BULB GARDENING

A. J. MACSELF

THE HOME GARDEN BOOKS

THE

HOME GARDEN BOOKS

Illustrated

By A. J. MACSELF

Bulb Gardening
Alpine Plants
A Real A B C of Gardening
Flowering Trees and Shrubs
Hardy Perennials
Gladioli

6s. net each

The Horticultural Exhibitor

3s. 6d. net

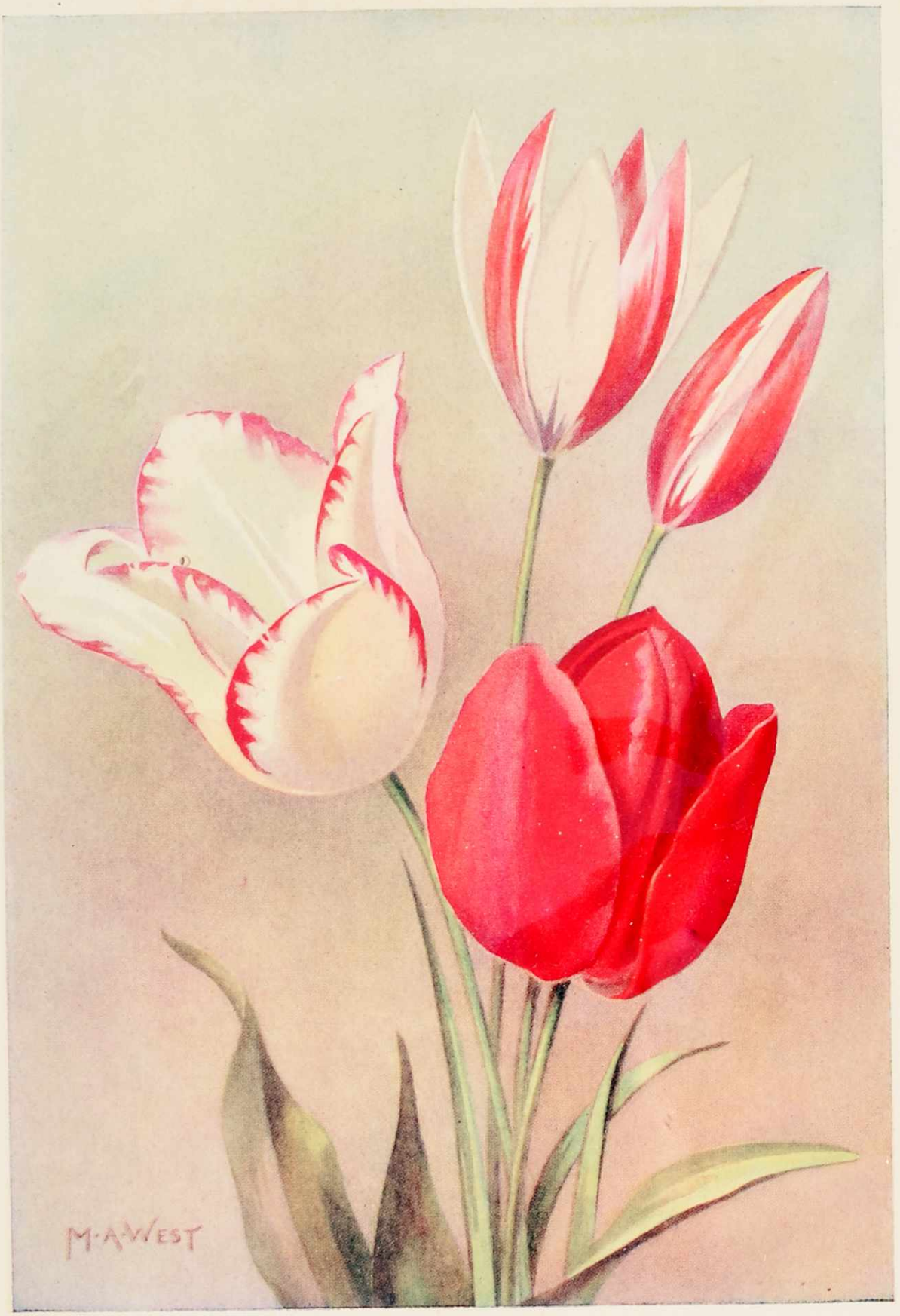
By MARY HAMPDEN

Rose Gardening
Town Gardening

6s. net each

BULB
GARDENING

THE HOME GARDEN BOOKS



HERBACEOUS TULIPS

May-flowering Tulip
'Picotee'
(White, rose edged)

