or old cow-manure may be added. The bulbs are generally grown in pots, singly or severally, according to circumstances, and may be placed in a cold or warm greenhouse, or even in a stove temperature when root action is established, to secure the quicker



FIG. 293.—*Polianthes tuberosa*, bulb.

The variety *gracilis* has narrower leaves, and longer tubed flowers with narrower segments. The double-flowered variety (*flore pleno*) is the one most generally favoured by gardeners, and hundreds of thousands of plants are cultivated every year to supply the white blossoms to the florists. The double-flowered varieties are divided into African, American, Italian, and Pearl Tuberose, the last named being the favourite with market-growers, the flowers being very double and much larger than the others.



FIG. 294.—*Polianthes tuberosa flore pleno*. (½.)

development of the blossoms. A fair amount of moisture at the root and in the atmosphere is necessary during growth, which starts in spring, and continues during the summer months. By keeping the bulbs cool, however, in spring and summer, growth will be retarded, and the flowers will not appear till a later period of the year as may be desired.

Tuberose may also be grown in the open air during the summer months. The bulbs should be planted out about the end of May or early in June, leaving the upper half uncovered with soil. In the autumn

such bulbs may be taken up and stored in sand in a frost-proof place, until the following year, when they may be replanted if sufficiently sound. Although Tuberoses may be increased by the offsets from the base of the old bulbs, it is on the whole better to purchase newly imported bulbs each year, as they are riper, and more likely to give good results than the bulbs harvested in our fickle climate.

POLYGONATUM (*poly*, many; *gonu*, a knee, a joint; in reference to the numerous joints in the stems), SOLOMON'S SEAL. Nat. Ord. Liliaceæ.—This genus contains more than twenty species of pretty herbaceous plants, with creeping fleshy root-stocks ending in a stalk which bears the strongly-veined leaves. The tubular or bell-shaped flowers droop from the axils of the leaves as a rule. The popular name of "Solomon's Seal" is derived from the circular sunken scar left on the root-stock after the annual leaf-stalks have died away.

The species mentioned below are all easily grown in the open air. They like rich, very moist, and yet well-drained soil, and somewhat dark and sombre situations, to make them luxuriant in foliage and blossom. When grown in hot, dry, sunny places, the Polygonatums do not grow so tall, or flower so profusely, and their beauty is over much sooner than if they were grown in cool, moist, shady spots. Apart from open-air culture, the plants, especially the common Solomon's Seal (*P. multiflorum*), may be forced into early blossom in the greenhouse or conservatory during the first months of the year. The root-stocks are potted up in the autumn, and kept covered up with soil, ashes, sand, or coco-nut fibre

until about Christmas-time. Root action will then be well established, and the plants may be brought into heat as required. In a cut state the sprays last a long time in water.

Propagation is easily effected in early autumn, simply by dividing the root-stocks, taking care to retain a good terminal bud to each severed portion. Seeds may also be sown when ripe, but it is a tedious process raising plants in this way.

P. biflorum.—A pretty Canadian species 1 to 3 ft. high, having ovate or lance-shaped leaves, and greenish-white flowers drooping in pairs from the leaf axils.

P. japonicum.—A Japanese species, 1 to 2 ft. high, with oblong leaves 2 to 3 ins. long, and drooping white flowers tinged with purple in April.

P. latifolium.—A native of Central Europe, 2 to 4 ft. high, having broad bright green leaves and greenish-white flowers drooping in clusters of from two to five in July. The variety *commutatum* from N. America is said to reach a height of 6 to 7 ft., and produces from six to ten white flowers in a cluster.

P. multiflorum (*Convallaria multiflora*).—This is the Common "Solomon's Seal," also known as "David's Harp" and the "Lady's Seal." It is a native of temperate Europe, and is also found wild occasionally in British and Irish woods. The arching stems grow 2 to 3 ft. high, and are furnished with oblong stem-clasping leaves 3 to 5 ins. long. The white flowers appear in May and June, and are more or less deeply edged with green, and later on give place to bluish-black berries.

There are several varieties, such as *flora pleno*, a rare double-flowered one; *striatum*, leaves striped with white; and *roseum*, flowers rosy tinted.

P. officinale (*P. vulgare*; *Convallaria Polygonatum*).—A pretty species found wild sometimes on wooded limestone cliffs in the British Islands. It grows 6 to 12 ins. high, and has oblong stem-clasping leaves 3 to 4 ins. long. The greenish-white flowers appear in May and June, and are succeeded by bluish-black berries. The variety *macranthum* from Japan has larger flowers and grows taller. (*Bot. Mag. t. 6133.*)



FIG. 295.—*Polygonatum multiflorum*. (4.)

P. oppositifolium (*Convallaria oppositifolia*).—A fine Himalayan plant, 2 to 4 ft. high, having opposite oblong pointed leaves, and corymbs of greenish-white flowers ribbed with red, drooping from the stems in April and May (*Bot. Mag. t. 3529*).

The variety *albo-vittatum* has reddish stems, and leaves striped with ivory or yellowish-white. Scarlet berries succeed the blossom in due course.

This species is practically hardy, but may require a little covering of litter or bracken in severe winters.

P. punctatum.—This is found wild on the Himalayas at an altitude of 7000 to 11,000 ft. It has angular, furrowed stems 1 to 2 ft. high, oblong lance-shaped leaves 2 to 3 ins. long, and greenish-white flowers dotted with lilac in May and June. (*Bot. Mag. t. 5061.*)

P. roseum.—A variable species from Central Siberia, with furrowed stems 2 to 3 ft. high, narrow lance-shaped leaves 3 to 5 ins. long, opposite or in whorls, and pairs of rosy cylindrical flowers in May and June (*Bot. Mag. t. 5049*).

P. verticillatum (*Convallaria verticillata*).—A rare British plant, 2 to 3 ft. high, with whorls of narrow lance-shaped leaves fringed with hairs on the margins. The greenish flowers appear in June and July, and are followed by red berries later on. (*Lodd. Bot. Cab. t. 1108.*)

POLYGONUM (*poly*, many; *gonu*, a knee, a joint; in reference to the numerous joints in the stems), KNOT GRASS, KNOT WEED. Nat. Ord. Polygonaceæ.—A large genus of coarse-growing but ornamental plants, some species of which have fibrous, others—those mentioned below—tuberous or rhizomatous root-stocks. They flourish in ordinary garden soil, sometimes so freely that they are apt to invade the space desired for choicer plants. Propagation is easily managed by division of the root-stocks, if necessary.

P. alexicaule.—A fine Himalayan species, 2 to 3 ft. high, having fleshy rhizomes, heart-shaped, pointed, stem-clasping leaves, and racemes of bright rose-red or white blossoms during the summer months (*Bot. Reg. 1839, t. 46*; *Bot. Mag. t. 6500*).

P. Bistorta.—This is the "Bistort" or "Snake-root" of our British meadows and pastures. It has

creeping, twisted, and somewhat tuberous root-stocks, and stems 1 to 2 ft. high, with oblong wavy leaves 3 to 6 ins. long, having winged stalks. The white or pink flowers appear in dense cylindrical spikes from June to September, and are very attractive. A good plant for the border or rockery. The variety *latifolia* is a finer plant in every way.

P. multilorum.—A pretty Chinese and Japanese plant, with tuberous roots, slender, climbing, reddish stems, and smooth, shining, thickish, heart-shaped leaves about 4 ins. long, with bright red stalks and a truncated stipule or ocrea at the base. The small whitish flowers are produced in loose and graceful panicles during the summer months.

POLYMNIA (the name of one of the Muses). Nat. Ord. Compositæ.—This genus contains about a dozen species of no particular garden value. The only one worth mention here is—

P. edulis.—A native of the Andes, having thick Dahlia-like roots, which are cultivated in that region as an article of diet. It has heads of yellow flowers, and is quite hardy.

PUSCHKINIA (after *M. Pouschkin*, a Russian botanist). Nat. Ord. Liliacæ.—A small genus of herbs with tunicated bulbs, the best being—

P. scilloides (*P. libanotica*; *P. sicula*).—A charming little bulbous plant from the Caucasus, Asia Minor, etc., having dark green, lance-shaped, channelled leaves 4 to 6 ins. long, and whitish or very pale blue flowers in April, borne on stems 4 to 8 ins. high. Each flower is about 1 in. across, the segments being distinctly striped with deep blue down the centre. (*Bot. Mag.* t. 2244.) The variety *compacta* has the flowers in denser

and more compact trusses, and looks more effective when planted in bold masses.

The "Striped Squill," as this species is called, likes a deep rich soil of sandy loam and peat or leaf-soil, and should be planted 3 to 4 ins. deep about September or October, in warm sheltered spots in the rock-garden or flower-border. After three or four years, the plants may be lifted, and offsets detached from the old bulbs for purposes of increase.

RANUNCULUS (*rana*, a frog; in reference to the aquatic species growing in places inhabited by frogs). Nat. Ord. Ranunculacæ.—A large genus consisting of annuals and perennials,



FIG. 296.—Ranunculus, fanged roots.

some of which are aquatic, others terrestrial; others again with fibrous roots, and a few with tuberous roots. Amongst the latter the best-known species is—

R. asiaticus.—A native of S. Europe and Asia, about 9 ins. high, with tuberous fanged roots, ternate or biternate leaves divided into toothed or deeply trifid segments. The flowers are variable in colour, being white, red, scarlet, variegated, etc.

From this species what is known as the "Garden Ranunculus" has been evolved by generations of gardeners carefully selecting, hybridising, and intercrossing the best

varieties. The main types are (1) *sanguineus*, from which the "Turkey Ranunculus" has arisen. It has double flowers of orange, yellow, or purple, or variegations of the same, white and blue colours being excluded; (2) *superbus*, in which the flowers are large, single, semi-double, or double, of brilliant shades of colour; (3) *temulobus*, with finely divided leaves and flowers usually white or yellow, rarely purple; and (4) *vulgaris*, from which the "Persian Ranunculus" has been evolved, and in which the double and single flowers are almost of every shade of colour except blue.

As stated in the author's *Practical Guide to Garden Plants*, the above represent the main divisions into which the Asiatic Ranunculus naturally falls. But owing to the careful selection, hybridisation and inter-crossing by British and Continental gardeners, extending over many generations, the wild forms have practically disappeared, and there are now an infinite number of varieties cultivated, being divided into groups known as Scotch, Dutch, French, Italian, Persian, and Turban or Turkish. The Scotch and Dutch varieties are usually the finest forms of the Persian, and are dwarfer in habit, with double flowers edged and spotted. The French and Italian varieties are modifications of the Turkish, and are remarkable for their vigour and size. The Turkish forms are less variegated in colour than the others, and have a large proportion of scarlet, white, yellow, and orange self-coloured flowers somewhat resembling *Pæonies*.

CULTURE.—The roots of the Garden Ranunculus are best planted about the end of February or early in March, but in mild parts of the Kingdom they may also be planted in

October. A loamy soil deeply dug and enriched with well-decayed manure or leaf-mould will generally give good results. An open and fairly sunny situation should be chosen, and when ready for planting, drills about 2 to 3 ins. deep, and 6 to 9 ins. apart should be drawn with a hoe. The "claws" or fangs of the roots should be placed downwards, leaving from 4 to 6 ins. between one plant and another in the rows. The loose soil is then gently raked over the "crowns," prior to which some gardeners place a handful of sand over each plant. The soil should be made fairly firm, either by gently patting down with the spade or carefully treading with the feet. When the leaves appear, the soil should be carefully hoed if necessary to keep down weeds and freshen it up; and later on when growth is in full swing, an occasional watering with weak liquid manure will benefit the plants. In dry seasons attention should be paid to watering, but the surface soil should not be allowed to cake owing to lack of hoeing. Where the ground has been trenched and well manured in advance, and the hoe is used from time to time, there will not be so much necessity for artificial watering, as such a soil usually contains abundant supplies, which arise to the root region by capillary attraction.

After the flowers have withered, and the leaves begin to turn yellow, the time for lifting the tubers is at hand. They should be taken up carefully, and allowed to dry after the soil has been shaken off. Afterwards they may be stored away in a cool, airy, frost-proof place until the planting season again comes round.

Propagation is effected by separating offsets from the older tubers, and also by means of seeds. These should be allowed to ripen thoroughly in the

flower-heads, and should then be sown in cold frames in light, rich, sandy soil; or in the open ground the following April and May. Seedling plants come into blossom when about three or four years old.

Amongst other bulbous-rooted Buttercups, mention may be made of *R. bulbosus flore pleno*, which has beautiful double-yellow flowers; *R. bullatus*, from N. Africa, has a knotty root-stock and sweet-scented yellow flowers; *R. chærophyllus*, a tuberous-rooted species from Portugal, has glistening yellow flowers; *R. Ficaria*, the Lesser Celandine or



FIG. 297.—*Ranunculus Ficaria*. (3.)

Pilewort, has clusters of club-like roots, and bright yellow flowers from March till May. Though pretty, it is a weed in many gardens, and is very difficult to eradicate; *R. gramineus*, 6 to 12 ins. high, with clusters of thickish roots and yellow flowers, which are "doubled" in the variety

flore pleno; *R. pedatus*, from E. Europe, grows about 1 ft. high, and has bright yellow flowers in May and June (*Bot. Mag.* t. 2229); and a few others not so well known.

R. carpathicus is a showy species with creeping root-stocks. It grows about a foot high, and has roundish lobed leaves and golden-yellow flowers in May. It is a native of Hungary. (*Bot. Mag.* t. 7266.)

REINECKIA (after *J. Reineck*, a clever German gardener). Nat. Ord. Liliaceæ.—The only species known is—

R. carnea.—A pretty perennial from China and Japan, having creeping root-stocks, tufts of narrow, lance-shaped, pointed leaves 6 to 12 ins. long, and spikes of sweet-scented flesh-coloured flowers in April and May; the perianth being tubular, with six oblong acute segments (*And. Bot. Rep.* t. 361; *Bot. Mag.* t. 939). In the variety *variegata*, the leaves are beautifully striped with green and yellowish-white (*Ill. Hort.* t. 323).

This species and its variety flourish in good garden soil in warm sheltered spots in the border or rock-garden, and may be increased by division of the root-stocks in early autumn.

RICHARDIA (after *L. C. Richard*, a French botanist). Nat. Ord. Aroideæ.—A genus containing about a dozen species of perennial herbaceous plants, having thick, fleshy, and more or less tuberous root-stocks, large sagittate leaves, and male and female flowers borne on an erect cylindrical or club-like spadix enclosed by a large and ornamental funnel-shaped spathe. They are all natives of S. Africa. The name **ZANTEDESCHIA** is being adopted by continental botanists for *Richardia*.

The *Richardias* or Arum Lilies are

still popularly known amongst gardeners as *CALLAS* or *ARUMS*—genera very closely related but differing in certain botanical characters. Generally speaking, the *Richardias* mentioned below require to be grown in a warm greenhouse, although some of them are almost hardy in the most favoured parts of the Kingdom, if the crowns of the tubers can be kept free from frost. They all like a rich loamy soil and plenty of moisture at the root when in full growth. A little well-decayed cow-manure, and a handful of sand with the loam will be an advantage. One great point to keep in mind in growing *Richardias* is, when once growth commences the temperature should not be allowed to jump up and down erratically. Nothing checks growth quicker than a sudden drop in the temperature at night-time, especially when the spathes or “flowers” are showing. The plants then remain almost stationary in growth, and unless carefully handled soon become a prey to green-fly and other troubles. Perhaps this applies more particularly to plants that are being forced into early bloom for Christmas, Easter, or Whitsuntide, than when the plants are grown cooler and under more natural conditions.

Arum Lilies are most easily propagated by the offsets from the old tubers. Of late years, however, such kinds as *R. Elliottiana*, *R. hastata*, and *R. Pentlandi* have been raised from well-ripened seeds. These should be sown when ripe, or in early spring in well-drained pots or pans in rich sandy loam. The temperature at night should not fall below 50° F., and the air should be fairly moist. During the daytime the temperature may be 5° or 10° higher, but the young plants should be shaded from strong sunshine. Owing to the

brittleness of the roots it is better not to disturb the seedlings for at least twelve months after germination. The seeds should therefore be sown a couple of inches apart at first, so as to allow sufficient space afterwards for development.

The kinds mentioned below are all noteworthy:—

R. Adlami.—This is rather a fine species, having green hastate leaves,



FIG. 298.—*Richardia Adlami*. (4.)

and large creamy-yellow spathes with a deep purple blotch at the base. It flowers during the summer months.

R. africana (*R. aethiopica*; *Calla aethiopica*).—This is commonly known as the *Arum Lily*, the *Trumpet Lily*, and the *Lily of the Nile*. It is a native of S. Africa, and grows from 2 to 3 ft. high, having tuberous rootstocks, large green sagittate leaves, and beautiful white trumpets or spathes enclosing a cylindrical yellow

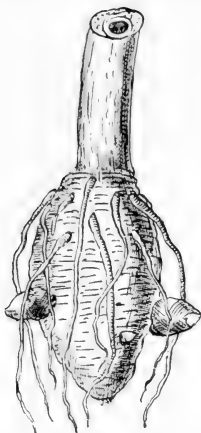


FIG. 299.—*Richardia africana*, tuber. ($\frac{1}{2}$.)



FIG. 300.—*Richardia africana*. ($\frac{1}{2}$.)

spadix in the centre. The plants may be had in flower at almost any period of the year according as they are grown in warm or cool surroundings. (*Bot. Mag.* t. 832; *Garden*, 1888, i. 654.)

There are variations from the type, but the most distinct form is that known as "Little Gem," which is about half the size of the ordinary variety in foliage and flowers, and "Childsi," another dwarf but very free-flowering form (*Gard. Chron.* 1903, xxxii. 173, 188, 195). The variety *Nicolai* is a remarkably strong grower, with scapes $4\frac{1}{2}$ to 5 ft. high, and spathes 1 ft. or more across (*Gartenfl.* 1903, 201).

When Arum Lilies have finished their growth for the season, they should be allowed to die down gradually, giving but little water. Many growers plant them out during the summer months, and lift and repot them again about September. Others leave them to dry off in the pots, these being placed on their sides and stacked up on each other, facing south. When growth recommences, the tubers are shaken out of the old soil, and repotted into fresh rich loam.

R. albo-maculata.—A species about 2 ft. high, having rather narrow arrow-headed pointed leaves decorated with white oblique and translucent stripes. The flowers are like those of *R. africana*, but smaller, and tinged with green. (*Bot. Mag.* t. 5140; *Fl. d. Serr.* t. 2258; *Gartenfl.* t. 462.) This species crossed with *R. Elliottiana* has produced a hybrid called *R. × Lathamiana* (*Gard.* 1903, lxiii. 419; lxiv. 2); and crossed with *R. Elliottiana Rossi* has produced a hybrid known as *R. × leuco-rantha*.

R. aurata, with spotted leaves and large yellow spathes, is considered to

be a hybrid between *R. hastata* and *R. albo-maculata*. Crossed with *R. Elliottiana* it has produced a hybrid called *R. Taylori* (*Gard. Chron.* 1904, xxxv. 226).

R. cantabrigiensis.—A hybrid between *R. Rehmanni* and *R. melanoleuca*, showing a deeper pink spathe than in *R. Rehmanni*—the seed-bearing parent.

R. Elliottiana.—A splendid species about 2 ft. high, having dark green leaves heavily blotched with white,

for about a year. They will then be fine and sturdy, and if potted up

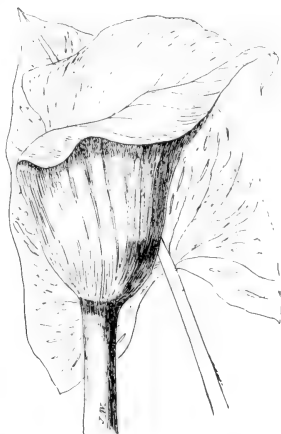


FIG. 302.—*Richardia Elliottiana*. (♂.)

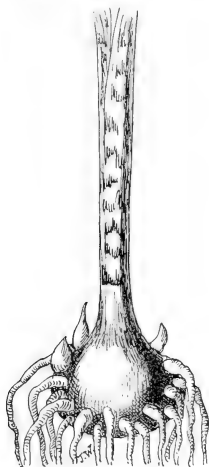


FIG. 301.—*Richardia Elliottiana*, 1-year-old seedling. (♂.)



FIG. 303.—*Richardia Elliottiana*, twin spathe. (♂.)

and pure yellow spathes of good size, but not so large generally as those of *R. africana* (*Garden*, 1894, ii. 989). Easily raised from seeds and by offsets. The seeds should be sown as soon as ripe in summer in rich sandy soil, and kept warm and moist. They germinate freely, and if not sown too thickly (about a couple of inches apart) the young plants may be left in the seed-pan

singly into pots and grown on they will make fine flowering-plants the third year from seed. Like *R.*

africana, this species frequently throws double spathes, as shown in the sketch. There is a stocky variety known as *Rossi*, and another called "*Mrs Roosevelt*," having pale lemon-yellow spathes.

R. hastata.—This species grows about 2 ft. high, and has oval hastate pointed leaves, green and unspotted. The spathes are of a greenish-yellow and of good size. (*Bot. Mag.* t. 5176.)

R. intermedia.—A strong-growing, compact, and free-flowering plant with broadly heart-shaped leaves dotted with white, and stalks marbled white and rose. Spathe very dark yellow, with small black blotch at base.

R. Lutwychei.—A species closely related to *R. hastata* and *R. Pentlandi*, having triangular, sagittate, pointed, green unspotted leaves with heavily spotted stalks. The spathes are bright yellow with a large deep purple blotch at the base. Now considered to be identical with *R. hastata*. (*Rev. Hort.* 1896, t. 60; *Gard. Chron.* 1893, xiii. 568.)