Tulip Species
'Tulipa Clusiana'
(White, streaked with red)

May-flowering Tulip
'Macrospila'
(Crimson-scarlet)

BULB GARDENING

BY

A. J. MACSELF

Illustrated in Colour, Half-tone and Line

THORNTON BUTTERWORTH LIMITED
15 BEDFORD STREET, LONDON, W.C.2

First Published 1925

MADE AND PRINTED IN GREAT BRITAIN

PREFACE

THE precise object of this book is to furnish useful information and instruction which will enable those who desire to grow Bulbs, Tubers and Corms in the garden or in the house to select suitable kinds for their purpose and environment, and to afford them treatment calculated to produce the best possible results.

Had I no other purpose in view than to make a book the subject should not be Bulbs, for literature in abundance is gathered under that heading.

Experts and Bulb Specialists are particularly well provided with profound works calculated to meet their every requirement, and no unsatisfied demand in that direction could be met by anything I might produce. If I had held the same opinion regarding the average, less experienced home-garden enthusiast this book would not have been written.

By common consent many roots which are correctly speaking tubers or corms are classed with bulbs for the sake of practical convenience, and there are many such among the subjects dealt with in the following pages. The tendency has sometimes been to unduly extend the range of plants which may reasonably be classed with bulbs, but this, to my mind, is an unnecessary and pernicious practice.

Kniphofias, pœonies, rhizomatous Irises, Alstrœmerias, Physalis, and other border perennials which happen to have fleshy roots are not suitably treated as bulbs, and their inclusion in bulb-lists is mischievous, since it tends to encourage the belief that it is correct and prudent to lift and dry-store their roots for indefinite periods, a decidedly injurious method of treatment. Sound reason for dragging in unnecessary subjects in this manner is difficult to discover in view of the facts that they are invariably dealt with among herbaceous plants and that the legitimate range of Bulbs, Tubers, and Corms is wide enough in extent for every conceivable purpose.