R. macrocarpa.—This is recognised by its very large fruits and medium-sized spathes, pale green outside, white within.

R. melanoleuca.—This species grows about 2 ft. high, and has oblong or oval sagittate-hastate leaves covered with white translucent blotches. The spathes are yellow, enclosing a white spadix and having a purple blotch at the base. (*Bot. Mag.* t. 5765.)

R. Pentlandi.—A fine species in the way of *R. Elliottiana*, but with larger, thicker, and unspotted green leaves, and large bright golden-yellow flowers (*Bot. Mag.* t. 7397; *Garden*, 1895, ii, 1033).

R. Rehmanni.—A little-known but distinct species, having lance-shaped

leaves, and rather small tubular spathes tinted with dull rose-purple (*Bot. Mag.* t. 7436). The variety *speciosa* is dwarfer and stronger-growing than the type, and the spathe is bright red; in the variety *coccinea* the spathe is scarlet



FIG. 304.—*Richardia Rehmanni*. (3.)

(*Gartenfl.* 1906, t. 1552). This species crossed with *R. melanoleuca* has produced a hybrid known as *R. cantabrigiensis*.

R. Sprengeri.—This species from the Transvaal is remarkable in having leaves truncated (not hastate or cordate) at the base, and the yellow spathes are broader than in other species (*Gard. Chron.* 1902, xxxii. 350).

RIGIDELLA (*rigidus*, stiff; in reference to the flower-stalk). Nat. Ord. Iridæ.—A genus containing only a few species of half-hardy bulbous plants, closely related to the

Tigridias. They may be grown in a greenhouse or in the open air in the milder parts of the Kingdom, but must be protected from frost. They like a compost of rich sandy loam and peat, and may be increased by offsets in spring; and also by seeds sown when ripe, or in spring in gentle heat. The following species are worth notice:—

R. flammea.—A Mexican plant 3 to 5 ft. high, with broad equitant strongly plaited leaves, dilated and sheathing at the base, and 18 to 24 ins. long. The drooping flowers are borne in dense umbels and appear about May and June, and are of a bright red, the outer segments being distinctly striped with deep purple at the base. (*Bot. Reg.* 1840, t. 16; *Pact. Mag. Bot.* vii. 247.)

The variety *orthantha* (once regarded as a distinct species) grows about 2 ft. high, and has bright scarlet flowers having a triangular blotch at the base of each perianth segment (*Fl. d. Serr.* t. 46).

R. immaculata.—This Guatemalan species is close to *R. flammea*, from which, however, it differs in being only about 2 ft. high, having a more slender habit, and in the scarlet flowers being unspotted and having a wash of yellow on the inner segments (*Bot. Reg.* 1841, t. 1; *Fl. d. Serr.* tt. 502, 2215).

ROMULEA (after *Romulus*, the reputed founder of Rome). Nat. Ord. Iridææ.—This genus contains over thirty species of plants with tunicated corms, bristle-like leaves, and solitary flowers having a regular six-parted perianth.

About a dozen species are natives of the Mediterranean region, the others being found in Southern and Tropical Africa. As garden plants they are little known, and are con-

finied almost entirely to botanical collections. Most of the species are tender and require the protection of a greenhouse or cold frame. The cultural requirements are the same as for their relatives the *IXIAS*—which see.

The following kinds (at one time mostly known under the generic name of *TRICHONEMA*) may be mentioned as worthy of note:—*R. bulbocodioides*, flowers bright yellow tinged with green outside (*Bot. Mag.* t. 1392); *R. Bulbocodium*, flowers lilac with a yellow throat (*Bot. Mag.* t. 265); *R. citrina*, yellow, unstriped; *R. Columnæ*, pale lilac with deeper lilac veins, tinged outside with green; *R. rosea*, reddish-lilac with a yellow throat, faintly striped purple outside (*Bot. Mag.* t. 1225). The variety *pubica* has a white throat (*Bot. Mag.* t. 1244); and *speciosa* has larger flowers with outer segments distinctly striped with black (*Bot. Mag.* t. 1476).

R. Macowani, one of the finest species, with funnel-shaped flowers, bright yellow at the base, unstriped, but tinged with green outside (*Gard. Chron.* 1887, i. 180, f.).

ROSCOËA (after *Wm. Roscoe*, the founder of the Liverpool Botanic Gardens). Nat. Ord. Scitamineæ.—This genus contains about half a dozen species of ornamental-leaved herbaceous plants with thick fleshy roots, and terminal spikes or clusters of purple, blue, or yellow flowers, having an elongated tubular calyx and corolla, the latter having an erect incurved and concave upper segment and spreading side segments.

R. gracilis, with yellow flowers, is now known as *Cautleya lutea* (*Bot. Mag.* t. 6991).

R. purpurea.—This is the best-

known species. It comes from the Himalayas, and has clusters of spindle-shaped tuberous roots, from which arise leafy striated stems less than a foot high, the leaves being stalkless, lance-shaped, wavy and pointed, and 6 to 8 ins. long, while the flowers are pale purple or lilac (*Bot. Mag.* t. 4630; *Bot. Reg.* 1840, t. 61). The variety *sikkimensis* is a mere colour variety.



FIG. 295.—*Roscoea purpurea*. (1.)

This species flourishes in a compost of rich fibrous loam and well-decayed manure or leaf-soil. It appears to be perfectly hardy in the milder parts of the Kingdom, and is easily increased by division of the root-stocks in spring.

SAGITTARIA (*sagitta*, an arrow; in allusion to the characteristic shape of the leaves), **ARROWHEAD**. Nat. Ord. Alismaceæ.—A genus of ornamental aquatic or marsh plants, some of which have tuberous or stolon-bearing root-stocks.

S. montevidensis is a beautiful aquatic from Buenos Ayres. It has large fleshy, tuberous root-stocks, emitting stolons from which other tubers arise, somewhat in the same way as potatoes. The large sagittate leaves have stalks 3 to 6 ft. long, and the pure white flowers with a crimson blotch at the base of the three segments are borne in whorls on stems 3 to 5 ft. high during the



FIG. 306.—*Sagittaria montevidensis*.

summer months. (*Bot. Mag.* t. 6755.)

This majestic plant is best grown in a warm greenhouse in rich muddy soil, and the leaves should be syringed frequently to keep them bright and clean. Easily increased by division of the root-stocks.

S. sagittifolia.—A beautiful British and European aquatic, with stolons which produce tubers about the size of an olive. The bright green arrow-shaped leaves have three-sided stalks 1 to 1½ ft. long, and the white flowers with purple claws are

borne from July to September in distant whorls, on scapes 1 to 2 ft. high.

The double-flowered variety, sometimes known as *japonica flore pleno*, is a handsome plant with roundish heads of white flowers.

This species and its variety are quite hardy, and may be grown on the margins of lakes, streams, ponds, etc., where they will be more or less submerged. The double-flowered variety can only be propagated by division. The single-flowered kinds in the same way, and also by seeds.

S. sinensis (*S. gigantea*; *S. lancifolia*), from China, is a beautiful plant about 3 to 5 ft. high, with lance-shaped leaves and white flowers, having the greenish outer segments flushed with rose (*Bot. Mag.* t. 1631). May be grown like *S. sagittifolia*.

SALVIA (*salvo*, to save; in allusion to the medicinal virtues), SAGE. Nat. Ord. Labiateæ.—A large genus containing some 450 species, many ornamental and easily grown. The only tuberous-rooted species worthy of note is—

S. patens (*S. spectabilis*; *S. macrantha*).—A beautiful hairy Mexican perennial, about 2½ ft. high, having ovate-triangular leaves with rounded teeth and lobed at the base. The deep blue flowers, over 2 ins. long, are borne in whorls on erect spikes during the summer and autumn months. (*Bot. Mag.* t. 3808.)

This species may be grown in the open air during the summer months, and in the milder parts of the Kingdom may be left in the open ground so long as the blackish spindle-shaped roots are protected from frost in the same way as Dahlias. It may be increased from seeds sown in gentle heat in spring; from cuttings in the same way as

Dahlias; and also by division of the root-stocks.

SANDERSONIA (after *J. Sanderson*, a secretary of the Natal Horticultural Society). Nat. Ord. Liliaceæ. The only species is—

S. aurantiaca, a native of Natal, having a tuberous root-stock from which arise climbing herbaceous stems 3 to 6 ft long, furnished with alternate, stalkless, lance-shaped leaves. The bell-shaped or inflated flowers, with six shallow lobes, are of a beautiful orange colour, drooping from the axils of the leaves in July and August. (*Bot. Mag.* t. 4716.)

This pretty plant is best grown in a warm greenhouse in a compost of rich sandy loam with a little leaf-soil or well-decayed manure, and may be trained up pillars, or on trellises in the same way as the Gloriosas or Littonias, to which it is closely related. In autumn the stems die down, after which the root-stocks should be kept dry until the following spring. In the milder parts of the Kingdom this plant may be grown in the open air, the roots being taken up and stored for the winter.

SANGUINARIA (*sanguis*, blood; in reference to the red juice). Nat. Ord. Papaveraceæ.—The only species is—

S. canadensis, popularly known as the "Blood Root" or "Red Puccoon." It is a native of N. America, and grows 3 to 6 ins. high, having a thickish creeping root-stock and solitary, rounded, palmately veined leaves with dentate margins. The beautiful white flowers appear in April and May, and consist of two sepals and eight to twelve petals arranged in two or

three circles. (*Bot. Mag.* t. 162.)
The variety *grandiflora* has larger
flowers.



FIG. 307.—*Sanguinaria canadensis*. (½.)

The Blood Root flourishes in a moist loamy soil in somewhat shaded places in the rock-garden or border, and may be increased by division of the root-stocks in early autumn or spring. Seeds may also be sown in pots or pans when fully ripe, or in spring in a cold frame, and should be left for a year before transplanting, as the roots are so brittle.

SAUROMATUM (*saura*, a lizard; in allusion to the speckled interior of the spathe). Nat. Ord. Aroideæ.—A genus containing about half a dozen species of herbaceous perennials having tuberous root-stocks, solitary, deeply divided leaves with long stalks, and somewhat evanescent spathes in the centre of which is the spadix bearing the male and female flowers.

The species mentioned below flourish in a warm greenhouse in a compost of light rich sandy loam and peat or leaf-soil, and like plenty of moisture when in growth. They may be increased by offsets from the older tubers.

S. guttatum (*Arum venosum*).—A Himalayan species about 2 ft. high

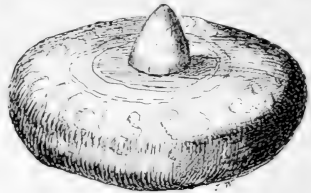


FIG. 308.—*Sauromatum guttatum*, sprouting tuber. (½.)



FIG. 309.—*Sauromatum guttatum*. (¾.)

with round flattish tubers, and leaves deeply divided into pointed oblong lance-shaped segments. The greenish spathes, washed with yellow inside

and irregularly blotched with deep purple, appear about May and June. (*Bot. Mag.* t. 1017.)

This is the plant to which the name "Monarch of the East" has been applied. The tubers, instead of being grown in a greenhouse as recommended, are often placed in fancy bowls, or even on the mantel-shelf, without any water whatever. If the temperature is high enough, 65° to 70° F. growth commences, and the nourishment stored up in the tuber is sufficient to produce the flower - spathes without further attention.

Other species are *S. brevipes*, from the Sikkim Himalayas, with purple-tinted spathes (*Gard. Chron.* 1903, xxxiv. 93; *Bot. Mag.* t. 7940); *S. pedatum*, with dark purple and yellowish spathes (*Gartenfl.* t. 495); *S. punctatum*, green and purple; and *S. nervosum*, purple and yellow (*Bot. Mag.* t. 4465).

SAXIFRAGA (*saxum*, a stone; *frangere*, to break; in reference to the roots entering the crevices of rocks which are thus split). Nat. Ord. Saxifragaceæ.—Out of some 160 species, perhaps the only ones to mention in this work are—

S. granulata fl. pl. is a charming Saxifrage 6 to 12 ins. high, with beautiful white double flowers in April and May. It has small white bulb-like bodies forming at the base of the stems. The single-flowered species is a native of Britain, and is popularly known as "Fair Maids of France," "First of May," and the "Meadow Saxifrage."

S. peltata, popularly known as the "Umbrella Plant." It is found wild on the borders of lakes and streams in California, and has a large fleshy creeping root-stock, from which arise roundish shield-like lobed leaves

12 to 18 ins. across, and borne on downy stalks 1 to 2 ft long, the lobes being cut and sharply toothed. The white or pale pink flowers appear in April and May. (*Bot. Mag.* t. 6074; *Fl. d. Serr.* t. 2441; *Gartenfl.* t. 735.)

This is by far the largest and most noble looking of the Saxifrages. It is quite hardy, and will flourish in good soil near the edges of ponds or streams, etc., and also in moist parts of the flower-border. The circular leaves, being deeply depressed in the centre where the stalk beneath joins the blade, hold a good deal of water after rain, and in the autumn they assume attractive tints of red and brown. This Saxifrage may be increased by seeds and division of the root-stocks.

SCHIZOSTYLIS (*schizo*, to cut; *stylos*, a column or style; in reference to the divided thread-like styles). Nat. Ord. Irideæ.—The best-known species is—

S. coccinea, a handsome S. African plant, 2 to 3 ft. high, with fleshy and slightly swollen root-stocks, sheathing sword-like leaves, and spikes of crimson-scarlet flowers from September to December, each about 2 ins. across (*Bot. Mag.* t. 5422).

This pretty plant flourishes in rich, moist loam, peat, leaf-mould, and silver sand in about equal proportions. It is not hardy, except in the very mildest parts of the Kingdom, and even then it must be protected from frost. Grown in pots or pans in the greenhouse, it is very effective during the later months of the year. The stock is best increased by dividing the leek-like tufts, and the stolons which arise from their bases. Fig. 310.

SCILLA (*skilla*, *squilla*, a squill), SQUILL, BLUEBELL. Nat. Ord. Liliaceæ.

—A large genus of herbaceous plants, with tunicated bulbs, more or less strap-shaped leaves, and six-petalled flowers borne on simple leafless scapes.

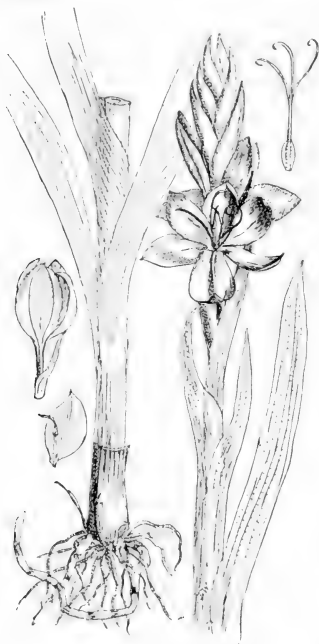


FIG. 310.—*Schizostylis coccinea*. (A.)

Most of the Scillas are perfectly hardy, but there are several which require the protection of a cold frame or greenhouse. All kinds are easily grown in rich sandy soil, or in any good garden mould, the hardy ones being particularly valuable for planting in thousands in the grass, or beneath deciduous and early-flowering trees and shrubs, or on the margins of borders, or nooks in the rock-garden; and in all these places may

be associated with their close relatives the Chionodoxas. The best time for planting is usually at the end of September and during October, and as most of the species flower from February and March till May and June, they may be looked upon as excellent spring-flowering plants. When grown in pots or pans, the Scillas are useful for the decoration of the cool greenhouse early in the year, the blossoms being much cleaner and brighter looking than those that are tarnished by exposure to the weather. All Scillas are readily increased by offsets from the older bulbs.

The following are some of the best species, the tender ones being indicated, all others being hardy:—

S. Adlami.—A native of Natal, with small mauve-purple flowers (*Gard. Chron.* 1891, ix. 521).

S. amœna (*Hyacinthus stellaris*).—This pretty species, known as the "Star Hyacinth," is a native of Central Europe, and has roundish violet-coated bulbs, lance-shaped channelled leaves 6 to 9 ins. long, and racemes of bright indigo starry flowers, borne from March to May on stems 4 to 6 ins. high (*Bot. Mag.* t. 341).

S. autumnalis, a British and European species, with rosy-lilac starry flowers produced in August. The white-flowered variety *albus* is a somewhat choicer garden plant.

S. axillaris.—A strong-growing species with leaves a foot long and $2\frac{1}{2}$ ins. broad, spotted with brownish-purple near the base beneath. Flowers whitish outside, with a green keel and bright violet edges with white inside. (*Gard. Chron.* 1903, xxxiii. 386.)

S. Bertholeti.—A rare species from Tropical Africa, with strap-shaped leaves 6 to 12 ins. long, and bell-shaped pale lilac flowers, from ten

to twelve in a truss (*Bot. Mag.* t. 5308). Greenhouse.

S. bifolia.—A Central European species, with narrow lance-shaped leaves 4 to 8 ins. long, and deep blue somewhat starry or bell-shaped flowers in February and March (*Bot. Mag.* t. 746).

There is a white-flowered variety (*alba*); a rose-coloured one with a tint of violet (*rosea*); *splendens* has intense cobalt-blue flowers; and *taurica*, of a rich violet colour, from the mountains of Asia Minor. One of the earliest-flowering forms is *ruberrima*, the flowers of which are much brighter in bud than those of the type; they also open reddish rather than blue (*Gard. Chron.* 1906, xxxix. 165).

S. Buchanani.—A species from Nyassaland, with small bulbs, lance-shaped green leaves a foot long, and a flexuose scape 8 ins. high, bearing a dense raceme of green flowers with purple filaments (*Gard. Chron.* 1893, xiii. 568). Must be grown in a greenhouse.

S. chinensis (*Barnardia scilloides*).—A pretty but little-known Chinese Squill about 9 ins. high, with spikes of rosy-pink flowers produced from June to August (*Bot. Reg.* t. 1029; *Bot. Mag.* t. 3788). This species should be grown in a frame or greenhouse, or in a warm sheltered spot if in the open air.

S. cilicica.—This is like *S. sibirica*, but has longer and broader leaves, and the flowers are more intensely blue, but smaller (*Gard. Chron.* 1908, xlv. 194, f.). **S. Hohenbackeri** seems to be intermediate between this and *S. sibirica*.

S. concinna.—A South African species with narrow leaves 8 to 12 ins. long, heavily spotted with purple behind. The flowers are oblong, bell-shaped, rosy-purple, produced

in spring twenty to thirty on a scape. (*Bot. Reg.* t. 235). Greenhouse or frame.

S. Cooperi.—Another S. African Squill, with leaves 9 to 12 ins. long, striped and spotted with purple. The drooping bell-shaped bright purple flowers appear in spring, thirty to fifty in a truss (*Bot. Mag.* t. 5580). Greenhouse or frame.

S. Cupani.—A hardy Sicilian plant, with strap-shaped leaves 3 to 4 ins. long, finely ciliated on the edges. The blue flowers are borne in loose racemes in May and June. (*Bot. Reg.* t. 1878.)

S. festalis (*S. nutans*; *Hyacinthus non-scriptus*).—This is the Common

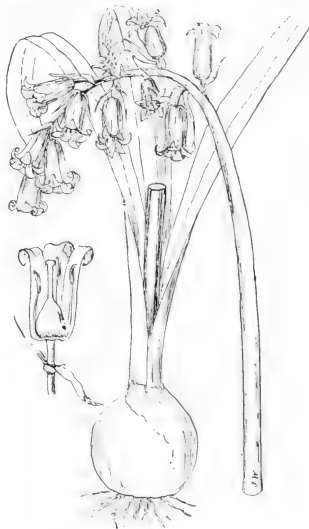


FIG. 311.—*Scilla festalis*. (½.)

Bluebell or Wild Hyacinth of British woods and copses. It has whitish pear-shaped bulbs, deep shining green leaves 9 to 18 ins. long, and racemes

of drooping bell-shaped blossoms from April to June, and varying in colour from bluish-purple to white or pink.

There are several varieties of the Common Bluebell, such as *alba*, white; *rosea*, rose-red; *rubra*, deep red; *bracteata*, with long bracts at base of pedicels; and *cernua*, with broader leaves and larger bright blue flowers.

The Bluebell is an excellent plant for naturalising purposes, and the bulbs should be planted from 4 to 6 ins. deep early in autumn, and in thousands for this purpose.

S. hispanica (*S. campanulata*).—This is the beautiful Spanish Bluebell



FIG. 312.—*Scilla hispanica*. (1.)

from the Iberian Peninsula, having narrow strap-shaped leaves, and blue bell-shaped flowers, borne in May on slender scapes 12 to 18 ins. high (*Bot. Mag.* t. 127).

There are several varieties, such as *alba*, with beautiful white flowers, and one of the best; *aperta*, blue

striped with white; and others such as *Blue Queen*, porcelain blue; *Excelsior*, azure blue; *cærulea major*, pale blue, late flowering; *Rosalind*, pink; *rosea major*, rose pink, large; *Riverslea*, pale blue, early; *Sky Blue*, tall, self-blue, late; etc.

S. hyacinthoides.—A pretty Squill from S.W. Europe, with leaves 12 to 18 ins. long, minutely ciliated on the margins. The scapes are 1 to 2 ft. high, and in April and May bear from fifty to one hundred bluish-lilac or gentian-blue, bell-shaped flowers. (*Bot. Mag.* t. 1140.)

S. italica.—A charming Italian bluebell with flaccid, strap-shaped leaves 4 to 8 ins. long, and dense racemes of blue flowers in April and May (*Bot. Mag.* t. 663).

The variety *purpurea* has deeper coloured flowers.

S. lanceæfolia (*Lachenalia lanceæfolia*).—A S. African species, with leaves 4 to 6 ins. long, spotted on the upper surface. The roundish bell-shaped flowers, purple inside and greenish outside, are borne in dense clusters about April and May (*Bot. Mag.* t. 643). Greenhouse.