A. J. M.

CONTENTS

PART I

CONCERNING ORDINARY GARDEN CULTURE

PART II

CONCERNING INDOOR CULTURE OF BULBS, CORMS AND TUBERS

LIST OF ILLUSTRATIONS

COLOUR

HALF-TONE

LINE DRAWINGS

PART I
CONCERNING ORDINARY GARDEN CULTURE

BULB GARDENING

CHAPTER I

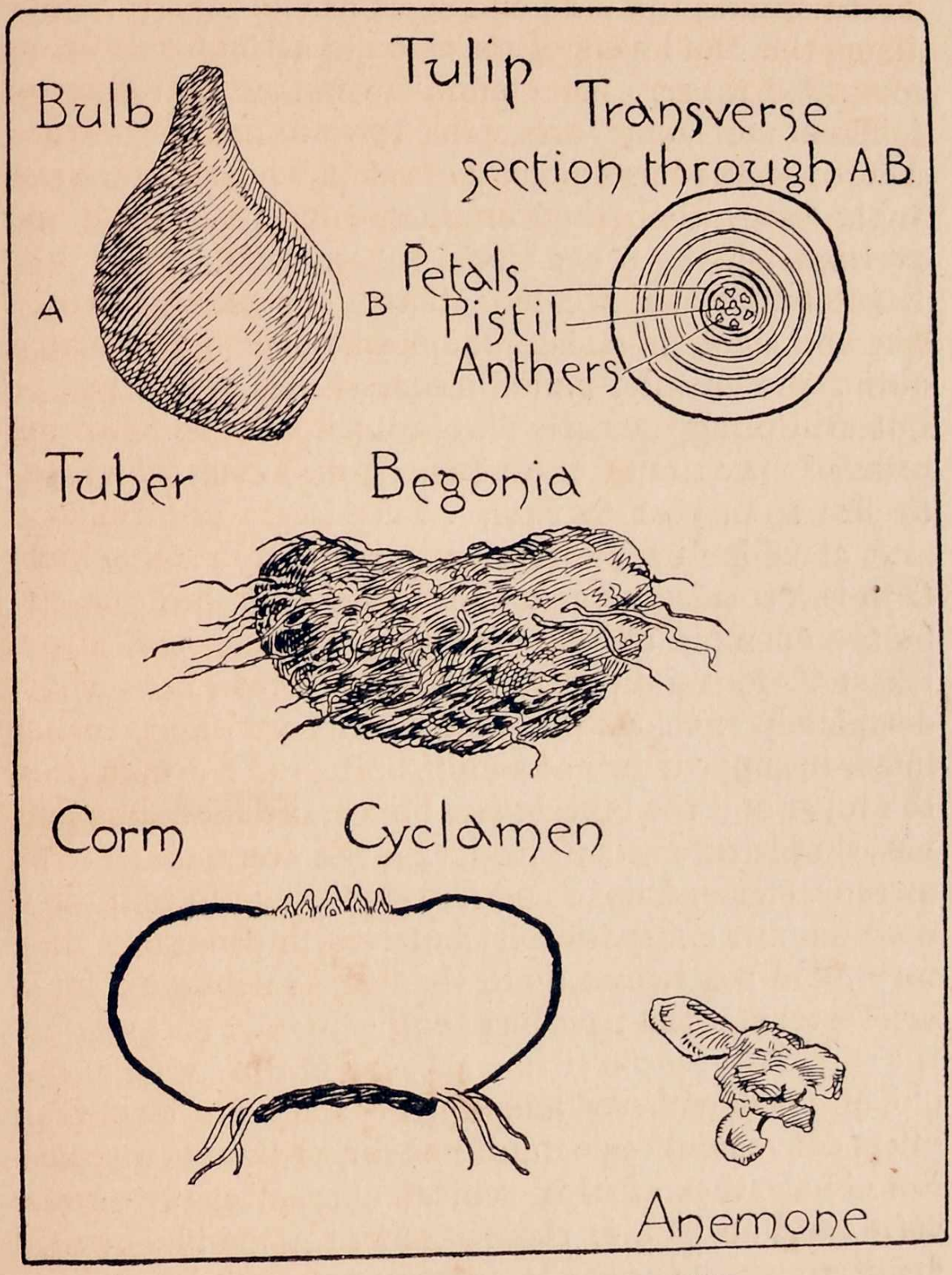
BULBS, TUBERS AND CORMS

FOR reasons which are too obvious to require explanation horticulturists frequently and by common custom adopt for general usage terms which by literal interpretation would be inaccurate but are quite satisfactory because their implied meaning is readily understood. Thus, for instance, the term "Alpines" is commonly made to embrace the whole range of dwarf, compact, or prostrate and trailing plants which are suitable for rock-gardening irrespective of whether they belong to the Alps or to the plains. Thus, also, the term Bulbs is allowed to cover the many plants which have tuberous roots or corms instead of correctly defined bulbs. Small though the importance may appear to be it is well that all should clearly understand the differences between the several kinds of roots, for certain points are likely to arise in the course of cultivation in connection with which this knowledge will be useful. If a proper bulb, such as a Hyacinth, Daffodil, Tulip, or Blue-bell (Scilla) is cut horizontally across it will be found that it is built up of separate layers of

flesh, rolled tightly and closely overlapping in the same manner as the layers of an onion. All bulbs are thus composed of a series of separate layers, but in the case of Liliums the layers are split up into narrow strips, secured at the base, but otherwise detached, and loose at the top, although generally speaking incurving and overlapping.