S. laxiflora.—A S. African species with lance-shaped leaves, and green flowers with purple filaments (*Gard. Chron.* 1891, ix. 668).

S. leucophylla.—A very distinct species from Persia, having bright purple flowers tipped with green (*Gard. Chron.* 1893, xiii. 506).

S. lilio-hyacinthus.—This fine Pyrenean Squill has been known for generations, but it is still rare in gardens. It is easily recognised by its rather large scaly bulbs, broad bright green leaves, and its blue starry flowers appearing in April and May on stems about a foot high. There is a still scarcer white-flowered variety, *albus*.

S. messeniaca, from Greece, has

leaves 4 to 9 ins. long, $\frac{1}{2}$ to 1 in. broad, and dense racemes of small blue flowers with spreading segments (*Bot. Mag.* t. 8035).

S. monophylla (*S. pumila*).—A pretty Spanish Bluebell, having solitary leaves 6 to 9 ins. long, and blue or violet flowers in April and May, borne in rather loose clusters (*Bot. Mag.* t. 3023).

S. natalensis.—A rare species from Natal, having strap-shaped lanceolate leaves 8 to 12 ins. long, and spreading conical trusses of pale yellow or creamy flowers in April (*Bot. Mag.* t. 5379; *Fl. d. Serr.* t. 1043). Greenhouse.

S. peruviana, the CUBAN LILY.—A native of the Mediterranean region, and not of Cuba or Peru as might be imagined from the names. It has large whitish pear-shaped bulbs, and rosettes of strap-shaped leaves 6 to 12 ins. long, fringed with white hairs. The beautiful blue starry flowers are borne in May and June, in dense, broadly conical clusters often 6 ins. across. (*Bot. Mag.* t. 749.)

The variety *glabra* has lilac flowers and leaves without hairy margins; and *alba* has white flowers.

The bulbs of this species should be planted from 4 to 6 ins. deep in warm and sheltered spots. In severe winters they should be protected with some litter or bracken.

S. pratensis.—A Dalmatian species with narrow leaves 6 to 12 ins. long, and clusters of blue bell-shaped flowers in April and May (*Bot. Reg.* 1839, t. 63).

S. puschkinoides.—A pretty little Squill from Turkestan, having narrow leaves and trusses of erect starry pale blue flowers in April and May (*Gartenfl.* 1051, f. 1).

S. sibirica (*S. amœna sibirica*; *S. amœnula*).—A well-known and popular Siberian Squill, having ovoid

bulbs, lance-shaped channelled leaves 4 to 6 ins. long, and loose racemes of drooping starry bell-shaped flowers, varying from light porcelain blue to deep blue, with a deeper coloured central line (*Bot. Mag.* tt. 1025, 2408).



FIG. 313.—*Scilla sibirica*. (½.)

There are a few varieties of which *alba* is pure white and charming; *amœnula* is dwarfer than the type, and produces its brighter blue flowers earlier in the year; the variety *multiflora* has more flowers than in the type; and *lilacina* has lavender-tinted blossoms.

The Siberian Squill flowers as early as February, and is particularly valuable for planting beneath early-flowering deciduous trees and shrubs; as well as for the rockery and flower-border or greenhouse decoration.

S. socialis.—A very rare species from Natal, flowering about November in a state of cultivation.

S. villosa.—A rare Moroccan species, with leaves 3 to 6 ins. long, ciliated

on the edges, and sparsely hairy on the under-surface. The blue starry flowers appear in corymb-like clusters in spring (*Bot. Mag.* t. 3211).

SINNINGIA (after *Wm. Sinning*, gardener at the University of Bonn). Nat. Ord. Gesneraceae.—This genus has already been referred to as having been confused with the genus **GLOXINIA**. Although closely related, the two genera are kept distinct botanically. The *Sinningias* proper are all natives of Brazil, and are herbaceous plants with tuberous root-stocks, large opposite long-stalked, softly hairy leaves, and flowers borne singly or in clusters from the leaf-axils. The corolla is tubular, bell-shaped, inflated at the base, and obliquely five-lobed.

There are about sixteen species altogether, requiring precisely the same cultural treatment as described for the Gloxinias at p. 257. Among the best-known kinds are:—

S. Carolinæ (*Tapeinotes Carolina*).—With oblong lance-shaped leaves and white flowers marked inside with red (*Bot. Mag.* t. 5623).

S. concinna (*Stenogastru concinna*).—A charming little species, having small tubers and roundish oval deeply crenulate leaves, and drooping tubular inflated flowers purplish above, yellow beneath, and spotted with purple within (*Bot. Mag.* t. 5253).

S. Helleri (*S. velutina*).—A species with oval oblong velvety leaves 4 to 6 ins. long, and white flowers having red spots on a greenish throat (*Bot. Mag.* 4212; *Bot. Reg.* t. 997).

S. hirsuta (*Gloxinia hirsuta*).—This species has broadly oval heart-shaped leaves, deeply crenated on the margins and purplish beneath. Corolla bluish-lilac, spotted with purple within. (*Bot. Mag.* t. 2690; *Bot. Reg.* t. 1004.)

S. speciosa.—The typical species has already been described and commented upon under **GLOXINIA** at p. 257. It has been figured in the *Bot. Mag.* t. 1937; *Bot. Reg.* iii. t. 213; xxx. t. 48; and its variety *albiflora*, with white flowers, in *Bot. Mag.* t. 3206; the variety *caulescens*, with large leaves, in *Bot. Reg.* t. 1127; and the large-leaved variety *macrophylla*, with white veins, in the *Bot. Mag.* t. 3934; in both publications as *Gloxinia*. Under this name the innumerable garden forms are still known, and probably will continue to be so for several generations.

The variety *Menziesiana* has a large calyx with long hairy segments, and a large violet corolla heavily spotted with red (*Bot. Mag.* t. 3943).

S. velutina has oval roundish crenulate leaves with purplish veins; funnel- or bell-shaped corolla, and pale greenish flowers (*Lodd. Bot. Cab.* t. 1398).

S. villosa has oblong oval, pointed, crenulate leaves, and greenish-yellow flowers (*Bot. Reg.* t. 1134).

S. Youngeana, said to be a hybrid between *S. speciosa* and *S. velutina*, has violet or purple flowers, yellowish-white at the base, spotted in the throat (*Bot. Mag.* t. 3954).

SISYRINCHIUM (*sys*, a pig; *rynchos*, a snout; in reference to pigs grubbing out the root-stocks). Nat. Ord. Iridæ.—There are about sixty species known, but comparatively few are of a garden value. Many of them are quite hardy, but a few are tender. They all flourish in a light rich soil of peat, loam, and sand in about equal proportions, and may be increased by division of the root-stocks in autumn. Although usually classed with bulbous plants, there are practically neither rhizomes, tubers, or bulbs in the genus,

although the plants have a Leek-like base.

The following are some of the best-known kinds:—

S. angustifolium (*S. gramineum*).—This native of the United States and Mexico is now naturalised in boggy parts of Western Ireland and in New Zealand. It has winged stems, narrow leaves, and violet flowers yellow at the base of the oboval and distinctly mucronulate segments. (*Bot. Mag.* t. 464; *Red. Lil.* t. 282.)

S. Bermudiana.—A native of Bermuda, 6 to 12 ins. high, with flattened broadly winged stems, narrow leaves, and sky-blue flowers in June and July (*Bot. Mag.* t. 94). This species requires to be grown in a greenhouse or frame.

S. californicum (*Marica californica*).—A half-hardy Californian plant with uniform yellow flowers (*Bot. Mag.* t. 983). Greenhouse or frame.

S. chilense.—A native of Brazil, 9 to 18 ins. high, with narrow sword-shaped leaves, and lilac flowers, yellow at the base of the segments (*Bot. Mag.* t. 2786). Greenhouse.

S. filifolium.—A rush-like species from the Falkland Islands, 6 to 12 ins. high, the roundish leafless stems bearing clusters of pure white bell-shaped flowers at the top (*Bot. Mag.* t. 6829). Greenhouse.

S. graminifolium.—A Chilean species, 12 to 18 ins. high, with winged stems, narrow grass-like leaves and yellow flowers (*Bot. Reg.* t. 1067). The variety *maculatum* has the base of the floral segments spotted with blood red (*Bot. Mag.* t. 3197). Greenhouse.

S. grandiflorum.—This is the best-known species of all, and is popularly known as the "Spring Satan Flower." It is a native of N. America, and is

a beautiful hardy perennial with a somewhat creeping root-stock, erect narrow pointed leaves 6 to 8 ins. long, and drooping, dark purple, bell-shaped flowers in May and June (*Bot. Mag.* t. 3509; *Bot. Reg.* t. 1364). The variety *album* has white flowers.

This species is quite hardy, and should be planted in bold masses in the border or rockery for effect.

S. iridifolium (*S. laxum*).—This species grows wild from Brazil to Chili, and is 12 to 18 ins. high, having narrow sword-like leaves ciliated on the margins, and yellowish-white flowers veined with brown (*Bot. Mag.* t. 2319; *Bot. Reg.* t. 646, as *Marica*). Greenhouse.

S. micranthum.—This Tropical American plant is now naturalised in parts of Australia. It has flexuose stems, bract-like leaves, and small pale yellow flowers (*Bot. Mag.* t. 2116). Greenhouse.

S. striatum (*Marica striata*).—A Chilean species, 1 to 2 ft. high, having narrow distichous leaves, and pale yellow flowers striped with brown (*Bot. Mag.* t. 701). Greenhouse or frame.

S. tenuifolium.—A Mexican plant having two-edged stems, narrow pointed leaves with roughish margins, and pale yellow flowers (*Bot. Mag.* tt. 2117, 2313).

SPARAXIS (*sparasso*, to tear; in allusion to the torn spathes). Nat. Ord. Irideæ.—This genus contains about half a dozen species of graceful bulbous plants, having bell-shaped flowers cut into six more or less equal segments.

The species are all natives of S. Africa, and may be regarded as fairly hardy in the milder parts of the Kingdom. In other localities they are best grown in a frame or greenhouse, and generally speaking may be

treated like the *IXIAS*. They like warm, sheltered spots, well-drained sandy soil, and should be planted in large clumps to secure an effect. The best way to increase them is by offsets from the older bulbs when the leaves have died down.

S. bulbifera (*Ixia bulbifera*).—A pretty species 6 to 12 ins. high, with two-ranked lance-shaped leaves, and yellow bell-shaped flowers, having the spathes striped with purple at the tips (*Bot. Mag.* t. 545; *Red. Lil.* t. 128). Best grown in frame or greenhouse.

S. grandiflora.—A fine species 1 to 2 ft. high, with lance-shaped pointed leaves, and deep violet-purple flowers in April and May, the wedged-shaped segments often having a deeper coloured blotch at the base (*Bot. Mag.* tt. 779, 541, *Ixia*.)

There are several varieties of this species, one called *liliago*, having white flowers; another *lineata*, with yellow flowers lined and washed with rose; and *stellaris*, a fine purple.

S. pulcherrima is now known as *DIERAMA*—which see.

S. tricolor.—This species resembles *S. grandiflora* in appearance, but has rich orange-red flowers with a yellow centre, and a purple-brown blotch at the base of the segments (*Bot. Mag.* tt. 381 (*Ixia*), 1482).

There are several varieties, such as *blanda*, white, suffused with red and yellow; *Griffini*, yellow tipped with violet-purple; and *versicolor*, bright purple with a yellow blotch at the base.

SPREKELIA (after *Dr Sprekel*, a German botanist). Nat. Ord. Amaryllideæ. —The only species in this genus is—

S. formosissima (*Amaryllis formosissima*), *JACOBÆA LILY*.—A distinct and beautiful plant from Guatemala

and Mexico, having bulbs about 2 ins. thick, narrow strap-shaped leaves 12 to 18 ins. long, and bright crimson irregular wavy flowers, each about 6 ins. across, borne on stems 6 to 12 ins. high. The three upper segments of the perianth are distinctly clawed, the middle one being broader than the others, while the three other segments droop (*Bot. Mag.* t. 47).

There are varieties such as *glauca*, with glaucous leaves and paler flowers; *Karwinski*, in which the petals are keeled and edged with white; and *ringens*, in which the upper petal is striped at the base and centre with yellow.

The *Jacobæa Lily* if planted in the outside border about May will flower in the open air during the summer months. The bulbs, however, should be taken up in the autumn and stored till the following spring. Generally speaking, it is too tender for open-air treatment altogether except in the very mildest parts of the Kingdom. It may, however, be easily grown in a greenhouse in a compost of rich sandy loam, with a little peat or leaf-soil, and some old cow-manure. The plants are increased by offsets from the old bulbs.

STENOMESSION (*stenos*, narrow; *messon*, the middle; the flowers being contracted in the middle). Nat. Ord. Amaryllideæ.—A genus containing about a dozen species of pretty bulbous plants, all natives of the Andes of Peru and Ecuador, at an altitude of 8000 to 13,000 ft. The leaves are narrow, strap-shaped, or lance-shaped, and the flowers (few or many) are borne in an umbel on top of a scape. The perianth is funnel-shaped, often somewhat contracted from the base to the middle.

These bulbous plants, if not altogether hardy, except in the most

favoured parts of the United Kingdom, are easily grown in frames or greenhouses. The bulbs should be planted or potted up in February or March in a well-mixed compost of sandy loam, leaf-mould, and a little cow-manure, any offsets from the old bulbs being detached at the time to increase the stock. During growth a fair amount of water will be necessary, and the plants when in blossom should be shaded from the burning rays of the sun. During the winter period the bulbs require a rest, and may be kept quite dry in the old soil. When growth recommences they should be shaken out of the old mould and potted up afresh.

S. aurantiacum (*S. Hartwegi*).—The roundish bulbs of this species are about 1 in. through, and the bright orange funnel-shaped flowers appear in summer on scapes 1 to 1½ ft. high, before the narrow leaves appear (*Bot. Reg.* 1844, t. 42; *Rev. Hort.* 1883, t. 396).

S. coccineum (*Coburgia coccinea*).—The ovoid bulbs are about 1½ ins. in diameter, and the bright green leaves about a foot long are developed after the bright red flowers (*Ref. Bot.* t. 309; *Bot. Mag.* t. 3865).

The variety *breviflorum* has paler red flowers, and lance-shaped leaves.

S. croceum.—The bulbs and leaves as in the other species. Flowers four to six in an umbel, pale yellow, cylindrical, suddenly dilated at the middle. (*Red. Lil.* t. 187, as *Paneratium*).

S. flavum (*Chrysiophiala flava*).—This species has oblanceolate leaves a foot long and an inch broad, and the flowers are bright yellow 1½ to 2 ins. long (*Bot. Mag.* t. 2641; *Bot. Reg.* t. 978).

The variety *latifolium* (or *S. vitellinum*) has orange-yellow flowers, with an entire tooth between each stamen filament (*Bot. Mag.* t. 3803; *Bot.*

Reg. 1842, t. 2). The variety *curvidentatum* has golden-yellow flowers greenish at the base, with a bifid tooth between each stamen filament (*Bot. Mag.* t. 2640).

S. humile (*Coburgia humilis*).—This species has erect orange-red flowers 2½ ins. long, borne singly on a very short scape about March and April (*Ref. Bot.* sub t. 308; *Bot. Reg.* 1842, t. 46).

S. incarnatum.—The long-necked roundish bulbs are 2 to 3 ins. in diameter, and the strap-shaped leaves 1 to 1½ ft. long and an inch broad,



FIG. 314.—*Stenomesson incarnatum*.

appear at the same time as the pale or bright red flowers, which are 2 to 3 ins. long, and borne on top of a scape 1½ to 2 ft. high (*Ref. Bot.* sub t. 308; *Gartenfl.* t. 1147; *Ill. Hort.* 1891, 123; *Garden*, 1896, i. t. 1076; *Sw. Brit. Fl. Gard.* ser. ii. t. 17).

There are several varieties, such as *fulvum* (or *Coburgia fulva*), brownish-yellow (*Bot. Mag.* t. 3221; *Bot. Reg.* t. 1497); *trichromum* (*Coburgia*),

scarlet with distinct green stripes on the segments (*Bot. Mag.* tt. 3867, 5686; *Rev. Hort.* 1890, t. 108); *versicolor*, varying from scarlet to pale brown (*Bot. Reg.* xxviii, t. 66).



FIG. 315.—*Stenomesson incarnatum trichromum*.

S. luteo-viride.—This species has round bulbs 3 ins. through, leaves a foot long and 1 to 1½ ins. broad, developed in April and May at the same time as the flowers, the latter being primrose-yellow tipped with green, and 2 to 2½ ins. long (*Bot. Mag.* t. 6508).

S. Pearcei.—Bulbs ovoid, 2 ins. through, long-necked. Leaves lance-shaped, a foot long, developed after the pale yellow funnel-shaped flowers, which are borne on scapes 2 to 3 ft. high. (*Ref. Bot.* t. 308.)

S. recurvatum.—The bulbs are 1 to 1½ ins. in diameter, the narrow leaves are about 1 ft. long, and the reddish-yellow flowers, 2 to 2½ ins.

long, are borne on scapes 1 to 1½ ft. high (*Ref. Bot.* sub t. 308).

S. suspensum.—Bulbs ovoid 1 to 1½ ins. through; leaves narrow lance-shaped about 1 ft. long. Flowers drooping, 1 to 1¼ ins. long, bright scarlet. (*Ref. Bot.* t. 22.)

S. viridiflorum (*Callithauma viridiflorum*).—The cylindrical-necked, ovoid bulbs are 1½ to 2 ins. in diameter, and the leaves are about 1 in. broad. The flowers with a curved tube 2 ins. long, are entirely green, and are borne on scapes 1½ to 2 ft. high (*Bot. Mag.* t. 3866, a). The variety *angustifolium* has narrower leaves (*Bot. Mag.* t. 3866, b); and the variety *Elvesi* has the staminal cup deeply six-cleft, its lobes quadrate and emarginate.

STERNBERGIA (after Count Sternberg, a German botanist). Nat. Ord. Amaryllideæ.—The Sternbergias are charming little plants with long-necked bulbs, strap-shaped leaves, and bright yellow, erect, funnel-shaped flowers. They are perfectly hardy, and will flourish in any good garden soil that has been deeply dug, and is of a more or less gritty nature. When grown in bold masses in the rock-garden, shrubbery, grassland, or flower-border, they are wonderfully effective, the bright golden-yellow of the blossoms being in striking contrast to the foliage. They are easily increased by offsets, but the bulbs should never be disturbed until the leaves have completely withered. The bulbs vary from ½ to 1 in. in diameter in *S. colchiciflora*, to 2 ins. in *S. lutea*, and should therefore be planted from 3 or 4 to 6 ins. deep.

S. colchiciflora.—A very old garden plant, native of S. Europe and Asia Minor, having narrow leaves 3 to 4 ins. long in spring, at the same time as the seed-pods are ripening. The pale yellow sweet-scented flowers

over $1\frac{1}{2}$ ins. long, appear in autumn. (*Bot. Reg.* t. 2008.)

S. Fischeriana.—This is a fine Caucasian species, remarkable for its large yellow Crocus-like flowers being produced in spring instead of autumn. In other respects it closely resembles *S. lutea*. (*Bot. Mag.* t. 7331; *Gartenfl.* t. 576.)

S. lutea (*Amaryllis lutea*).—This species extends on both sides of the Mediterranean to Syria and Persia, and is popularly known as the "Winter Daffodil" and the "Yellow Star Flower." It is also supposed to be the "Lily of the Field" alluded to

Mag. t. 290; *Red. Lil.* t. 418; *Garden*, 1887, i. t. 602.)

There are several varieties, such as *angustifolia*, with narrower leaves and smaller flowers; *major*, with broader leaves and larger flowers; *græca*, with very short leaves and flower-stems; and *sicula*, with large flowers, having narrower and more pointed petals.

S. macrantha.—A fine species from the mountains of Asia Minor, having grey-green leaves fully developed in June, while the bright yellow flowers, larger than those of *S. lutea*, are not produced until September and October (*Bot. Mag.* t. 7459).

STRICKLANDIA (after *Sir Chas. Strickland*, a keen amateur grower of



FIG. 316.—*Sternbergia macrantha*. ($\frac{1}{2}$.)



FIG. 317.—*Stricklandia euerosioides*.

in the Scriptures, and has been cultivated for at least three hundred years in Britain. The large bright yellow flowers, over 2 ins. long, appear in September and October, nestling amongst the leaves, which are about 1 ft. long and $\frac{1}{2}$ in. broad. (*Bot.*

bulbous and other plants, born 1819, died 1909).—A genus with only one species—

S. euerosioides (*Leperiza euerosioides*; *Stenomesson Stricklandi*).—A

native of the Andes of Ecuador, having ovoid bulbs 2 ins. in diameter, bearing two thin oblong leaves 6 to 9 ins. long, with a petiole shorter than the blade. The pure white funnel-shaped flowers are borne on a slender roundish scape about 1 ft. high. The sketch was made from a plant that flowered in the collection of Mr A. Worsley, an ardent bulb-grower, at Mandeville House, Isleworth, about ten years ago. This plant flourishes in a greenhouse in sandy loam and leaf-mould. (*Gard. Chron.* 1878, i. 170; 1882, ii. 102.)

STRUMARIA (*struma*, a tubercle; the style being enlarged at the base). Nat. Ord. Amaryllidææ.—A small genus of South African bulbous plants, having narrow strap-shaped leaves, and funnel-shaped flowers divided into oblanceolate segments, borne in umbels.

These little-known bulbs may be grown in cold frames or greenhouses, or in the open air in the very mildest parts of the Kingdom. The tunicated bulbs vary from $\frac{1}{2}$ in. to $1\frac{1}{2}$ ins. in diameter, and the flowers are usually borne in April, May, and June. The best-known kinds are *S. angustifolia*, *S. rubella*, *S. truncata*, and *S. undulata*, all with pinkish flowers, the last-named species having wavy lance-shaped segments (*Jaeg. Ic.* ii. t. 360). The species were formerly mixed up with the HESSEAS.

SYMPHYTUM (*symphleo*, to make unite; in reference to the healing qualities). Nat. Ord. Boraginææ.—This genus contains about sixteen species, including the well-known "Comfrey" (*S. officinale*), but the only species with a tuberous root-stock is—

S. tuberosum.—A British plant, 1 to 2 ft. high, also native of Central Europe, having short, thickish, hori-

zontal rhizomes, hairy stems and leaves, and yellowish, drooping, tubular flowers in June and July. This plant flourishes in any damp garden soil, and may be grown in rough places unsuitable for choicer subjects.

SYMPLOCARPUS (*symploke*, reunion; *karpus*, a fruit; in reference to the cohesion of the ovaries into a compound fruit). Nat. Ord. Aroidææ.—The following is the only species:—

S. foetidus (*Pothos foetidus*).—This is the Meadow or Skunk Cabbage of N. America, N.E. Asia, and Japan. It is a vigorous-growing bog or marsh plant with thickish root-stocks, and grows 1 ft. or more high, having large, thickish, oval heart-shaped leaves 1 to 2 ft. long. The flowers are borne on a violet spadix, which is enclosed by an arching spathe striped and spotted with purple and yellowish-green. (*Bot. Mag.* t. 836.)

This plant is perfectly hardy in the milder parts of the Kingdom, and may be grown in the same way as *Lysichitum*, to which it is closely related. It is easily increased by division of the root-stocks.

SYNANDROSPADIX (*syn*, together; *aner*, anther; *spadix*, a club). Nat. Ord. Aroidææ.

S. vermitoxicus.—A rare aroid from Tucuman, having a tuberous root-stock with large annual leaves which are hastate, green, and very fleshy. The scape is about a foot high, and bears an open ovate spathe 6 ins. long and 4 ins. wide, grey-green outside, flesh-coloured inside. The spadix, about 6 ins. long, is covered with flowers. (*Bot. Mag.* t. 7242.)

This plant may be grown in the same way as recommended for *Amorphophallus*.

SYRINGODEA (*syringodes*, fistular; in allusion to the slender perianth-tube). Nat. Ord. Iridææ.—Out of the seven species in this genus the only one worth notice is—

S. pulchella.—A pretty little South African plant with roundish bulbs about $\frac{1}{2}$ in. thick, sickle-shaped bristle-like leaves, 3 to 4 ins. long, and pale purple cylindrical flowers in autumn, with deeply lobed wedge-shaped segments (*Bot. Mag.* t. 6072; *Fl. d. Serr.* t. 2096).

This species may be grown in a frame or cool greenhouse in a compost of rich sandy soil, and to secure an effect several little bulbs should be planted together in a pot or pan. The plants may be increased by offsets.

TACCA (the Malayan name). Nat. Ord. Taccacææ.—This genus, known formerly as **ATACCIA**, comprises about nine species of stove plants with tuberous root-stocks, leaves simple or much divided, flowers regular, borne in umbels with several large, more or less ornamental leafy bracts, and numerous drooping, thread-like, sterile blossoms.

T. artocarpifolia.—A remarkable tuberous-rooted plant from Madagascar. It bears about three leaves with brown stalks, 2 ft. long, stout, cylindric, the blade being 2 to 3 ft. across, and cut into three main lobes, which are again much divided. Numerous flowers are borne on thickish brown scapes 5 to 6 ft. high, the sterile ones being drooping and thread-like, the fertile ones being globular, greenish with a brown base. (*Bot. Mag.* t. 6124.)

T. Chantrieri.—This resembles *T. cristata*, but differs in being much larger in every way, and in having more numerous long-stalked flowers.

T. cristata (*T. Rafflesiana*).—A fine

species from the Malayan Archipelago, having conical tuberous root-stocks, oblong pointed leaves purplish at the base, and numerous deep purple flowers, the sterile ones being drooping and cord-like, the fertile ones with six lobes in two pairs with a greenish centre (*Bot. Mag.* t. 4589).



FIG. 318.—*Tacca acristata*. (1.)

T. integrifolia.—A native of the East Indies, with a tuberous root-stock, ovate, lance-shaped, entire leaves with brown stalks, and six-lobed greenish-purple flowers, subtended by large leafy purple-veined spathes (*Bot. Mag.* t. 1488).

T. oceanica (*T. pinnatifida*).—A Polynesian species, having turnip-like root-stocks, three-lobed leaves with segments deeply divided and cut, and clusters of green flowers with leafy bracts on top of a stoutish scape (*Bot. Mag.* tt. 7299, 7300).

These wonderful and curious looking plants are easily grown in a compost of sandy loam and leaf-soil, and require abundance of heat and moisture, especially during active growth. The plants may be syringed

freely, and thus kept clean until the flowers begin to appear. They are increased by offsets which are produced sparingly from the sides of the thickish root-stock. The offsets should be placed singly in 4- or 5-in. pots. These should be well drained with plenty of crocks at the bottom, and a compost of fibrous loam, peat, and coarse sand in about equal proportions should be used. The offsets should be placed in a propagating frame, and a bottom heat of 70° F. should be maintained. The atmosphere should be kept fairly moist, but not too much so, as the offsets are liable to rot away. In a few weeks they will be well rooted, and may then be exposed to more light and air. During the summer months, the plants, young or old, should be shaded from very strong sunshine. As the plants increase in size, they may be potted on each year into slightly larger pots than before.

TAMUS (name obscure, used by Pliny). Nat. Ord. Dioscoreaceæ.—The only species worthy of note is—

T. communis, popularly known as "Black Bryony," "Lady Seal," and "Murrain Berry." It grows wild in the copses and hedges in parts of England, and has black pear-shaped fleshy root-stocks, from which arise slender, climbing, angular stems several feet in length. The beautiful ovate, heart-shaped, tapering leaves are 3 to 6 ins. long, and are remarkable for having netted veins—an unusual feature amongst Monocotyledonous plants. The small greenish-white flowers appear in May and June, and are succeeded by oblong red berries, $\frac{1}{2}$ in. long in autumn.

This is really an excellent plant for trailing over arches, trellises, old hedges, etc., and will flourish in any garden soil in partially shaded spots.

It may be increased by careful division of the root-stocks, or from seeds.

This plant, although known as the "Black Bryony," must not be confused with the Common Bryony (*Bryonia dioica*), described at p. 118.

TECOPHILÆA (after *Tecophilo*, a daughter of Bertero). Nat. Ord. Hamodoraceæ.—The best-known member of this genus is—

T. cyanocrocus.—A charming Chilean perennial 6 to 9 ins. high, having fibrous-coated corms, and linear, channelled, wavy leaves. The sweet-scented, six-parted flowers



FIG. 319.—*Tecophilæa cyanocrocus*.

appear in March and April in loose trusses, and are of a bright gentian-blue colour with a white centre. The variety *Leichtlini* has deeper blue flowers without a white centre; and the variety *Regei* has narrower leaves and petals than the type. (*Gartenfl.* t. 718.)

This pretty plant, unfortunately, is only fairly hardy in the milder parts of the Kingdom. At the base of a south wall, the corms may be planted

from 6 to 9 ins. deep in a compost of well-drained sandy peat and leaf-mould. In very wet or severe winters, the dormant corms should be protected with a little litter or bracken, or old lights. When grown in pots, the plants are charming for cool greenhouse decoration, but the corms need not be buried more than 2 or 3 ins. in the soil. During vigorous growth plenty of water may be given, but the supply should be gradually diminished as the autumn approaches, and the plants show signs of resting. The plants are increased by offsets at planting time, or by seeds sown in pots under glass when thoroughly ripe.

TESTUDINARIA (*testudo*, a tortoise, the markings on the hard tuber resembling those on the shell of a tortoise). Nat. Ord. Dioscoreaceæ.—The best known of the two species in this genus is—

T. elephantipes (*Tamus elephantipes*).—A singular-looking South African plant popularly known as "Elephant's Foot," Hottentot Bread," and "Tortoise Plant." It has a large woody tuberous root-stock, sometimes as much as a yard in diameter, marked very much like a tortoise's body, and giving rise to slender climbing branching stems, sometimes 30 to 40 ft. long, and furnished with broadly heart-shaped or kidney-shaped leaves with netted veins. The greenish-yellow flowers are small and bell-shaped, the staminate (male), and pistillate (female), being borne on separate plants. (*Bot. Reg.* t. 921; *Bot. Mag.* t. 1347.)

This extraordinary plant is more of a vegetable curiosity than anything else in greenhouses. It may be seen growing in the Succulent House at Kew, flourishing in a compost of sandy loam and mortar

rubble, requiring just enough heat in winter to keep the frost away from it. When seeds can be procured, plants may be easily raised from them, by sowing in sandy loam and leaf-soil in a temperature of 60° to 65° F. When the young plants are well established, with stems 6 to 9 ins. high, they may be potted up separately in small pots in a similar compost, and grown on from year to year.

THALICTRUM (*thallo*, to grow green; in reference to the colour of the young shoots), MEADOW RUE. Nat. Ord. Ranunculaceæ.—Of the fifty species in this genus, there are a few with tuberous root-stocks.

T. anemonoides (*Anemone thalictroides*).—A pretty North American hardy perennial about 6 ins. high, with clusters of thickened tuberous roots and twice- or thrice-ternate leaves, having long-stalked three-lobed leaflets. The white flowers, with protruding yellow stamens, appear in April and May. (*Bot. Mag.* t. 866.) The variety *flore pleno* has small double flowers.

T. tuberosum.—A Spanish Meadow Rue, about 12 ins. high, with knotty root-stocks, twice- or thrice-pinnate leaves, and corymbs of white flowers in June.

These two species flourish in partial shade in a nook in the rock-garden, and like a moist peaty soil. They may be increased by careful division of the root-stocks in early autumn, or by seeds. The latter method is often considered best, as the root-stocks, if divided roughly, often take a long time to recover.

THLADIANTHA (*thladias*, compressed; *anthos*, a flower—the first description of the plant is said to have been from a dried specimen).

Nat. Ord. Cucurbitaceæ.—The best known member of the genus is—

T. dubia.—A native of India and China, having swollen tuberous roots and climbing stems 12 to 20 ft. long, furnished with pretty heart-shaped hairy leaves. The yellow flowers are freely produced during the summer months, and in the case of the female plants are succeeded in autumn by bright red downy fruits about the size and shape of a hen's egg. (*Bot. Mag.* t. 5469.)



FIG. 320.—*Thladiantha dubia*, seedlings.

This species will grow well in the open air if planted against a south wall in the Midlands, or in any position in the mildest parts of the Kingdom. To secure a good supply of the bright red fruits, it must be remembered that the plant is diœcious—that is, the male and female flowers are borne on distinct and separate plants. Of course both kinds should be grown, as it is essential to have the pollen from the stamens of one plant to fertilise the pistils of the other. The plants may be increased by division of the root-stocks in spring, and from seeds sown under glass.

T. Oliveri.—This is a much finer and more vigorous plant than *T. dubia*, but has no tubers. The stems are 30 ft. long, the leaves are larger, and the flowers more numerous. (*Rev. Hort.* 1903, 472, f. 194.)

THOMSONIA (after *Dr A. T. Thomson*, 1778-1849). Nat. Ord. Aroideæ.—A genus containing only two or three species of tuberous-rooted stove plants, closely related to *Amorphophallus* and requiring the same treatment. The species known are **T. Hookeri**, and **T. nepalensis**, the latter from the Himalayas, having a large tuberous root-stock, an annual leaf 2 ft. high, with a trisected pinnatifid blade 2 ft. across, and an erect scape 4 ft. high, bearing a greenish-yellow boat-shaped spathe nearly a foot long, and an erect yellow spadix nearly as long as the spathe. (*Bot. Mag.* t. 7342.)

TIGRIDIA (*tigris*, a tiger; *eidos*, like; in reference to the spotted flowers), **TIGER FLOWER**. Nat. Ord.

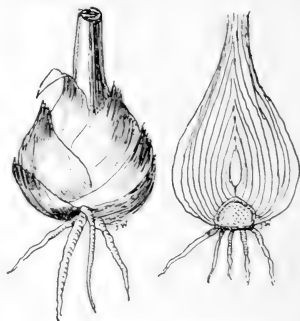


FIG. 321.—*Tigridia*, bulb and section.

Irideæ.—A genus containing about ten species of herbaceous plants, with ovoid bulb-like corms covered with brown and membranous coats, and having plaited leaves, and more or less heavily spotted cup-like flowers, with three broad outer petals and three much smaller inner ones. Filaments united to the top in a long cylindrical column.

The Tiger flowers, being mostly

natives of Mexico and Peru, are not strictly hardy in the British Islands. They may, however, be grown with considerable success south of the Thames, and in all favoured localities in the open air; and the bulbs may be even left in the ground during the winter months if protected from severe frosts and cold drenching rains. They may be planted out in April or May, 3 to 6 ins. deep, on a south border made up of rich sandy loam, and leaf-mould or well-rotted manure. The plants like



FIG. 322.—*Tigridia Pavonia*, var. (½.)

plenty of moisture during the summer months when in full growth, and enjoy a good mulching or top-dressing of old cow-manure which keeps the soil damp during hot seasons. Occasional waterings with liquid manure, especially when the plants are coming into blossom, will impart vigour to the trusses and brilliancy to the flowers. The

simplest way to increase the stock is to detach offsets when lifting the bulbs in autumn, or when replanting in spring. When the bulbs are taken up at the end of the flowering season, they should be stored in sand, dry soil, or coco-nut fibre, and kept in a frost-proof place.

Notwithstanding the somewhat fleeting character of the individual blossoms, the Tiger flowers if planted in bold masses make a brilliant and rather unique display of colour, and the quaint structure and markings of the flowers always attract attention. Each day sees a fresh supply of blossoms taking the place of those that have already faded. Some of the species mentioned below are best grown in frames or greenhouses, and these are specially noted, as well as those species natives of Peru.

T. atrata.—A Mexican species about 2 ft. high, with lance-shaped plaited leaves, and purple-brown flowers with green claws.

T. buccifera.—This species grows about a foot high, and has yellowish-green flowers, spotted with purple at the base, the three outer oboval segments being also purple (*Gard.* and *For.* 1889, f. 125). Frame or greenhouse.

T. curvata.—A little-known species, about a foot high, with yellowish flowers spotted with purple, the narrower inner segments being reddish-brown, the claw being dotted with blackish purple. Frame or greenhouse.

T. lutea.—A Peruvian species, under a foot high, having sweet-scented pale yellow flowers obscurely spotted (*Bot. Mag.* t. 6295).

T. Meleagris (*Hydrotania Meleagris*).—A distinct-looking species, 1 to 1½ ft. high, remarkable for having a cluster of several flowers emerging from the spathe. These

are drooping, broadly bell-shaped, purplish edged with yellow, and spotted with purple. (*Bot. Reg.* xxviii. t. 39.)

T. Pavonia (*Ferraria Pavonia*; *F. Tigridia*).—This is the well-known "Peacock Tiger Flower" of Mexico. It has forked leafy stems 1 to 2 ft. high, plaited leaves 12 to 18 ins. long, and flowers about 6 ins. across, the outer segments being violet at the base, scarlet at the tips, and with zones of yellow blotched with purple. (*Bot. Mag.* t. 532; *Red. Lil.* t. 6; *And. Bot. Rep.* t. 178.)

There are several varieties, the best being *alba*, pure white spotted with purple; *aurea*, yellow; *conchiflora*, yellow blotched with purple; *grandiflora*, a fine large-flowered form; and several others differing merely in shades of colour.

T. Pringlei.—This grows 1 to 2 ft. high, and has winged, plaited leaves, and shallow cup-like flowers of a brilliant scarlet blotched with crimson (*Bot. Mag.* t. 7089). Frame or greenhouse.

T. Van Houttei.—This grows 2 to 3 ft. high, and produces bell-shaped yellow flowers, having a large purple blotch at the base of the outer segments (*Fl. d. Serr.* t. 2174).

T. violacea.—This has forked branches about a foot high, and narrow leaves about a foot long. The drooping flowers are violet, the outer petals being rosy-purple, with a white claw spotted with purple. (*Bot. Mag.* t. 7356; *Fl. d. Serr.* t. 998.)

TRICHOPUS (*trichos*, a hair; *pus*, a foot; in reference to slender stems). Nat. Ord. Dioscoreaceæ.—The only species is—

T. zeylanicus, a native of India and Ceylon, being a dwarf plant with a woody root-stock from which arise

numerous short wiry three-angled stems, each bearing a heart-shaped lanceolate leaf $2\frac{1}{2}$ ins. long, and several star-shaped purple flowers on slender stalks. The fruits are three-angled, winged. (*Bot. Mag.* t. 7350.) This plant may be grown in rich loamy soil in the stove house.

TRICYRTIS (*treis*, three; *kyrtos*, convex, gibbous; alluding to the three outer segments of the perianth having sac-like bases). Nat. Ord. Liliaceæ.—A small genus of perennial plants with short creeping root-stocks, and tall stems furnished with ovate or oblong, nearly stalkless and stem-clasping leaves. The bell-shaped flowers have six lance-shaped segments, the three outer ones of which are saccate at the base. The filaments of the six stamens unite into a tube around the ovary.

The members of this genus are distinct and ornamental plants, but not very well known in gardens generally. They are quite hardy, but unfortunately often flower so late in the season that the early frosts play havoc with the blossoms. To avoid this, especially in northern localities, the plants may be grown in cold frames or greenhouses. Propagation is effected by careful division of the root-stocks in spring. Seeds may also be sown when obtainable.

T. hirta.—This handsome plant is known as the "Japanese Toad Lily." It has softly hairy stems 1 to 3 ft. high, and alternate lance-shaped stem-clasping leaves 4 to 6 ins. long, arranged in two almost opposite rows. The beautiful white flowers, heavily spotted with violet or purple, appear from August to October at the ends of the shoots and in the axils of the upper leaves. (*Bot. Mag.* t. 5355.)

The variety *nigra* has velvety

blackish blotches on the flowers, and these generally appear earlier than those of the type.

T. macropoda.—A native of China and Japan, 2 to 3 ft. high, having oblong, pointed leaves 4 to 5 ins. long, smooth above, downy beneath, and pale purple flowers in autumn spotted with blackish-purple (*Bot. Mag.* t. 6544; *Gartenfl.* t. 313). The variety known as *albostrigata* has variegated leaves.

T. pilosa.—A hairy Himalayan species 2 to 4 ft. high, with stem-clasping leaves 4 to 6 ins. long. The whitish flowers, with large deep purple spots appear somewhat earlier than those of the other species. (*Bot. Mag.* t. 4955; *Fl. d. Serr.* t. 1219.)

TRILLIUM (*trilix*, triple; the leaves and parts of the flower being in threes). Nat. Ord. Liliaceæ.—A genus of herbaceous perennials, having short thick root-stocks, and being remarkable for having the leaves and flowers arranged in threes. Such popular names as "American Wood Lily," "Indian Shamrock," and "Three-leaved Nightshade" have been applied to different species.

The Wood Lilies—as the Trilliums are generally called in England—are excellent plants for partially shaded spots in the rock-garden, or in the flower-border. They flourish in a deep well-drained peaty soil that holds sufficient moisture for their roots during the summer months. To obtain fresh plants, the root-stocks may be carefully divided in autumn or early spring, but it is better to leave the plants undisturbed when once nicely established. They are all natives of N. America.

T. cernuum.—This species grows about 18 ins. high, and has broadly rhomboidal leaves 2 to 6 ins. long.

The drooping white flowers appear in April and May. (*Bot. Mag.* t. 954.)

T. erectum (*T. foetidum*).—This grows about a foot high, and is remarkable for its dark purple nasty-smelling flowers which appear in May (*Bot. Mag.* t. 470). In the variety *album*, the flowers are white; and in *ochroleucum*, yellowish-white (*Bot. Mag.* t. 3250, as *viridiflorum*). The variety *declinatum* has white or pinkish flowers, and *atropurpureum* is a strong grower with deep reddish-crimson or plum-coloured flowers.

T. erythrocarpum.—This is popularly known as the "Painted Wood Lily," owing to the white flowers, which appear in April and May being striped with purple at the base (*Bot. Mag.* t. 3002). It is best to plant this rather shy species in damp peaty soil in semi-shaded spots.

T. grandiflorum.—The Wake Robin. A fine free-growing species



FIG. 323.—*Trillium grandiflorum*. (A.)

1 to 1½ ft. high, having leaves 3 to 5 ins. long, and pure white flowers about 3 ins. across in May (*Bot. Mag.* t. 855,

as *T. erythrocarpum*; *Garden*, 1891, t. 821; *Gartenfl.* t. 575; *Fl. d. Serr.* t. 991). This is the very best species from a garden point of view. There are several forms, one being flushed with rose or pink, called *roseum*.

T. nivale.—This charming little species grows 3 to 4 ins. high, and has oblong almost stalkless leaves,



FIG. 324.—*Trillium nivale*.

and pure white flowers about 2 ins. across, in April and May (*Bot. Mag.* t. 6449).

T. obovatum.—This is apparently a form of *T. erectum*, having white flowers fading to pink.

T. recurvatum.—Somewhat similar to *T. sessile*, having dusky purple-brown flowers.

T. sessile.—This species grows from 6 to 12 ins. high, has stalkless, broadly oval leaves mottled with light and dark green, and deep purple flowers (*Bot. Mag.* t. 40; *Fl. d. Serr.* t. 2311).

The variety *californicum* is more robust and has larger flowers. *T. discolor* with deep purple flowers (*Bot. Mag.* t. 3097) is considered by

Sereno Watson to be identical with *T. sessile* Wrayi.



FIG. 325.—*Trillium sessile californicum*. (L.)