The bulb is not the real root of the plant, but is a reservoir or store-house for nourishment accumulated during the growing period of one season which will be utilized during the early stages of growth the following season. The proper roots issue from a ring which encircles the base of the bulb. They begin to form soon after the dormant bulb has been planted in soil, which, however, requires to be tolerably moist, or in the case of bulbs which are allowed to remain in the ground from season to season the new roots are emitted after a short dormant period, the length of which varies somewhat in accordance with the kind of bulb, and the condition of soil, etc. When the flowers have faded, and the plant has completed and ripened its growth the roots, as well as the stems and leaves die, leaving the bulb again in a dormant state. It is whilst bulbs are in this stage they may be lifted for cleaning, storing if necessary for a brief period, and transplanting.

Tubers differ from bulbs in that they are formed of one solid mass of substance instead of layers of scales. Some have a number of scattered growing eyes, some have a cluster of eyes closely crowded around a central point or crown. Roots, in some cases, issue from numerous individual bases regularly or irregularly dis-



EXAMPLES OF BULB, TUBER, AND CORM

posed around the base and sides of the tuber. Sometimes the roots congregate in tufts at intervals on an elongated tuber. Some plants form new tubers at the joints of spreading roots, after the manner of potatoes. These young tubers quickly develop, whilst the original tuber from which they originated exhausts itself and perishes. Many other kinds, tuberous Anemones, and Begonias, for instance, have tubers of perennial character, and solid substance which will yield up considerable nourishment for production of foliage and bloom, but still retain sufficient to build up the tissues and cellular material of their own bodies, even increasing in size from year to year.

A corm is in some respects similar to a tuber; its flesh is a solid mass, not scaled as a bulb, but usually, as for example in the Gladiolus, Crocus, and Montbretia there is a separate ribbed, or veined skin which completely envelops the solid fleshy body, and gives it much the appearance of a bulb. The corm differs from the tuber and the bulb in one important characteristic, viz., that it exhausts itself during the production of the season's stems, foliage and flowers, but simultaneously with its own exhaustion it contrives to produce a new corm, and sometimes more than one to take its place next season. The new corm will generally be found at the end of the season sitting close upon the crown of the old, and now withered and dying corm. The Gladiolus offers convenient opportunity at lifting time in autumn for observation of this typical characteristic of the corm, and an idea of the amount of nourishment and creative energy one of these must contain and deal with will be gathered when it is seen that in addition to

producing all the foliage and flower spike of the plant during summer the one corm has managed to produce another, and perhaps two as large as itself, and also a vast number of small seed-like cormels known as "spawn," which, if sown and cared for, will in the course of the ensuing season develop into strong young corms. The foliage and flowers depend primarily upon the reserve nourishment hoarded in the corm, but the production of next season's corms and spawn is the outcome of fresh supplies drawn from the soil by the roots and from the air by the foliage, the two forms of nourishment coming into contact and undergoing rapid conversion in the cells of the corm. When thoroughly ripe, but not before the old withered corm, and old decayed skin should be removed and destroyed, the spawn collected, and the new corms placed in shallow trays for storage in a cool and fairly dry place until planting time arrives.

Premature lifting is very harmful ; the final development of new corms being dependent upon continuation of growth after the production of flowers is finished. Removal of faded flower spikes, preventing formation of seeds will benefit the young corms by concentrating all nourishment upon them. Bulbs also require to complete their growth and reach the dormant stage before they are lifted, and it is of considerable importance that no foliage shall be cut before it has completely ripened and withered. Tubers of perfectly hardy plants are in many instances indefinite in regard to seasons of rest, sometimes proceeding at once to form new herbage if the old foliage is cut away too soon, but they are weakened in the process. Those which are not