FIG. 326.—*Trillium stylosum*.

T. stylosum (*T. Catesbii*; *T. nervosum*).—This species, 1 to 1½ ft.

high, with oval or oblong pointed leaves, produces its pink tinted flowers in April and May, and is remarkable for having the three styles united from the base to the middle.

TRITELEIA (*treis*, three; *teleios*, complete; in allusion to the perfect ternary arrangement of the flowers and seed-pods). Nat. Ord. Liliaceæ.—The species formerly known, and still known in gardens under this name, are now referred to the genus **BRODLEA**—which see, p. 113.

TRITONIA (*triton*, a weathercock; in allusion to the variable direction



FIG. 327.—*Tritonia*, showing corms and rhizomes. (1.)

of the stamens). Nat. Ord. Irideæ.—A genus of S. African plants, having fibrous-coated corms, narrow sword-like leaves, and flowers in gracefully arching spikes. The plants so well known in gardens under the name of **MONTBRETIA** are now referred to this genus.

Being natives of S. Africa, these plants are not considered sufficiently hardy for open-air culture, except in the very mildest parts of the Kingdom. They are, however, easily grown in cold frames and greenhouses, and in all except the bleakest spots, they may be grown with fair success in open sunny borders during the summer months. They like a compost of rich loam, leaf-soil, or peat in about equal proportions, and during growth plenty of moisture at the roots. In the autumn the corms should be lifted when the leaves have turned yellow, and stored in a frost-proof place till the end of March or April. The best method of increasing the stock is by offsets. Seeds, however, may be sown when thoroughly ripe, or in spring, by those who have patience enough to wait a few years for flowering-size corms to develop.

T. Clusiana.—This is a species about 1 ft. high, which seems to form a link between *Tritonia* and *Antholyza*, the flowers being hooded as in those of the last-named genus (*Gard. Chron.* 1905, xxxviii. 269).

T. crocata (*Ixia crocata*).—A fine species about 2 ft. high, having a two-ranked spike of saffron or orange-yellow bell-shaped flowers in June and July. In some forms the flowers are spotted with red, yellow, or brown (*Bot. Mag.* tt. 135, 184). The variety *miniata* has scarlet flowers (*Bot. Mag.* t. 609). **T. deusta** differs only in having a purple-black blotch on the claw of the three outer segments (*Bot. Mag.* t. 622).

T. crocosmiæflora (*Montbretia aureo-Pottsi*).—This is a fine garden hybrid between *T. Pottsi* and *Crococoma aurea* (see p. 164). It resembles a *Gladiolus* in growth, being 2 to 2½ ft. high. About July it produces masses of bright orange-

scarlet funnel-shaped flowers on branched leafy stems, which are very useful for cutting. There are now



FIG. 328.—*Tritonia crocosmiaeflora*. (4.)

many splendid garden varieties all worthy of a place in the outdoor garden. Amongst the best are—

Craesus, large yellow; *Diadem*, rich dark orange petals zoned with a broad maroon ring around the clear yellow eye; *Etoile de Feu*, deep orange-red; *Gerbe d'or*, rich golden yellow; *Germania*, rich orange flowers; *Le Pactole*, large deep yellow flowers 3 ins. across; *Lutetia*, elegant flowers of a ruddy tint; *Martagon*, deep orange reflexed flowers with orange-red throat; *Messidor*, soft yellow flowers on tall much-branched stems; *Prometheus*, large flowers 3 ins. in diameter, deep orange, touched with orange-red around the eye; *Solfaterre*, chrome yellow; *Sunbeam*, clear yellow, rayed with deep orange-red.

T. flava.—Flowers yellow, cylindrical (*Bot. Reg.* t. 747).

T. hyalina (*T. fenestrata*).—A rather tender species with pinkish flowers (*Bot. Mag.* t. 704).

T. lineata (*Gladiolus lineatus*).—This species has white-edged leaves and straw-yellow flowers veined and washed with orange (*Bot. Mag.* t. 487; *Red. Lil.* tt. 55, 400).

T. Pottsi (*Montbretia Pottsi*).—A fine species 3 to 4 ft. high, with sword-



FIG. 329.—*Tritonia Pottsi*. (3.)

like leaves $1\frac{1}{2}$ to 2 ft. long, and gracefully nodding spikes of bright yellow funnel-shaped flowers suffused with red (*Bot. Mag.* t. 6722). There are several fine forms, amongst the best being *grandiflora*, with orange-red flowers; *Goldmine*, reddish-scarlet. Indeed the forms of *T. Pottsi* and *T. crocosmiaeflora* are now becoming confused, and are apparently referred to under either name.

Other species of *Tritonia*, chiefly of botanical interest only, are *T. rosea*, pink (*Bot. Mag.* t. 7280); *T. scillaris*, reddish, fading to white (*Bot. Mag.* t. 629); *T. securigera*, brownish (*Red. Lil.* t. 53; *Bot. Mag.* t. 883); *T.*

squalida, brownish (*Bot. Mag.* t. 581); and *T. undulata*, red, varying to white and blue (*Bot. Mag.* t. 599).

TROPÆOLUM (*tropaion*, a trophy; the leaves resemble a buckler, and the flowers a helmet). Nat. Ord. Geraniaceæ.—Out of the thirty-five species in this genus there are several with tuberous root-stocks, the best-known being mentioned below. The stems of most species are more or less climbing or rambling, and bear leaves more or less lobed and not so round as in such well-known kinds as the large and small Indian Cress (*T. majus* and *T. minus*). They are all easily recognised, not only by the lobed or unlobed peltate leaves, but also by the irregular flowers composed of five petals, often hairy at the base, by the eight free stamens, and the three-lobed capsule. Some of the species described below are more tender than others, and can only be regarded as hardy in the mildest parts of the Kingdom. They may, however, be grown in warm sheltered spots, and in well-drained sandy soil into which some leaf-mould or well-decayed manure has been dug. In bleak localities the tuberous roots should be covered with a layer of litter or bracken in winter as a protection against severe frosts.

T. azureum.—A beautiful but rather tender Chilean species with roundish tubers, slender stems 3 to 6 ft. long, small irregularly five-lobed leaves, and blue flowers with five bilobed petals (*Bot. Reg.* xxviii. t. 65).

T. Beuthi.—A native of Bolivia, with tuberous root-stocks, roundish leaves divided into five to six obovate lobes, and yellow flowers in June and July. Rather tender.

T. brachyceras.—This Chilean plant has the leaves divided into six to seven lobes, and yellow flowers with

a short spur (*Bot. Mag.* t. 3851; *Bot. Reg.* t. 1926; *Fl. d. Serr.* t. 368). A tender plant best grown in a greenhouse.

T. edule.—A Chilean species closely related to *T. polyphyllum*, having leaves divided into six oblong, lance-shaped lobes, and orange-yellow flowers with a tapering spur (*Maund. Bot.* t. 248; *Paxt. Mag. Bot.* ix. t. 127).

T. Leichtlini.—This is a fine hybrid between *T. polyphyllum* and *T. edule*. It has tubers about the size of a small potato, grey-green leaves deeply cut into narrow lobes, and producing in May and June numerous bright orange-yellow flowers spotted with red. (*Rev. Hort.* 1897, t. 400.)

T. Moritzianum.—A beautiful plant from Caracas, having large tuberous roots, long-stalked peltate leaves 4 to 6 ins. across, and bright yellow and orange flowers in July, the upper ciliated petals being veined with deep red (*Bot. Mag.* t. 3844; *Paxt. Mag. Bot.* viii. t. 199). It is safer to grow this in a frame or greenhouse in most places.

T. pentaphyllum.—A native of Buenos Ayres, having roundish brown-skinned tubers, slightly twisted and branched purplish stems, and leaves palmately cut into five oblong lobes. The flowers appear in June and July, and are bright vermilion, the sepals being purple. (*Bot. Mag.* t. 3190.)

T. polyphyllum.—A free-growing Chilean species, with trailing stems 3 to 4 ft. long, well furnished with grey-green leaves cut into about eight obovate lance-shaped lobes. The bright yellow flowers appear in June and July, the two broader petals being spotted with red. The tubers are oblong, with dark red skin. (*Bot. Mag.* t. 4042; *Fl. d. Serr.* t. 2066; *Paxt. Mag. Bot.* x. t. 175.)

T. spectosum.—This fine Chilean climber, popularly known as the "Flame Nasturtium," has pear-shaped tubers, hairy stems, and six-lobed almost peltate leaves. The bright scarlet flowers are borne in great profusion from June to October in localities where the plants flourish, the upper petals being heart- or wedge-shaped, the lower ones rounded and the spur long. (*Bot. Mag.* t. 4323; *Fl. d. Serr.* t. 281.)



FIG. 230.—*Tropæolum spectosum*. (3.)

This species does not grow equally well in all places—chiefly perhaps because it is coddled too much. It likes a deep soil composed of loam, leaf-soil, and sand, to which a little well-rotted manure may be added. Very hot scorching positions should be avoided. Cool shady spots facing between north-east and north-west, and under walls, bushes, or hedges are best. The tubers should be planted in April or May, 4 to 6 ins. deep, and left to look after themselves.

T. tricolorum.—Another pretty Chilean species with small, roundish, brown-skinned tubers, trailing stems with leaves cut into five to six oblong lobes, and flowers having small orange-yellow petals, and a fiery scarlet calyx (*Bot. Mag.* t. 3169; *Fl. d. Serr.* tt. 369, 1881). There is a fine variety called *grandiflorum*, with larger flowers and a more vigorous habit. Greenhouse or frame.

T. tuberosum.—A Peruvian species with yellowish tubers tinged with carmine, from which arise stems 3 to 6 ft. long, bearing leaves divided into five lobes. The flowers appear from July to September, the calyx being deep red, and the petals golden-yellow with dark-coloured veins. (*Bot. Mag.* t. 3714; *Fl. d. Serr.* t. 452.)

T. umbellatum.—This Peruvian species is remarkable for its large tubers, which in a native condition often weigh from 2½ to 5 lbs. The zigzag climbing stems bear palmately five-lobed leaves, and the red and orange flowers are borne in umbels at the ends of the shoots. (*Bot. Mag.* t. 4337; *Fl. d. Serr.* t. 302.) Frame or greenhouse.

T. violæflorum.—A distinct and handsome Chilean species, having leaves deeply cut into five more or less bluntly lance-shaped lobes, and flowers of sky-blue becoming paler with age (*Bot. Mag.* t. 3985, as *T. azureum*). Frame or greenhouse.

TULBAGHIA (after Governor *Tulbagh* (d. 1771) of S. Africa). Nat. Ord. Liliaceæ.—A genus containing about a dozen species of garlic-smelling herbaceous plants with rhizomatous root-stocks, narrow strap-shaped leaves, and more or less urn-shaped flowers in umbels.

The Tulbaghias are easily grown in a cold frame or greenhouse, and if massed in pots or pans are fairly attractive when in flower. They like a well-drained compost of sandy loam and peat or leaf-soil in equal proportions, and may be increased by offsets or seeds.

All the species are natives of S. Africa, the following being best known:—

T. alliacea.—Flowers greenish-purple with a reddish corona, four to five in an umbel on stems 9 to 18 ins.

high (*Ref. Bot.* t. 349; *Bot. Mag.* t. 3547).

T. capensis.—Flowers greenish-purple, with an obscure purplish deeply-cleft corona, borne in umbels of six to eight on stems $1\frac{1}{2}$ to 2 ft. high in June (*Bot. Mag.* t. 806, as *T. alliacea*).

T. natalensis.—This is closely related to *T. alliacea*, but has greenish-white fragrant flowers.

T. Simmleri.—This has ovoid bulbs, strap-shaped bluntish leaves, and small rosy flowers.

T. violacea.—Flowers violet-purple, with a ligulate corona. From eight to twenty flowers are borne in an umbel about March and April on stems 1 to 2 ft. high (*Bot. Mag.* t. 3555).

TULIPA (said to be from the Turkish word *tulband*, a turban; in reference to the shape of the flowers; or derived from the Persian name, *thoulyban*). Nat. Ord. Liliaceæ.—A genus of beautiful herbaceous plants, having tunicated brown-skinned bulbs, broadish grey-green leaves, and erect scapes usually ending in one, but sometimes two or three to seven bell-shaped or cup-like flowers, having six distinct and highly coloured petals.

With the possible exception of the Daffodil, there is no bulbous plant grown in so many hundreds of thousands as the Tulip. It has been cultivated for generations, and at the present day is probably more popular than ever. This is the case not only in the British Islands, and on the Continent, but also in America, whither hundreds of thousands of bulbs are now exported annually from Europe. The kinds grown so largely are all seedling generations of the progeny of *T. Gesneriana*, which was introduced from the Levant in

1577, and two years later was brought from Constantinople to Augsburg by Conrad Gesner. Some years previous (in 1554) Busbecq, the Flemish diplomatist, admired the Tulips in the Turkish gardens, and it was no doubt through his agency they first became known in Western Europe.

The garden varieties are almost innumerable, and many square miles are devoted to their culture in Holland. There is no reason, however, why Tulips should not be grown commercially in parts of England and Ireland in hundreds of thousands, and experience has proved that excellent bulbs can be secured by attention to cultural details.

The soil of Guernsey, and probably that of Jersey also, is specially adapted for the cultivation of Tulips, Daffodils, Gladiolus, etc., in enormous quantities, and many growers are already aware of this fact.

It must be a poor soil indeed, in which Tulips will not grow. Any garden soil that has been deeply dug, and contains a fair amount of humus (well-decayed manure or leaf-mould), will yield good results. The great point is to avoid stagnant moisture, and this can easily be done by deep cultivation. On the whole a rich sandy loam may be looked upon as the ideal one for Tulips.

For open-air culture, the best time to plant the bulbs is at the end of August or September and during October and November, each bulb being placed about 6 ins. deep in the soil, and about the same distance apart. To secure a uniform depth of planting a bluntish dibber may be used, the proper depth at which it is to be pushed into the soil being marked on it.

As there are early, mid-season, and late-flowering varieties, and as each

group differs a good deal in height and colour, better effects, as a rule, are obtained by planting one or at most two varieties in the same bed. If all kinds are mixed together, the result will be disappointing in formal beds. In the mixed flower-border, however, there is no reason why mixtures should not be planted in vacant spaces, and thus avoid the formality of geometrical beds.

As a rule, warm, open situations sheltered from bleak winds are best for outdoor Tulips. They do not like being under low-growing evergreen trees or bushes, or under walls, or in deep shade. They are children of the vernal sun, and will display their brilliant colours under its rays to the best advantage.

In conjunction with Tulips, such spring-flowering plants as Polyanthus, Forget-me-Nots, Wall-flowers, Pansies, and Violas, Primroses, Mossy Saxifrages, *Silene compacta*, Double White Arabis, Yellow Alyssum, and Aubrietias—commonly known as Purple Rock Cress—may be planted in autumn over the Tulips and between the rows. In this way a beautiful effect of colour with one combination or another may be secured in spring. The only thing to bear in mind is not to have two nearly similar colours in the same bed. Thus Yellow Alyssum would not look so well under yellow Tulips as it would under red, white, or purple ones, and so on with the other plants mentioned.

In the early summer, when the Tulip leaves have withered, the bulbs may be lifted, cleaned, and stored in a cool, open, airy place until planting-time again comes round. The best or first size bulbs should be kept separate from the offsets of second size ones, and the still smaller offsets or spawn should be kept also

distinct from the others. It is not essential to lift Tulips in this way, but it is generally better to do so.

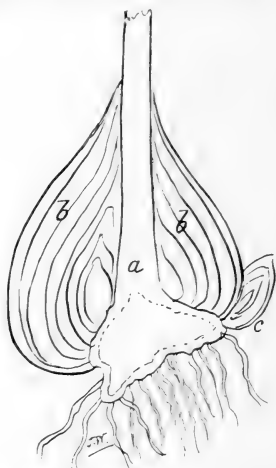


FIG. 331.—Tulip, section of bulb showing (a) flower-stem which has absorbed old bulb; and (b) the new bulbs forming as a result of the aerial leaf-action.

It may perhaps be well to mention that the bulbs taken out of the ground in spring or early summer, are not the ones that were planted the previous autumn. They are quite new, and the fact that they develop so well in British gardens, notwithstanding our peculiar winters, is another argument in favour of their cultivation. The sketch (Fig. 331) shows how the flower-stem absorbs the bulb that is planted, while new bulbs for the following season are developed during the growing season.

Garden Tulips may be divided into groups as follows:—

I.—EARLY AND BEDDING TULIPS.

This popular group has been derived chiefly from *T. suaveolens*,

a sweet-scented species from S. Russia. The varieties have been grouped according to their predominating colour, after the system adopted by the author in his *Practical Guide to Garden Plants*.

(a) *Single-Flowering Early Tulips.*

Scarlet, Rose, Crimson, and Pink shades.—*Adelaine, Artus, Bacchus, Belle Alliance, Couleur de Cardinal, Crimson King (Roi Cramoisi), De Keyzer, Duc van Thol* (scarlet, rose, and crimson shades), *Dusart, Jules Janin, La Riante, Le Matelas, Maas, Miranda, Pottebakker* (scarlet), *Princess Wilhelmina, Proserpine, Rachel Ruisch, Rembrandt, Rosamundi Huykman, Rose Aplatie, Rose Brillante, Rose Luisante, Rose de Provence, Rose Gris de lin, Rose Queen, Rose Tendre, Samson, Scarlet Beauty, Stanley (Cramoisie pourpre), Van Berghem, Vermilion Brilliant, Vesuvius.*

Orange, Brownish, and Terra Cotta shades.—*Cardinal's Hat, Commandant, Duc van Thol* (orange), *Leonardo da Vinci, Prince of Austria, Thomas Moore.*

Yellow shades.—*Bouton d'Or, California, Canary Bird, Chrysolora, Duc d'Orange, Gold Finch, Golden Crown, King of the Yellows, Mon Trésor, Ophir d'Or, Pottebakker, Prince de Ligny, Yellow Prince.*

White, or Blush.—*Albion (White Hawk), Alba regalis, Comte de Mirabeau, Grootmeister van Maltha, Jacht van Delft, Jacoba van Beyeren (White Swan), Jan Steen, Joost van Vondel, La Laitière, La Reine, L'Immaculée, Nelly, Pax alba, Pigeon, Pottebakker, Princess Marianne, White Swan.*

Purple and Violet shades.—*Eleonora, Molière, Paul Moreelse, Potter, Purple Crown, Van der Neer, Wouwerman, Queen of the Violets (President Lincoln).*

Shades of Red, Rose, Pink, or

Violet, and White.—*Admiral Reinier, Alida Maria, Belle Lisette, Bride of Haarlem, Cerise Gris de lin, Cameleon, Cottage Maid, Couleur ponceau, Donna Maria, Globe de Rigaut, Joost van Vondel, Roi Pepin, Spaandonk, Standard Royal (silver), Wapen van Leiden, Zomerschoon.*

Red and Yellow.—*Brutus, Duc de Berlin, Duchesse de Parma, Duc Major, Keizerskroon (Grand Duc), Standard Royal* (golden).

(b) *Double-Flowering Tulips.*

(Those marked with an asterisk (*) are late-flowering.)

Scarlet and Crimson shades.—*Agnes, Imperator Rubrorum, Lady Grandisson, Le Matador, *Pæony Red, Rex Rubrorum, Rose Crown, Rubra maxima.*

Pink and Rose shades.—*Arabella, Couronne des Roses, Le Blason, Lucretia, Murillo, Raphael, Rose d'Amour, Salvator Rosa.*

White.—**Alba maxima, Blanche hâtive, Grand Vainqueur, La Candeur, Rose Blanche, Murillo.*

Red and Yellow.—*Duc de Bordeaux, Duc van Thol, Gloria Solis, Helianthus, *Pæony Gold, Regina Rubrorum, Titian, Tournesol, Velvet Gem, Princess Alexandra.*

Orange or Yellow shades.—*Couronne d'Or, Tournesol, Leonardo da Vinci, *Yellow Rose.*

Variou shades.—*Bakker or Brown Tournesol* (brown and yellow), *Cousine and Turban Violet* (violet), *Duke of York* (carmine and white), *Gris de lin pale* (violet and white), *Purple Crown* (deep purple), *Queen Victoria* (purple-red), *Rosine* (semi-double pink), *Wilhelm III.* (orange-scarlet), *Blue Flag* (violet-blue), **La Belle Alliance* (blue and white), **Rhinoceros* (rosy-violet).

White, with Red, Crimson, etc.,

shades.—**Couronne impériale, Gloriosa, Hercules, Mariage de ma fille.*

II.—DARWIN TULIPS.

This name was first given to an apparently new race of Tulips in the year 1889—just eighty years after the birth of the famous naturalist, and no doubt in compliment to him, as showing the mysterious powers of the laws of evolution. These Darwin Tulips are really self-coloured forms of *T. Gesneriana*, and may be placed in the same category as the “Breeder” or “Mother” Tulips from which the “Florists” Tulips eventually break or rectify. The flowers are large and deeply cup-shaped, and are borne on stout and sturdy stems $1\frac{1}{2}$ to 2 ft. or more high. The blossoms appear in May and last into June, and when the bulbs have been planted in bold masses, there is nothing so effective in the garden in the early summer than the Darwin Tulips. As cut flowers they are also excellent, lasting several days fresh in water. As to colours, all shades except real blue and yellow are represented, from creamy-white through shades of pink, rose, cerise, scarlet, vermilion, maroon, mauve, apricot, to deep purple and violet, and almost glossy purple-black. The predominating colour is usually toned down or up with shades of another, the edges of the petals being often paler in colour. There are many varieties with names of more or less fleeting popularity, but the older ones are constantly dropping out, being replaced by new ones. To secure a collection of modern varieties, the reader is therefore advised to consult a current bulb catalogue.

What are now known as “Rembrandt” Tulips are broken or rectified Darwin Tulips, somewhat resembling the Byblœmens. The petals, however, are not so feathered

and finely striped, but the combination of colours is very charming. Names, of course, have been given to some of the best, but they are likely to be of only fleeting interest. The reader should therefore consult a current bulb catalogue for the latest developments.

FORCING TULIPS.—During the winter months several varieties of Tulip are forced into early blossom in hot-houses and warm greenhouses. The bulbs are potted up in the autumn, or placed in boxes, and covered with a few inches of soil. About the end of November some of the earlier kinds, like the Scarlet Duc Van Thol, are first brought in to the heated houses, but after Christmas until the end of February and March, other varieties are also used. Besides the *Duc Van Thol*, other sorts for forcing are:—*Canary Bird, Chrysolora, Duchess of Parma, Golden Prince, Joost van Vondel, La Reine, Pottebakker, Rose Gris de Lin*, amongst the singles, and *La Candeur, Murillo, Rex Rubrorum*, etc., amongst the doubles.

III.—FLORISTS’ OR ENGLISH TULIPS.

What are technically known as “Florists’” Tulips are quite distinct in a way from the other groups, such as the Bedding, the Darwin, and the Parrot Tulips. The bulbs are much dearer, and are grown only by a small but enthusiastic band composing the National Tulip Society. Many years ago the Florists’ Tulip was very popular in England, “and almost every village had its Tulip Society. Now, however, there are very few who retain the old love for producing this particular class of Tulip, and they are mostly confined to Lancashire, Yorkshire, and Notts.”

The late Rev. F. D. Horner, a successful and enthusiastic cultivator,

has defined a good Florists' Tulip as one having a round cup-shaped flower, with a good shoulder, and petals level at the top, neither reflexing outwards, nor curving inwards at their upper edges. The base of the cup inside must be white or yellow, according to the class, and free from any stain; and the filaments, upon which six bold black anthers stand, must be pure as the ground colour. The petals should be smooth on the edge and of good substance, that their colours may appear dense, and the flower keep its shape. Breadth of petal is a most valuable property, otherwise the flower, as it expands and grows, would show strips of daylight through the base of the cup, a deadly fault known technically as "quartering." (*Practical Guide to Garden Plants.*)

These Florists' Tulips are originally raised from seed, and at the end of from four to seven years the first flowers appear. These are always of one colour, although the seeds from which they were raised may have been ripened in flowers beautifully "flamed" and "feathered," and with two or three distinct colours. Such seedling Tulips are called "Breeder" or "Mother" Tulips, and are similar to what are now called "Darwin" Tulips. In the course of time the uniform colour becomes split up into two or more colours. The flowers are then said to "break" or "rectify." These "rectified" Tulips are divided into two groups. (i.) those having a *pure white* centre, base, or ground, the purer the white the better; and (ii.) those having a *pure yellow* one. The "white grounds" are also divided into two sections; (a) *Roses*, in which the flowers may be of delicate pink, rose, scarlet, cerise, crimson, and intermediate shades; and (b) *Byblæmens*, in which the flowers may be

shades of pale lilac, lavender, violet, brown, and black, and the deeper and blacker the colours the better.

The "yellow ground" Tulips consist of one class only, called *Bizarres*, in which the flowers may be orange, scarlet, crimson, black, brown, etc.

All rectified Tulips, whether *Roses*, *Byblæmens*, or *Bizarres*, have the petals either "feathered" or "flamed."

As stated in the *Practical Guide to Garden Plants*, a "feathered" Tulip is one in which the colour is beautifully pencilled and feathered round the edges only of each petal, thus producing a light and graceful effect. When the feathering is broken, splashed, or confused, it is a defect.

A "flamed" Tulip is beautifully pencilled like the feathered group, but is distinguished from it by having strong and brilliant streaks, bands, or flames of a distinct colour shooting up the centre from near the base, and forking out towards each feathered edge. The "flaming" and "feathering" should be well blended, but always leaving the ground colour pure and clear between them.

In each group there are several varieties, particulars of which, as to shades of colour, may be obtained from current catalogues.

IV.—PARROT OR DRAGON TULIPS.

These curious-looking and remarkable Tulips are believed to be derived from *T. viridiflora*, a curious green and yellow striped form of *T. Gesneriana*. The garden forms have brilliant shades of scarlet, and yellow mixed with green, slashed and cut into all kinds of curious shapes. Unfortunately the stalks are rather weak, and in windy seasons the flowers are much blown about if not supported by slender stakes.

The following are the principal varieties: *Admiraal van Constanti-*

nopel, glossy red, shaded and tipped with orange; *Aurantiacum*, fine orange; *Café Brulée*, dark brown; *Couleur de Café* (Coffee Colour), brown and deep yellow; *Crimson Beauty*, deep crimson, with black markings; *Fire King*, dark scarlet, striped gold; *Lutea Major*, yellow, fine; *Perfecta*, yellow and scarlet; *Rubra et Lutea*, red and yellow; *Rubra Major*, scarlet, extra fine, true.

V.—NATURAL SPECIES OF TULIPS.

Besides the garden forms mentioned above, some attention has been given of late years to the cultivation of natural species of Tulips. Some kinds like *T. Gesneriana*, *T. Greigi*, *T. Oculis-Solis*, *T. macrospeila*, *T. suaveolens*, etc., are fairly common, but the others are not so well known. The short descriptions below will serve to identify them.

T. acuminata (*T. cornuta*).—A curious species of unknown origin, easily recognised by its long, narrow-pointed segments, the flowers being red, yellow, and speckled (*Red. Lil.* t. 445; *Bot. Reg.* t. 127).

T. Alberti.—A native of Turkestan about 2 ft. high, with grey-green wavy leaves, and orange-scarlet flowers 2 ins. deep, faintly blotched with reddish-brown (*Bot. Mag.* t. 6761; *Gartenfl.* t. 912).

T. altaica.—A native of the Altai Mountains at an elevation of 1000 to 6000 ft., usually having three lance-shaped leaves and carmine-red flowers with a yellow centre, borne in April on downy stalks 3 to 4 ins. high (*Gartenfl.* t. 942).

T. australis (*T. Breyniana*; *T. Celsiana*).—A native of S.W. Europe, closely related to our Wild Tulip *T. sylvestris*, but readily distinguished by its dwarf habit, star-shaped yellow flowers flushed with red, and broad

and somewhat reflexed leaves (*Bot. Mag.* t. 717; *Red. Lil.* t. 38). *T. triphylla*, from Turkestan, with greenish-yellow flowers, is closely related, as is also *T. humilis*, from Persia, with pale yellow flowers tinged with red outside.

T. Batalini.—A dwarf species from Buchara, 4 to 8 ins. high, with prostrate leaves and creamy-yellow



FIG. 332.—*Tulipa Batalini*. (4.)

flowers about 3 ins. deep, having a thin line of red or crimson on the extreme edge of the petals (*Gartenfl.* t. 1307; *Gard. Chron.* June 1896, 759, f.).

T. biflora.—A Caucasian Tulip, chiefly remarkable for producing clusters of two to five creamy-white flowers with a yellow centre and tinged with green outside, on a stalk 3 to 6 ins. long (*Bot. Mag.* t. 6518; *Bot. Reg.* t. 535; *Gartenfl.* t. 239).

T. Billietiana.—A native of the Swiss Alps, with oval lance-shaped

wavy leaves and bright yellow flowers tinged with orange-red (*Bot. Mag.* t. 7253).

T. Borszczowi (pronounced "Borshovi").—A native of Central Asia, about 1 ft. high, with handsome flowers remarkable for having the three inner petals of a bright golden-yellow on both sides, while the three outer petals are yellow inside, but bright red outside with a distinct yellow edging (*Bot. Mag.* t. 6635; *Gartenfl.* t. 1175). There is a yellow form without any blotches at the base.

T. brachystemon.—This species from Turkestan is close to *T. Kesselringi*, but has smaller yellow flowers with more pointed petals (*Gartenfl.* t. 1099, f. 2).

T. chrysantha.—A distinct species from Persia and Western Asia. It has small yellow flowers, and wavy leaves with cartilaginous margins.

T. Clusiana.—This fine species from S. France is known as the "Lady" Tulip. It has rosy flowers, white inside, with a deep purple or violet centre. (*Bot. Mag.* t. 1390.)

T. Dammanniana.—A native of Mount Lebanon, having narrow lance-shaped leaves with hairy edges, and scarlet or purple-red flowers with a blackish base (*Gartenfl.* t. 1300, f. 1).

T. dasystemon.—A dwarf species with shining leaves, several white and yellow flowers being produced in succession from a single stem (*Gard. Chron.* 1905, xxxvii. 268).

T. Didieri.—A pretty South European species, having crimson flowers with a blue-black centre and yellowish-white margins (*Bot. Mag.* t. 6639). There are several forms, including a yellow and white flowered one.

T. Eichleri.—A beautiful species from the Caucasus, having broad

leaves and large bright scarlet flowers having a black centre, and sometimes edged with yellow (*Bot. Mag.* t. 6191; *Gartenfl.* t. 799).

T. elegans.—This is considered a probable hybrid between *T. acuminata* and *T. suaveolens*. It has bright red or carmine flowers with a yellow centre, the segments being reflexed and tapering. (*Garden*, 1887, ii. t. 626.)

T. Elwesi.—A Persian species 6 to 9 ins. high, having bright scarlet flowers edged with yellow, and having a small black blotch at the base (*Gartenfl.* t. 1147).

T. Fosteriana.—This species has flowers of a brilliant crimson blotched at the base (*Gard. Chron.* 1905, xxxvii. 268).

T. galatica.—A fine Tulip with broad wavy leaves, and large lemon-



FIG. 333.—*Tulipa galatica.* (3.)

or straw-yellow flowers about 3 ins. deep, and of the shape shown in sketch. The flowers appear in May.

T. Gesneriana.—This fine but

variable species is widely distributed from Italy to Asia Minor. It has broad ovate lance-shaped leaves, and sweet-scented bright scarlet flowers with a blackish centre. (*Bot. Reg.* t. 46, 380.) This is the parent of most of the Garden Tulips. The variety *fulgens* has a yellow instead of a blackish centre; *spathulata* has brilliant red flowers with a purple-black base; and *violacea* has reddish-violet flowers with a blue-black base. *T. Schrencki*, from Turkestan, with bright crimson flowers, having a black blotch at the base is a distinct variety, considered by some authorities to be the parent of the Scarlet *Duc Van Thol* Tulips. (See *T. suaveolens*.)

T. Greigi.—A fine species from Turkestan, easily recognised by its pale or grey green leaves, being heavily blotched with purple-brown. The large fiery red bell-shaped flowers have a blackish base with a yellow zone. (*Bot. Mag.* t. 6177; *Gartenfl.* t. 773; *Fl. d. Serr.* t. 2261.) There are several forms, one called *aurea*, having yellow flowers with a reddish centre, and *alba*, having white margins.

T. Haageri.—A native of Asia Minor about 9 ins. high, with cherry-red flowers often tinged with yellow outside, and a blue-black centre bordered with yellow within (*Bot. Mag.* t. 6242; *Gartenfl.* t. 790; *Belg. Hort.* 1877, t. 2). The variety *nitens* is much finer than the type, having flowers 3 ins. across, bright orange-red, black at the base, and flushed with grey and bronze outside (*Gard. Chron.* 1903, xxxiii. 305; *Gard.* 1903, lxiii. 293, 325, 372, f.).

T. iliensis.—A native of Turkestan about 6 ins. high, with narrow leaves and citron-yellow flowers (*Bot. Mag.* t. 6518, B.; *Gartenfl.* tt. 975, 982).

T. ingens.—A native of Bokhara, having bright scarlet - vermilion

flowers with a conspicuous black blotch at the base, the outer segments having a broad yellowish band outside (*Gard. Chron.* 1902, xxxii. 14, f. 7).

T. Kaufmanniana.—A beautiful Tulip, 8 to 12 ins. high, from Turkestan, with grey-green leaves developed after the large bright carmine flowers edged with white are produced. The inner surface of the perianth segments is pearly white, with a bright yellow base bordered with crimson. (*Bot. Mag.* t. 6887; *Gartenfl.* t. 906, f. 6-10.) There are a few forms or variations of this species sometimes seen, that known as *pulcherrima* being probably a hybrid between it and *T. Greigi*. The variety *aurea* has yellow margins; and *coccinea* has vivid scarlet flowers with a clear yellow base.

T. Kesselringi.—A native of Turkestan with narrow channelled grey-green leaves and bright yellow flowers about 2 ins. deep, the three outer segments being suffused with reddish-brown outside (*Bot. Mag.* t. 6754; *Gartenfl.* t. 964).

T. Kolpakowskyana.—A pretty species also from Turkestan, with deeply channelled lance-shaped leaves about 1 ft. long, having minutely ciliated margins. The scapes are 1 to 2 ft. high, each bearing a large handsome flower 2 to 3 ins. deep, variable in colour, being sometimes bright red with a black centre and purple-black stamens, sometimes yellow flushed with red outside, and sometimes pure yellow with a blackish centre and yellow anthers and filaments. (*Bot. Mag.* t. 6710; *Gartenfl.* t. 951; *Garden*, 1891, t. 819.)

T. Korolkowi.—This is a native of the deserts between Khiva and Tashkend, and is related to *T. Eichleri*, but has smaller flowers of a dazzling red, with a black blotch at the base.

T. lanata.—A native of Asia Minor, about 8 to 12 ins. high, having brilliant crimson flowers, the segments of which are furnished with a woolly tip—hence the specific name.

T. Leichtlini.—A distinct and pretty species from Kashmir, about 18 ins. high, the three inner segments of the perianth being yellowish-white and much shorter and blunter than the outer ones, which are of a bright purple or coral-red, edged with white (*Garden*, 1891, t. 819).

T. linifolia.—A species from Central Asia, recognised by its narrow grey-green very wavy leaves and glowing scarlet flowers with a black centre, borne on scapes 6 to 8 ins. high.

T. Lownei.—A Syrian Tulip with yellow-green leaves and bright lilac flowers, the segments of which are marked at the base with a broad bright yellow stain (*Gard.* 1899, lvi. 155).

T. macrospeila.—A fine Tulip, probably a hybrid between *T. Gesneriana* and some other species. It is like *Gesneriana* in habit, and has large fragrant crimson flowers 3 to 4 ins. deep, the broad bluntish segments each having a blackish wedge-shaped blotch bordered with yellowish-white at the base.

T. maculata.—Another kind of garden origin, resembling *T. Gesneriana*, and having bright crimson-red flowers with a black centre, borne on downy stalks.

T. maleolens, from Italy, is similar, but has unpleasant-smelling flowers.

T. Maximowiczii.—A rare species from Bokhara, related to *T. linifolia*, and having the stems furnished with alternate linear leaves, the margins of which are red and minutely hairy. The fine purple-red or bright crimson flowers have a dark blotch bordered

with white at the base: (*Gartenfl.* t. 1307; *Gard. Chron.* June 1896, 757, f.)

T. Michelliana.—A Persian Tulip with leaves like those of *T. Greigi*, and large red flowers with a black basal blotch broadly edged with yellow.

T. montana.—This species is distributed from Armenia to Afghanistan, and is remarkable for the dense wool which covers the interior of the bulb coats. It flowers as late as July, the blooms being of a bright carmine-red with a blackish centre. (*Bot. Reg.* t. 1106.)

T. nitida.—A dwarf species from Bokhara resembling *T. Korolkowi*. Flowers about 2 ins. deep, bright vermilion-scarlet, with a black base. (*Gard. Chron.* 1902, xxxi. 350, f. 119; *Gard.* 1903, lxiv. 40.)

T. Oculis-solis.—A fine Tulip from S. France, with bright red flowers 2 to 3 ins. deep, having a large black blotch bordered with yellow at the base (*Red. Lil.* t. 219; *Bot. Reg.* tt. 204, 1143, 1419 (the variety *præcox*)).

T. Orphanidea.—A native of Greece, with stalks 1 to 2 ft. high, bearing bright yellow flowers with pointed petals flushed outside with red (*Bot. Mag.* t. 6310; *Gartenfl.* t. 373).

T. Ostrowskyana.—This species from Turkestan is closely related to *T. Oculis-solis*. It has narrow lance-shaped leaves and bright red flowers with a blackish base. (*Bot. Mag.* t. 6895; *Gartenfl.* t. 1144, f. 1-2; *Garden*, 1894, ii. t. 965.) Fig. 334.

T. patens (*T. tricolor*).—A Siberian Tulip, having oblong funnel-shaped whitish flowers with a yellow base (*Gartenfl.* t. 827; *Bot. Mag.* t. 3887).

T. persica.—A Persian Tulip with deep green narrow leaves edged with red, and scapes 6 to 9 ins. high, often

bearing more than one sweet-scented flower, the interior of which is bright yellow, the outside being golden bronze.



FIG. 334.—*Tulipa Ostrowskyana*. (3.)

T. præcox.—A native of Central Europe, having strong stems 1 to 1½ ft. high, and conical flowers of a bright red inside, greenish yellow at the base with a blackish-violet blotch (*Bot. Reg.* t. 380, as *T. Gesneriana*).

T. præstans.—An early-flowering Tulip from Bokhara, close to *T. Kaufmanniana* and *T. suaveolens*. The roundish bulbs have a very thick parchment-like skin. The leaves and flower-stems are covered with minute white hairs. Flowers light scarlet-vermilion with a yellow base. The flowers are borne singly or in clusters of six to ten on a single scape. (*Bot. Mag.* t. 7920; *Gard. Chron.* 1903, xxxiii. 239, 324, 364, f. 126.)

T. primulina.—A native of Eastern Algeria, somewhat like *T. sylvestris*. It has narrow leaves and sweet-scented bell-shaped primrose-yellow flowers about an inch deep, the outer segments being tinged with red outside, while the stamens are densely hairy at the base. (*Bot. Mag.* t. 6785.)

T. pulchella.—A pretty dwarf Tulip from the Cilician Taurus, with narrow channelled leaves about 3 ins. long, and slender scapes only an inch or two high. The funnel-shaped flowers are rose, mauve, or lilac, with a yellow base, and very hairy whitish filaments. (*Bot. Mag.* t. 6304.)

T. retroflexa.—This attractive Tulip is thought to be a hybrid between *T. acuminata* and *T. Gesneriana*. The stems are 1½ to 2 ft. high, bearing a bright yellow flower about 3 ins. deep. (*Garden*, 1887, ii. t. 626.)

T. saxatilis.—A native of Crete, having bright shining green leaves, unlike those of most Tulips. The scapes are 9 to 12 ins. high, with a pale magenta flower having a deep yellow base. (*Bot. Mag.* t. 6374.)

T. Sintenesi.—A curious Armenian species, having flattish leaves and red or scarlet flowers covered with a "bloom," and having a black blotch at the base (*Bot. Mag.* t. 7193).

T. Sprengeri.—Another Armenian species, closely related to *T. Haageri*. It has fine glowing scarlet flowers without a blotch at the base, borne on scapes about 18 ins. high, from the middle to the end of June.

T. stellata, from the N.W. Himalayas, is closely related to *T. Clusiana*. It has whitish or pale yellow flowers without a blotch at the base. (*Bot. Mag.* t. 2672.)

T. suaveolens.—This fine species is a native of S. Russia, and is considered to be the parent of the early red and orange *Duc Van Thol* Tulips. It has broad leaves, and the sweet-scented bright scarlet, yellow-edged flowers are borne on scapes about 6 ins. high. (*Bot. Mag.* t. 839; *Fl. d. Serr.* t. 1223.) The variety *pluriflora* has two flowers on a stem.

T. sylvestris.—This species is admitted as a doubtful native of Britain, and is found in chalk-pits

and waste ground in various parts of England. It has narrow grey-green leaves 6 to 10 ins. long, and bright yellow sweet-scented flowers on stems 1 to 2 ft. high. (*Bot. Mag.* t. 1202; *Rev. Hort.* t. 165.) *T. Biebersteiniana*, *T. fragrans*, and *T. strangulata* are considered to be forms or geographical variations of *T. sylvestris*.

T. triphylla.—A native of Central Asia, having three to four narrow sickle-shaped leaves, and bright citron-yellow flowers tinted with green on the outside (*Bot. Mag.* t. 6459; *Gartenfl.* t. 942). The variety *Hoeltzeri* has the three outer petals yellow and purple. (*Gartenfl.* t. 1144, f. 3-4, A. B.).

T. Tubergeniana.—A native of Bokhara, having large rich orange-crimson flowers with a dark blotch at the base of the very broad and somewhat sharply-pointed segments (*Gard. Chron.* 1904, xxxv. 358, f.; *Flora and Sylva*, April 1905).

T. turkestanica.—A native of Turkestan, closely related to *T. biflora*, having lance-shaped curved leaves and often two white flowers about 1½ ins. across, with a yellow centre (*Gartenfl.* t. 1050, f. 2).

T. undulatifolia.—A handsome Tulip from Asia Minor, having grey-green narrow lance-shaped wavy leaves, and scapes 6 to 9 ins. high, with a bright crimson bell-shaped flower washed with green outside, and having a black centre with a yellow ring. Some forms have yellow centres and flatter, less wavy leaves. (*Bot. Mag.* t. 6308.)

T. uniflora.—A Tulip from the Altai Mountains, having pale yellow flowers borne on slender scapes, about the middle of which are a pair of lance-shaped leaves (*Gartenfl.* t. 906, f. 25; *Sw. Br. Fl. Gard. Serr.* ii. t. 336).

T. violacea.—A Persian species near *T. Clusiana*, but with narrower leaves and smaller flowers of a brilliant deep carmine with a black base, and borne on stems about 6 ins. high. It is one of the first Tulips to flower in the open. (*Bot. Mag.* t. 7440.)

T. viridiflora.—A curious form of *T. Gesneriana*, having large greenish or greenish-yellow flowers striped and banded with yellow. It is supposed to be the parent of the Parrot or Dragon Tulips.

T. vitellina.—This is considered to be a hybrid between *T. Gesneriana* and *T. suaveolens*. It has large flowers of a delicate whitish or butter-like yellow. (*Garden*, 1889, ii, t. 730.)

T. Wilsoniana.—A Persian species with wavy red-edged leaves, very bright red flowers without a basal blotch or only a very small one, and red filaments with golden anthers. The bulbs bear a mass of protruding woolly hairs. (*Gard. Chron.* 1901, xxix. 327, f. 121.)

DISEASES.—Tulips are sometimes afflicted with a fungus (*Sclerotinia parasitica*) which forms olive brown velvety patches on the stems, leaves, and flowers. Diseased plants should be taken up and burned at once, and the soil should be well dressed with slaked lime and flowers of sulphur to prevent the spread of the fungus.

TUPISTRA (*tupis*, a mallet; in reference to the form of the stigma). Nat. Ord. Liliaceæ.—A small genus closely related to *Aspidistra*, consisting of hothouse herbaceous perennials, having thickish or tuberous rootstocks, large leaves, and stalkless flowers in dense cylindrical spikes. All the species grow in rich loamy soil, and require plenty of heat and moisture during growth. The winter

temperature should not go below 55° to 60° F.

T. Clarkei.—A native of Sikkim, with thick creeping rhizomes, oblanceolate glossy leaves 4 ft. long and over 4 ins. broad on stiffish erect stalks. Flowers dull reddish-purple inside, at first green outside with purple margins, but entirely buff later on. (*Bot. Mag.* t. 7957.)

Other species are **T. macrostigma**, dark purple (*Bot. Mag.* t. 6280); and **T. squalida**, dull violet (*Bot. Mag.* tt. 1655, 3054).

TYPHONIUM (after *Typhon*, a monster with 100 snakes' heads. The plants are used to cure snake-bites in the East). Nat. Ord. Aroideæ.—A genus containing over a dozen species of tuberous-rooted herbs having long-stalked Arum-like leaves cut into three to five lobes in some species.

T. giganteum Giralddi.—A native of the moist places in the light woods of N. China, where it was discovered by Fr. Giralddi. It has large roundish tubers and broad, bright green, wavy, thick-ribbed leaves with speckled stalks. The peduncle, which is also speckled, bears a large, more or less constricted spathe 8 to 10 ins. long, and of a deep purple colour tinged with olive. The cylindrical blackish spadix in the centre is very conspicuous. (*Gard. Chron.* 30th August 1902, 150, f.)

This species having been proved hardy in Sweden, should prove an acquisition to the hardy Aroids in the British Islands. Other species, however, require a warm greenhouse or stove temperature. Father Giralddi's variety of *T. giganteum* might be grown in well-drained gritty soil, and is apparently easily increased from seeds, or by offsets from the tubers.

URCEOCHARIS (made up from *Urceolina* and *Eucharis*). Nat. Ord. Amaryllideæ.—This title represents an interesting bi-generic hybrid between *Urceolina pendula* and *Eucharis grandiflora*, known under the name of *U. Clibrani*. It is intermediate between its parents in almost every particular, and has white-stalked flowers in trusses on top of the stem. (*Gard. Chron.* 1892, ii. f. 36; *Journ. Hort.* 1893, xxvi. f. 38).

This plant is still very rare. It will flourish in a warm greenhouse, in a compost of rich sandy loam and leaf-soil, with a little well-decayed cow-manure.

URCEOLINA (*urceolus*, a little urn or pitcher; in reference to the shape of the flowers). Nat. Ord. Amaryllideæ.—This genus consists of the three species mentioned below. They are herbaceous plants with tunicated bulbs 1 to 2 ins. in diameter, thin stalked oblong or lance-shaped leaves, and umbels of urn-shaped flowers drooping from the top of a fleshy leafless scape.

The Urceolinas are natives of the Andes of Peru and Bolivia, one species, *U. miniata*, being found at an altitude of 10,000 ft. They are easily grown in a cool or slightly warm greenhouse, and may be potted in a compost of rich sandy loam and leaf-soil. Growth commences in spring, and a fair amount of moisture is necessary at the root, until the plants show signs of going to rest in the autumn and winter. Then the bulbs are kept dry and cool until they show signs of life again in spring. They may be shaken out of the old soil and repotted, or some of the old soil may be removed from the top, and replaced with fresh compost. Offsets are the simplest method of increase.

U. latifolia (*Leperiza latifolia*).—This species has leaves about 9 ins. long, and 4 to 5 ins. broad without the stalks, and six to eight bright yellow flowers tipped with green during the summer months (*Bot. Mag.* t. 4592).

U. miniata (*Pentlandia miniata*).—The leaves about 1 ft. long, and 1 to 1½ ins. broad, are produced after the flowers. These are bright scarlet, not tipped with green, two to six drooping from a scape 1 to 1½ ft. high. (*Bot. Reg.* 1839, t. 68.)

U. pendula (*U. aurea*), the *Drooping Urn Flower*.—This is the best-known species. It has oblong pointed leaves a foot or more long



FIG. 335.—*Urceolina pendula*. (3.)

and 4 or 5 ins. broad, and bright yellow flowers tipped with green, drooping from a scape a foot or more high (*Bot. Mag.* t. 5464). The variety *fulva* has shorter leaves, more rounded at the base, and much smaller flowers than the type.

URGINEA (from *Ben Urgin*, the name of an Arab tribe). Nat. Ord. Liliaceæ.—A genus containing about twenty-five species of bulbous plants, having strap-shaped or narrow leaves, and starry or bell-shaped six-parted flowers borne in erect trusses.

The species mentioned below are all natives of S. Africa, except when otherwise stated, and although not strictly hardy, may be grown during the summer months in the open air in the milder parts of the country. They are, however, chiefly grown in pots in greenhouses, and are only of botanical or economic interest. A sandy loam suits them, and stock is increased by offsets.

U. altissima (*Drimia altissima*).—A species having roundish bulbs 4 to 6 ins. through, broadly lance-shaped leaves 12 to 18 ins. long, and whitish flowers, keeled with purple in dense trusses on stems 2 to 3 ft. high (*Bot. Mag.* t. 1074).

U. exuviata.—A plant with bulbs about 1 to 2 ins. through, roundish flexuose leaves, 1 to 2 ins. long, and trusses of whitish flowers veined with purple (*Bot. Mag.* t. 871).

U. filifolia (*Albuca filifolia*).—This species has bulbs about 1 in. in diameter, thread-like wavy leaves, and whitish flowers keeled with purple on slender stems 6 to 12 ins. high (*Bot. Reg.* t. 557).

U. maritima (*U. Scilla*), SEA ONION SQUILL.—A native of the Mediterranean region, having large ovoid bulbs 4 to 6 ins. in diameter, and grey-green lance-shaped fleshy leaves. Flowers whitish keeled with greenish-purple, borne in dense trusses a foot long, on reddish stems 3 to 5 ft. high. (*Bot. Mag.* t. 918; *Red. Lil.* t. 116.)

The bulbs of this species supply the Squills of commerce. They contain a very acrid juice which will blister the fingers, whilst the vapour

arising from it often irritates the eyes and nose.

UVULARIA (*uvula*, from *uva*, a small bunch of grapes; in reference to the arrangements of the fruits or seed-pods), **BELLWORT**. Nat. Ord. Liliaceæ.—A small genus of hardy herbaceous perennials with thickish creeping root-stocks, stalkless or perfoliate leaves, and bell-shaped flowers drooping from the tips of the shoots.

The *Uvularias* or *Bellworts* are natives of N. America, and are perfectly hardy. They flourish in sandy peaty soil, and may be increased by division of the root-stocks in autumn, but may also be raised from seeds. When grown in bold masses in the rockery or garden they look very graceful.

U. grandiflora.—A pretty plant 1 to 2 ft. high, having smooth perfoliate leaves 2 to 4 ins. long, and pale yellow flowers about May and June (*Bot. Mag.* t. 1112).

U. perfoliata.—This is similar in appearance to *U. grandiflora*, but has rather longer leaves and smaller flowers (*Bot. Mag.* t. 955).

U. puberula.—This species has oblong pointed stalkless leaves 2 to 3 ins. long, fringed with hairs on the margins, and yellowish flowers from the ends of the shoots and the axils of the upper leaves (*Lodd. Bot. Cab.* t. 1260).

U. sessilifolia is somewhat similar to the others, but has oblong pointed stalkless leaves of a membranous texture (*Bot. Mag.* t. 1402).

VALLOTA (after *P. Vailot*, a French botanist). Nat. Ord. Amaryllidææ.—The only member of the genus is—

V. purpurea (*Amaryllis purpurea*; *A. speciosa*).—A charming S. African plant well known under the popular

name of “Scarborough Lily.” It has large ovoid bulbs, strap-shaped bright green leaves 18 to 24 ins. long, and six to nine bright scarlet funnel-shaped flowers on the top of a hollow fleshy scape 2 to 3 ft. high. (*Bot. Mag.* t. 1430).



FIG. 336.—*Valotta purpurea*. (½)

There are several varieties, the best being *eximia*, with white-centred flowers 4 ins. across; and *magnifica*, very similar, but more vigorous.

The Scarborough Lily may be grown out of doors during the summer months in the milder parts of the Kingdom. It is, however, generally grown in pots in the greenhouse, and flourishes in rich sandy loam and leaf-mould. When the bulbs are well established, they throw up their brilliant flowers every year, and if the plants have not had too much heat, they will last quite a long time in blossom in a cool drawing-room. Increased by offsets.

Hybrids are said to have been raised by crossing *Valloata* with *Hippeastrum*—a very likely proceeding.

VELTHEIMIA (after *Count Aug. Ferd. Veltheim* (1741 to 1801), a patron of botany). Nat. Ord. Liliaceæ.—A small genus of S. African bulbous plants having fleshy wavy leaves, and erect oblong-conical trusses of drooping, cylindrical flowers.

They are almost hardy in the mildest parts of the Kingdom, and may be grown in the open air at any rate during the summer months. They flourish in rich light sandy soil with a little leaf-mould or well-decayed manure, and may be easily increased by offsets, or by well-ripened leaves inserted in sandy soil to produce new bulbs at the base.

V. glauca.—A pretty plant with grey-green wavy leaves, and trusses of red or yellow spotted flowers borne on scapes a foot or more high (*Bot. Mag. tt. 1091, 3456*).



FIG. 337.—*Veltheimia viridiflora*. (4.)

V. viridiflora (*V. capensis*).—This is the best-known species. It has

tufts or rosettes of strap-shaped wavy leaves 9 to 12 ins. long, and scapes 1 to 1½ ft. high, bearing from forty to sixty reddish-yellow spotted flowers in summer. (*Bot. Mag. t. 501; Red. Lil. t. 186*.)

VERATRUM (*vere*, truly; *ater*, atrum, black; in reference to the colour of the roots), FALSE or WHITE HELLEBORE. Nat. Ord. Liliaceæ.—A genus of distinct herbaceous perennials having thickish poisonous rootstocks, strongly veined or plaited leaves, and branched trusses of starry six-parted flowers.

The Veratrums are bold and ornamental-looking plants in the border or rockery. They like a rich and well-manured loamy soil, and more or less shaded positions, and may be increased by division of the rootstocks in autumn or spring. They may also be raised from seeds, but this is a slow process, several years often elapsing before flowering plants are obtained.

V. album (*White Hellebore*).—A noble-looking perennial 3 to 5 ft. high, from the Caucasus and Altai Mountains. It has large stalkless, broadly oval, plaited leaves a foot or more long, and whitish flowers tinged with green outside, borne in dense trusses on stems 1 to 2 ft. high in July. (*Red. Lil. t. 447*.) The variety *Lobelianum* has wholly greenish flowers; and the variety *viride* (or *Helonias viride*), from N. America, also has greenish flowers with lance-shaped petals (*Bot. Mag. t. 1096*).

V. californicum.—A Californian species 5 to 6 ft. high, having branched panicles of greenish-white flowers (*Gard. Chron. 1900, xxviii. 22*).

V. Maackii.—A Siberian species about 2 ft. high, having lance-shaped leaves about 6 ins. long, and dark

purple flowers with a blackish base borne in loose panicles in July (*Gartenfl.* t. 1070).

V. nigrum.—An ornamental plant 2 to 3 ft. high, somewhat swollen at the base, and having oblong plaited leaves about 1 ft. long, and 6 to 8 ins. broad. The blackish-purple flowers are borne in June in dense racemes 1 to 3 ft. high. (*Bot. Mag.* t. 963.)

V. Wiedemannianum.—A native of Kurdistan, having flowers of indigo-blue, fading to purple-lilac.

WACHENDORFIA (after *E. J. Wachendorf*, a Dutch botanist). Nat. Ord. *Hæmodoraceæ*.—A genus with seven species of tuberous-rooted perennials having sword-shaped or rarely linear leaves, sometimes large and more or less plaited. Flowers yellow, in terminal and often hairy panicles or trusses. All natives of S. Africa.

The *Wachendorfias* flourish in sandy peat, loam, and leaf-soil, but can be regarded as hardy only in the mildest parts of the Kingdom. In severe winters they should be protected from frost and cold rains by means of hand-lights, bracken, etc. They may be increased by division of the tuberous roots in spring as growth is commencing, or by seeds sown in cold frames or gentle heat when ripe.

W. brevifolia grows about 1 ft. high, has lance-shaped plaited leaves, and crimson flowers tinged with yellow and softly hairy outside (*Bot. Mag.* t. 1116).

W. hirsuta.—A downy plant about 18 ins. high, with three-nerved narrow sword-shaped leaves, and reddish flowers becoming golden-yellow when fully open (*Bot. Mag.* t. 614).

W. paniculata.—This grows about 18 ins. high, and has three-nerved

sword-like leaves and golden-yellow flowers in panicles (*Bot. Mag.* tt. 616, 1060 (*pallida*)).

W. thyrsiflora.—A species about 2 ft. high with broad sword-shaped plaited leaves. The yellow flowers, with six lance-shaped acute segments, appear in early summer, in loose erect racemes. (*Bot. Mag.* t. 1060.)

WATSONIA (after *W. Watson*, a London apothecary), BUGLE LILY. Nat. Ord. *Iridææ*.—A genus of beautiful S. African herbaceous plants, having fibrous-coated corms, sword-shaped leaves, and tall spikes of tubular bell-shaped flowers.

The *Watsonias* may be grown in the open air during the summer months from the Midlands southwards, and should be planted in warm, sunny, and sheltered spots. In other localities it is safer to grow them in frames or greenhouses. Indeed this is how they are often cultivated. They like a rich sandy loam with a little leaf-soil, peat, or well-decayed manure, whether grown in pots or in the border. During growth the roots should have plenty of moisture, but when at rest no water should be given. In the autumn the corms of outdoor plants should be lifted before severe frosts set in, and may be stored in frost-proof places until April and May. The plants may be increased by offsets and by seeds.

W. aletroides (*Antholyza aletroides*).—A pretty species 2 to 3 ft. high, having thickish, narrow, sword-like leaves, and spikes of scarlet flowers in June and July (*Bot. Mag.* tt. 441, 533).

W. angusta (*W. iridifolia*).—This species has narrow lance-shaped leaves in two rows, and from eight to twenty-four scarlet flowers in a

spike (*Bot. Mag.* t. 600; *Fl. d. Serr.* t. 107).



FIG. 338.—*Watsonia angusta*.

W. brevifolia has narrow, pointed, distichous leaves, those on the stems being spathe-like. The scarlet flowers appear about May and June in one or two rows on the spikes. (*Bot. Mag.* t. 601.)

W. coccinea.—A fine plant 1 to 2 ft. high, closely related to *W. Meriana*, and having spikes of scarlet flowers (*Bot. Mag.* t. 1194).

W. densiflora.—A fine species, with narrow stiffish leaves $1\frac{1}{2}$ to 2 ft. long, and spikes of soft rosy flowers in June (*Bot. Mag.* t. 6400).

W. humilis.—A pretty plant 2 to $2\frac{1}{2}$ ft. high, with two rows of narrow sword-shaped leaves 1 to $1\frac{1}{2}$ ft. long, and deep rose-coloured flowers in July and August (*Bot. Mag.* tt. 63, 1193).

W. marginata.—This species grows 3 ft. or more high, and has somewhat leathery lance-shaped leaves 2 to $2\frac{1}{2}$

ft. long, and bright pink drooping flowers (*Bot. Mag.* t. 608). There is a smaller-flowered variety called *minor* (*Bot. Mag.* t. 1530).

W. Meriana (*Antholyza Meriana*).—This fine species, 1 to 2 ft. high, has thickish lance-shaped, strongly-nerved



FIG. 339.—*Watsonia Meriana*. (3.)

leaves, and spikes of purple or scarlet flowers in May or June (*Bot. Mag.* t. 418).

The variety *iridifolia* grows about 3 ft. high, and has white flowers (*Bot. Mag.* t. 600); *rosea-alba* has white and rose blossoms (*Bot. Mag.* tt. 537, 1193); and *Ardernei* or *O'Brieni* is perhaps the finest member of the genus. It grows 4 ft. high, and has branched stems bearing pure white funnel-shaped flowers 2 ins. across (Fig. 340).

W. punctata.—This dwarf-growing species, with narrow, flattish, or rounded leaves has scarlet or violet flowers in June (*And. Bot. Rep.* t. 177, as *Ixia*).

W. rosea (*Gladiolus iridifolius*).—This fine species grows 3 to 4 ft.

high, and has leathery leaves 2 to 2½ ft. long, and spikes of funnel-shaped bright rosy flowers from July to October (*Bot. Mag.* t. 1072; *Jacq. Ic.* t. 235).

W. strictiflora.—A little-known species with narrow leaves about 6 to 12 ins. long, and spikes of erect scentless cherry-red flowers marked with violet-purple in the throat (*Bot. Mag.* t. 1416).



FIG. 240.—*Watsonia Meriana*
Ardernei. (1.)

WELDENIA. Nat. Ord. Commelinaceæ.—A genus containing only one species—

W. candida.—A native of Mexico and Guatemala, having fleshy tuberous root-stocks, from which arise annually six to eight strap-shaped leaves with folding bases. The snow-white flowers, about an inch across, are borne on erect scapes in a cluster in the centre of the leaves (*Bot. Mag.* t. 7405).

WILBRANDIA (after *Joh. Bernh. Willbrand*, a German botanist, born 1789, died 1846). Nat. Ord. Cucurbitaceæ.—A little-known genus, the only known species of which is—

W. drastica (*Rhynchoscarpa glomerata*).—A tuberous-rooted perennial from Brazil, closely related to the Bryony, and having digitately five-lobed leaves and climbing stems 9 to 12 ft. long. The small whitish flowers (males and females being separate on each plant) are borne in panicles, and are succeeded in autumn by small egg-like fruits.

This plant—if worth growing at all—may be raised from seeds sown in heat annually, the young plants being placed in warm sunny spots about May or June.

WURMBEA (after *F. Van Wurmbe*, a Dutch Naturalist). Nat. Ord. Liliaceæ.—A little-known genus of bulbous plants, having narrow leaves, and short spikes of bell-shaped flowers. They are natives of S. Africa, and may be grown in a cool greenhouse or frame, or in the open air in the milder parts during the summer months in sandy loam and leaf-soil, and may be increased by offsets.

W. capensis (*W. campanulata*; *Melanthium monopetalum*).—This is the best-known species. It grows from 6 to 12 ins. high, and has the upper leaves linear, the lower ones being lance-shaped, dilated, and sheathing at the base. The white flowers appear in May and June, and if several plants are grown together they look very pretty. (*Bot. Mag.* t. 1291.)

W. purpurea is very similar, but has purplish flowers (*Bot. Mag.* t. 694).

XANTHOSOMA (*xanthos*, yellow; *soma*, a body; in reference to the

large yellow stigma). Nat. Ord. Aroideæ.—A genus containing about twenty species of hothouse herbaceous plants, closely related to the Caladiums, and having milky juice, tuberous or thickened root-stocks, and large hastate or sagittate leaves with long stalks. The flowers are monœcious, and borne on a spadix which stands in the centre of a convolute spathe.

These plants being natives of Tropical America (W. Indies, Brazil, Venezuela, Guiana, etc.), flourish in a hot moist atmosphere, with a minimum winter temperature of 60° to 65° F. During growth the foliage should be syringed two or three times a day, generally in the morning and late afternoon, and plenty of water should be given to the roots. The most suitable compost seems to be a rich sandy loam, to which leaf-mould and well-rotted manure may be added. Suckers are produced from the base of the plants, especially if the main stem has been cut or injured in any way, and by this means the stock may be increased. The suckers should be inserted in a hot-bed in a close case or under a bell-glass, and will soon root. The plants are valued chiefly for the ornamental appearance of the foliage.

X. auriculatum.—Leaves three-lobed, heart-shaped, suddenly tapering at the tip, having reddish or green stalks, striped with brown (*Gartenfl.* 1869, t. 603).

X. Barilleti.—A handsome plant with bright green leaf-stalks a yard long, the blades being deeply cut into three to five large strongly-veined lobes (*Rev. Hort.* 1882, p. 260).

X. cordatum.—This species has heart-shaped leaves 1½ ft. long and over 1 ft. broad, with stems 2 ft. or

more long. The yellow-green spathe, over 6 ins. long, is rose-tinted at the base and whitish inside. (*Kew Bull.* 1906, 7.)

X. Hoffmanni.—A Mexican plant, having leaves deeply cut into five to seven lobes, dark green with a bluish metallic sheen, the stalks being whitish blotched with dark purple. The spathe has a green tube, purple within, the limb being white.

X. Lindeni.—A pretty plant, is well known under the name of *Phyllotænium Lindeni*. It has oblong-hastate leaves about 1 ft. long, deep green, with the midrib and side veins of ivory white. (*Ill. Hort.* 1872, t. 88.) The variety *magnificum* has larger and finer leaves than the type.

X. mirabile.—This distinct species has green leaves about 1 ft long, spotted with yellow and divided into three oval, lance-shaped, pointed segments, the leaf-stalks being about a yard long. The flower-spathe is of a primrose-yellow colour. (*Gard. Chron.* 1874, ii. p. 258.)

X. sagittifolium.—Leaves 12 to 18 ins. long, broadly oval, sagittate, pointed, borne on stalks a yard or more high. Flower-spathe greenish and white. (*Bot. Mag.* t. 4989.)

X. violaceum.—A very ornamental species with sagittate, oval oblong blades 9 to 18 ins. long, on brownish-violet stalks 2 to 3 ft. long. Spathe pale violet outside, yellowish-white within, enclosing a violet and white spadix.

ZEPHYRANTHES (*zephyros*, west wind; *anthos*, a flower; reference to the New World—the West), ZEPHYR FLOWER. Nat. Ord. Amaryllidææ.—A genus containing about three dozen species of herbaceous plants with tunicated bulbs, narrow strap-shaped leaves, and more or less erect funnel-shaped flowers borne on slender hollow

stems. The genus *HABRANTHUS* is now merged in this.

Only a few species of Zephyr Flower can be regarded as hardy enough for out-door cultivation, and these are specially mentioned below. In most cases, especially in the less favoured parts of the Kingdom, it is safer to grow the bulbs in pots or pans in a frame, or slightly heated greenhouse. All species like a rich and fairly sandy loam, with a little leaf-mould or well-decayed cow-manure added. The bulbs vary from $\frac{1}{2}$ in. to $1\frac{1}{2}$ ins. in diameter, so that when planted in the open border or rockery they should be buried about three or four times their own diameter. When grown in pots it will be sufficient if the tops of the bulbs are just beneath the surface of the soil. To secure a display several bulbs should be planted together, as an odd one here and there is practically lost to view, and gives one a poor impression as to the real beauty of the plants when in blossom. The simplest way to increase the plants is by offsets from the old bulbs.

The following are some of the best-known species :—

Z. Andersoni (*Habranthus Andersoni*).—This pretty little species from Monte Video is fairly hardy in the milder parts of the country. It has pale green leaves 5 to 6 ins. long, and yellow flowers, tinged with coppery-red outside, borne on slender scapes 3 to 6 ins. long during the summer months. (*Bot. Reg.* t. 1345.)

Z. andicola.—A native of the Chilean Andes, with grey-green linear leaves and bright violet flowers 2 ins. long, borne on scapes 6 ins. or more high, in January or February. Greenhouse or frame.

Z. Atamasco (*Amaryllis Atamasco*).—A fine species from the damp

woods and fields of Virginia, with bright green leaves, and pure white scentless flowers, 3 ins. long, borne from April to May on stalks 6 to



FIG. 341.—*Zephyranthes Atamasco*.

12 ins. high, and tinted with pink or purple in the bud state (*Bot. Mag.* t. 239; *Red. Lil.* t. 31; *Lodd. Bot. Cab.* t. 1899).

Z. aurea.—A Peruvian species, having narrow acute leaves about 1 ft. long, and erect, funnel-shaped, orange-yellow flowers nearly 3 ins. across (*Rev. Hort.* 1904, 166, f. 67; *Gard. Chron.* 1908, xliii. 390; *Gard.* 1908, 325, f.).

Z. candida (*Amaryllis candida*; *A. nivea*), *Swamp Lily*.—This pretty Zephyr Flower is abundant on the marshes of La Plata, and has bright green roundish leaves about 1 ft. long, and scentless flowers pure white, or slightly tinged with rose outside, borne on slender stalks 6 to 9 ins. long, in September (*Bot. Mag.* t. 2607; *Bot. Reg.* t. 724). The variety

major has flowers 4 ins. long, borne on long stout stems.



FIG. 342.—*Zephyranthes candida*.

Z. carinata (*Z. grandiflora*; *Amaryllis carinata*).—A beautiful species, native of Central America and the West Indies, with linear leaves 6 to 12 ins. long. The beautiful deep rosy-pink flowers, 2 to 3 ins. long, appear about June on stems 6 to 9 ins. long, and last in perfect condition a long time. There is a certain amount of variation in the colour, and the form called *lilacina* is chiefly distinguished by lilac-tinted blossoms. (*Bot. Reg.* tt. 902, 2594.)

Z. citrina.—This is supposed to be a native of Demerara. It has roundish stolon-bearing bulbs $1\frac{1}{2}$ ins. in diameter, very narrow bright green leaves about 1 ft. long, and bright yellow flowers $1\frac{1}{2}$ to 2 ins. long, in August and September, borne on two-edged scapes about 6 ins. high (*Bot. Mag.* t. 6605). Greenhouse.

Z. Lindleyana.—A Mexican species with leaves 6 to 8 ins. long, and bright red flowers $1\frac{1}{2}$ to 2 ins. long, borne on slender scapes 6 to 12 ins. high in June. Greenhouse.

Z. longipes.—A native of Monte Video with linear leaves, thin flower-scapes 6 ins. high, and pale red flowers 3 ins. long, with lance-shaped spreading segments.

Z. mesochloa.—A native of Buenos Ayres, with whitish flowers, green at the base, and tinged with red outside, borne in May or June on stems about 9 ins. high (*Bot. Reg.* t. 1361). Fairly hardy in mild parts.

Z. robusta.—Also a native of Buenos Ayres, with narrow grey-green leaves which appear after the flowers. These are rose-red $2\frac{1}{2}$ to 3 ins. long, and are borne on slender scapes 6 to 9 ins. high, about July and August. (*Lodd. Bot. Cab.* t. 1761.)

Z. rosea (*Amaryllis rosea*; *A. carnea*).—A pretty Zephyr Flower from the Cuban mountains, with linear bright green leaves and bright rose-red flowers 1 in. long, about September and October (*Bot. Reg.* t. 821; *Bot. Mag.* t. 2537). Fairly hardy.

Z. Taubertiana.—A Brazilian species, with narrow linear leaves and large pink-tinted flowers (*Gartenfl.* 1896, t. 1427). Requires greenhouse treatment.

Z. texana.—A native of Texas, with bright yellow flowers tinted with coppery-yellow outside, borne on stalks 4 to 8 ins. high. Frame or greenhouse. (*Bot. Mag.* t. 3596.)

Z. Treatiæ.—A handsome species, native of the damp swampy parts of Florida, having grass-green leaves about $\frac{1}{2}$ in. broad, and white flowers about 3 ins. long keeled with red, in early summer, borne on more or less purplish stalks 6 to 12 ins. high. Fairly hardy.

Z. tubispatha (*Z. nervosa*; *Amaryllis tubispatha*).—A native of the West Indies and Central American mountains, with narrow linear flaccid leaves over 1 ft. long, and white, slightly fragrant flowers $1\frac{1}{2}$ to 2 ins. long, in early summer (*Bot. Mag.* t. 1586). Fairly hardy.

Z. verecunda (*Z. sessilis*; *Z. striata*).—A native of the highlands of Central Mexico, with narrow green leaves 6 to 12 ins. long, and white flowers $1\frac{1}{2}$ to 2 ins. long, keeled with red, and borne on stems 3 to 9 ins. high, in the spring and early summer months (*Bot. Mag.* tt. 2583, 2593; *Ref. Bot.* tt. 212, 356). Greenhouse or frame.

Z. versicolor.—A South American species, with leaves a foot long, produced after the flowers, which appear in January or February, and are white, 2 to $2\frac{1}{2}$ ins. long, flushed outside with red and green (*Bot. Mag.* t. 2485).

ZINGIBER (the Indian name). Nat. Ord. Scitamineæ.—This genus contains about twenty species of herbaceous perennials, having tuberous rhizomes, large more or less oblong or lance-shaped leaves, and flowers borne in dense spike-like clusters.

These plants are more of botanical and economic interest, although they are by no means unornamental. The root-stocks of the East Indian **Z. officinale** supply the Ginger roots of commerce; **Z. Cassumunar** supplies Bengal Root (*Bot. Mag.* t. 1426); **Z. Parishii**, from Moulmein, has creeping root-stocks about 3 ft. long, and produces stems about 3 ft. high, having elliptic lance-shaped leaves, and pale yellow flowers veined with purple (*Bot. Mag.* t. 6019); **Z. spectabile**, from the Malay Peninsula,

is about 8 ft. high, with oblong lance-shaped tapering leaves and pale yellow flowers with a red-brown lip spotted with yellow (*Bot. Mag.* t. 7967); **Z. Zerumbet**, from the East Indies and Malaya, grows 3 to 4 ft. high, with broadly lance-shaped wavy leaves and pale sulphur-yellow flowers (*Bot. Mag.* t. 2000). There is a variety with variegated leaves.

ZYGADENUS (*zygos*, a yoke; *aden*, a gland; in reference to the double glands on the perianth). Nat. Ord. Liliaceæ.—A little-known genus of herbaceous plants with rhizomes or bulbous root-stocks, clusters of narrow leaves, and branched racemes of more or less bell-shaped flowers.

These plants are chiefly of botanical interest. They like a deep, moist peaty soil in somewhat shaded places, and may be increased by division of the root-stocks or offsets. The following species are met with. They are all natives of N. America.

Z. angustifolius.—A slender-stemmed plant 12 to 18 ins. high, with reduced leaves, and racemes of small white flowers, turning purple with age (*Bot. Mag.* t. 1540).

Z. glaberrimus (*Helonias bracteata*).—This species grows 2 to 3 ft. high, and has narrow grassy leaves 12 to 18 ins. long, and small white flowers in June (*Bot. Mag.* t. 1703).

Z. glaucus (*Z. elegans*).—A plant 1 to 2 ft. high, with grey-green leaves 1 to 2 ft. long, and loose racemes of whitish-green flowers in summer (*Bot. Mag.* t. 1680, as *glaberrimus*).

Z. Muscætoxicum (*Helonias læta*), *Fly Poison Plant*.—This grows 1 to 2 ft. high, has the leaves much reduced, and bears greenish-white flowers in summer (*Bot. Mag.* t. 803; *Lodd. Bot. Cab.* t. 998).

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GLOSSARY OF TECHNICAL TERMS USED IN THIS WORK

- Achene**, a dry, non-bursting, one-seeded fruit.
- Achlamydeous**, flowers without sepals or petals.
- Actinomorphic**, when regular flowers can be cut into two equal halves in more than one plane.
- Acuminate**, taper-pointed.
- Adnate**, one organ united to another.
- Alternate**, when leaves are arranged on a stem one after another.
- Amplexicaul**, stem-clasping.
- Androecium**, the stamens (or male organs) of a flower.
- Angiosperms**, flowering-plants with ovules enclosed in an ovary.
- Anther**, the sac-like part of the stamen containing the pollen essential for fertilisation.
- Apocarpous**, when several pistils or carpels in the same flower are separate.
- Auricled**, with leaf-like appendages, as in Cyclamen.
- Bipartite**, when leaves are divided into two parts nearly to the base.
- Bipinnate**, when the pinnæ or divisions of a pinnate leaf are themselves again pinnate.
- Biterminate**, when the divisions of a ternate leaf are themselves ternate.
- Bracteate**, furnished with bracts.
- Bracts**, small leaves at the base of the pedicels.
- Bulb**. *See* p. 1, and Figs. 1, 2, 3, 4, 20-22.
- Calyx**, the outer and usually greenish whorl of leaf-like organs (sepals) outside the corolla (petals).
- Carpel**, another name for the pistil—*which see*.
- Cladodes**, leaf-like bodies, as in Asparagus.
- Connate**, when two similar bodies are slightly united at the base.
- Convolute**, when one part is rolled up within another lengthwise.
- Corolla**, the more or less highly-coloured whorl of floral leaves (petals) between the calyx and stamens.
- Corm**. *See* p. 1, and Figs. 5, 6, 13, 16, 17, 18, 19, 53.
- Corona**, the central conspicuous growth in Narcissi flowers.
- Corymb**, a raceme having flowers at one level owing to the lower ones having longer stalks than the upper ones.
- Crenate**, when the teeth on the margins of leaves are rounded.
- Cuneate**, wedge-shaped.
- Cyme**, an inflorescence formed of a terminal flower beneath which are two opposite side-shoots, each ending in a blossom and again having side-shoots.
- Diadelphous**, when stamens are in two distinct bundles.
- Dichlamydeous**, flowers having both sepals and petals.
- Dichotomous**, forked in pairs.
- Dicotyledons**, with two seed-leaves. *See* p. 43.
- Didynamous**, having two long and two short stamens.
- Diœcious**, when the stamens are on one plant and the pistils or carpels on another.
- Distichous**, arranged in two opposite rows.
- Ensiform**, sword-shaped.

GLOSSARY

- Epigynous**, when the sepals, petals, and stamens are seated apparently on the ovary.
- Epipetalous**, when the stamens are seated on the corolla.
- Equitant**, overlapping each other like the leaves of many Irises.
- Fasciated**, applied to stems which become fused and flattened.
- Fascicle**, a cyme or crowded cluster of flowers each on short stalks or pedicels.
- Filament**, the stalk of a stamen.
- Fistular**, hollow-stemmed or hollow-leaved.
- Flexuose**, **flexuous**, zigzag, changing direction at each joint; wavy.
- Follicle**, a swollen one-celled carpel with several seeds, as in *Pæony*, *Aconitum*, etc.
- Gamopetalous**, when the petals are united, not free.
- Gamosepalous**, when the sepals are united, not free.
- Glaucous**, grey- or blue-green.
- Gynœcium**, the carpels or pistils (female organs) of a flower.
- Hastate**, arrow-shaped, with the lobes pointing outwards, not downwards, as in *sagittate*—which see.
- Hermaphrodite**, when stamens and pistils are in the same flower.
- Hypogæous**, **hypogeal**, remaining underground.
- Hypogynous**, seated beneath the ovary.
- Indehiscent**, said of non-bursting seed capsules.
- Inflorescence**, the flowers and the way they are arranged on the stems.
- Involucre**, the circles of leafy bracts at the base of a flower-head.
- Irregular**, when the parts of a flower are unequal in size. *See* Figs. 37, 41.
- Laciniate**, cut deeply into narrow, irregular segments.
- Monadelphous**, one brotherhood—said of stamens when united into one bundle.
- Monochlamydeous**, when flowers have only sepals or petals, but not both.
- Monocotyledons**, with one seed-leaf. *See* p. 43.
- Monœcious**, when the stamens and pistils are in separate flowers but on the same plant, as in *Begonia*.
- Ob**, inverted or reversed, as in obovate, oblanceolate, obcordate, obovoid, etc.
- Ocrea**, a tubular membranous stipule surrounding the stem.
- Ovary**, the unripened seed-vessel.
- Ovule**, the young seed before it has been fertilised by the contents of the pollen-tube.
- Panicle**, a raceme with branching pedicels.
- Pedicel**, the stalklet of a single flower on a raceme, panicle, or corymb, etc. *See* Figs. 37, 40, 41, 50, 99, etc.
- Peduncle**, flower-stalk.
- Peltate**, roundish, with the stalk in the centre.
- Perfoliate**, when a stem apparently passes through a leaf.
- Perianth**, the name given (especially in Monocotyledons) to the floral leaves (petals).
- Perigynous**, growing above and round the ovary.
- Petals**, the parts of the corolla.
- Petiole**, leaf-stalk.
- Phanerogams**, flowering-plants. *See* p. 43.
- Pinnate**, when leaflets are arranged on opposite sides of a common stalk.
- Pistil**, the ovary, style, and stigma taken together.
- Pollen**, the dust-like granules from the anthers which serve to fertilise the ovules.
- Polygamous**, when male, female, and hermaphrodite flowers are intermixed on same plant.
- Polypetalous**, when the petals are quite free and distinct from each other.
- Protandrous**, when the anthers in a flower ripen before the stigmas.
- Protogynous**, when the stigmas in a flower ripen before the anthers.
- Raceme**, a main flower-stem with several shortly-stalked flowers, as in *Lily of the Valley*. *See* Fig. 99.
- Rachis**, the main or central stem of an inflorescence.

GLOSSARY

- Radical**, said of leaves when springing up from the root-stalk.
- Rhizome**. See p. 4, and Figs. 11, 12, 13, 38, 99.
- Root-stock**. See p. 5, and Figs. 36, 49, 52, 60, 66, 71.
- Rotate**, a gamopetalous corolla with a short tube and a very spreading limb.
- Sagittate**, leaves shaped like the barbed head of an arrow, the lobes pointing backwards. See *Hastate*.
- Scape**, a leafless flower-stem or peduncle springing from the root-stock, as in Tulips, Hyacinths, etc.
- Sepals**, the divisions of the calyx.
- Sessile**, when leaves have no stalks (petioles).
- Setaceous**, bristle-like.
- Sinuate**, having blunt lobes and notches alternately.
- Sinus**, a blunt or roundish indentation, as in the leaves of *Bocconia*, *Sanguinaria* (Fig. 307), etc.
- Spadix**, a fleshy club-like organ bearing flowers, as in the *Arum* family. See p. 47, and Figs. 43-45, 56-58, 61, 65, 83.
- Spathe**, a large white or coloured bract enclosing a spadix. See Figs. 43, 44, 45, 56, 57, 58, 83.
- Stamen**, the male organ of a flower, usually composed of a stalk or filament and an anther or pollen sac.
- Staminode**, a barren or antherless stamen.
- Stipules**, leaf-like appendages at the base of the leaf-stalk.
- Stigma**, the sticky tip of the pistil on which the pollen grains grow for fertilising purposes. The stigma of Irises are petal-like. See Figs. 200 *et seq.*
- Style**, the stalk of the pistil between the stigma and ovary. See Fig. 31.
- Syncarpous**, when the carpels are united, and not free and distinct from each other.
- Thallophytes**. See p. 42.
- Tendril**, a leaf or branch modified into a slender organ for twisting round supports. See Figs. 159, 160, 172, 173, 248.
- Trichotomous**, three-forked in succession.
- Tuber**. See p. 3, and Figs. 7, 8, 9, 109.
- Tubercle**, tubercule, a small tuber. See Figs. 74, 93.
- Umbel**, when many stalked flowers spring from one point and reach about the same level. See Figs. 95, 103, 104.
- Versatile**, attached loosely at the middle, as the anthers of *Liliums*. See Figs. 234, 239, 244, etc.
- Whorl**, when leaves, sepals, petals, etc., are arranged in a circle round an axis.
- Zygomorphic**, said of a flower that can be bisected in two similar halves in one plane only, as in *Aconitum*, Fig. 37.

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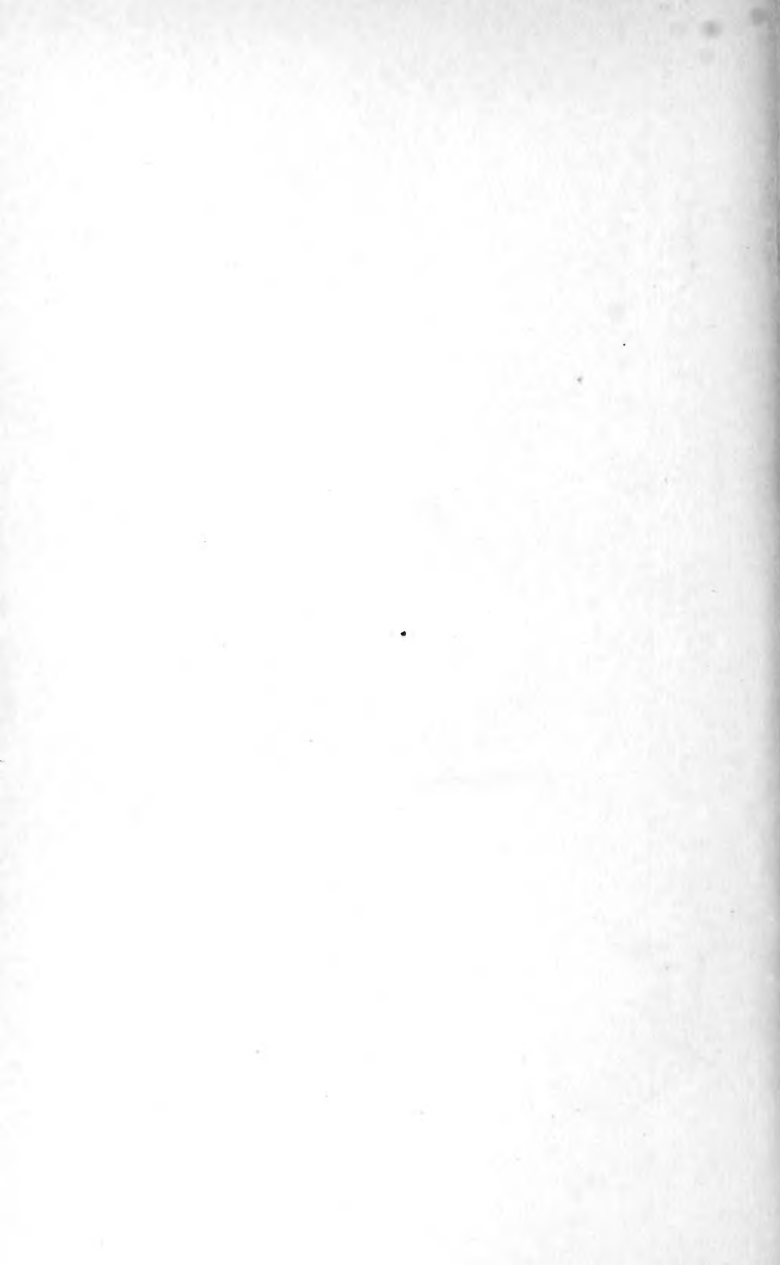
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