hardy, such as Begonias, will continue to grow vigorously until all the tender leaves and growing points of the stems are cut off suddenly by a chance frost. It is of no advantage to leave frozen growths on the plants, nor to leave their tubers in the ground, but when lifted they should be placed in trays and covered with coco-nut fibre to prevent them drying off too rapidly. The significance of these points will be realized when it is understood that during the whole period of active growth the roots take up soluble plant food from the soil and convey it to the bulb, tuber or corm. Simultaneously the foliage absorbs from the atmosphere certain gases, which also pass to the bulb or other fleshy body, and the combination of the contributions of the roots and the leaves results in conversion to cellular material which travels through the stems, leaves, and flowers to create new growth. When the heavy demand caused by production of flowers is at an end the surplus nourishment is secreted in the fleshy substance of the bulb, to be stored for use next season. This secretion of nourishment is only possible whilst a balance is maintained between the properties drawn from the soil and those drawn from the atmosphere. Therefore if leaves are cut before they have ceased to function the necessary balance is disturbed, and further effort of the roots is rendered abortive, the result being imperfections in next season's development of growth. It is by no means invariably essential that bulbs, tubers or corms shall always be lifted at the completion of growth. Indeed many will gain strength and multiply if left undisturbed for several years, nourishment being afforded by periodical top-dressing. Even in the case

of subjects which are not perfectly hardy it is frequently advantageous to cover their quarters with protecting material such as Heather or Gorse branches rather than lift every year. The covering must of course be removed before young growth becomes drawn and sickly in spring.

Obviously bulbs which are planted in grass cannot be annually lifted, but these usually thrive for a long period of time, young bulbs, developed from offsets, taking the place of old, exhausted bulbs.

CHAPTER II

DUTCH BULBS

THE particular reason for choosing this title for a chapter is that the term is commonly used as applying to the ordinary run of bulbs used for spring bedding, and for growing in pots or fancy bowls. The impression is widespread among the general public that Hyacinths, Tulips, Narcissi, Crocus, are all Dutch bulbs, and as a matter of fact quite a large number of people entertain the idea that we depend entirely upon Holland for the bulbs which bloom in British gardens. That is an erroneous idea, for we have bulb farms in this country where large quantities of bulbs, especially Narcissi and Tulips, as well as a wide range of more uncommon bulbous plants are produced.

We certainly do very little in the way of producing Hyacinths or the bedding varieties of Crocus, and it is true that a large proportion of cheap bulbs for bedding purposes are imported from Holland, our own farms being principally concerned with the raising of high-class new varieties, growing stocks for exhibition purposes, and in some districts producing vast quantities of bulbs for cut flower production.

Nobody can deny the Dutch bulb-growers the credit that is their due, for it is their industry and skill which

have combined to place at the disposal of the humblest cottager who loves his little garden bulbs that enable him at the cost of a few shillings to secure spring flowers of brightness, beautiful form and sweet perfume, whilst the spring glories of the public parks are largely due to the massed production of a wonderful range of gay-flowered bulbs by the Dutch growers.

A strong point in favour of the popular kinds of spring bedding bulbs is that they are capable of growing and blooming in almost any soil and situation. During the growth of the bulb itself to flowering size and strength a light, porous, but well-nourished soil is a necessity, and in this matter the Dutch growers are highly favoured, but when the bulb has been well grown, matured, and carefully harvested, it holds within its fleshy scales sufficient concentrated nourishment to produce both foliage and bloom, and so long as it is planted in soil which contains no destructive agents, and receives an adequate supply of moisture, it will manage to grow and bloom. That the moisture is the chief essential is evidenced by the fact that almost any well-developed and properly matured bulb will grow and bloom quite well in water alone, and although usually only Hyacinths and some of the cluster-flowered Narcissi are about the only bulbs grown in glasses or bowls of water, quite a wide range could be thus grown with equal success.

In the case of the bulbs grown in bowls of fibre it is almost the same, for the fibre contains extremely little nourishment, and is in reality just a sponge to hold ample quantities of water. It is well that it should be clearly understood that when bulbs are thus obliged

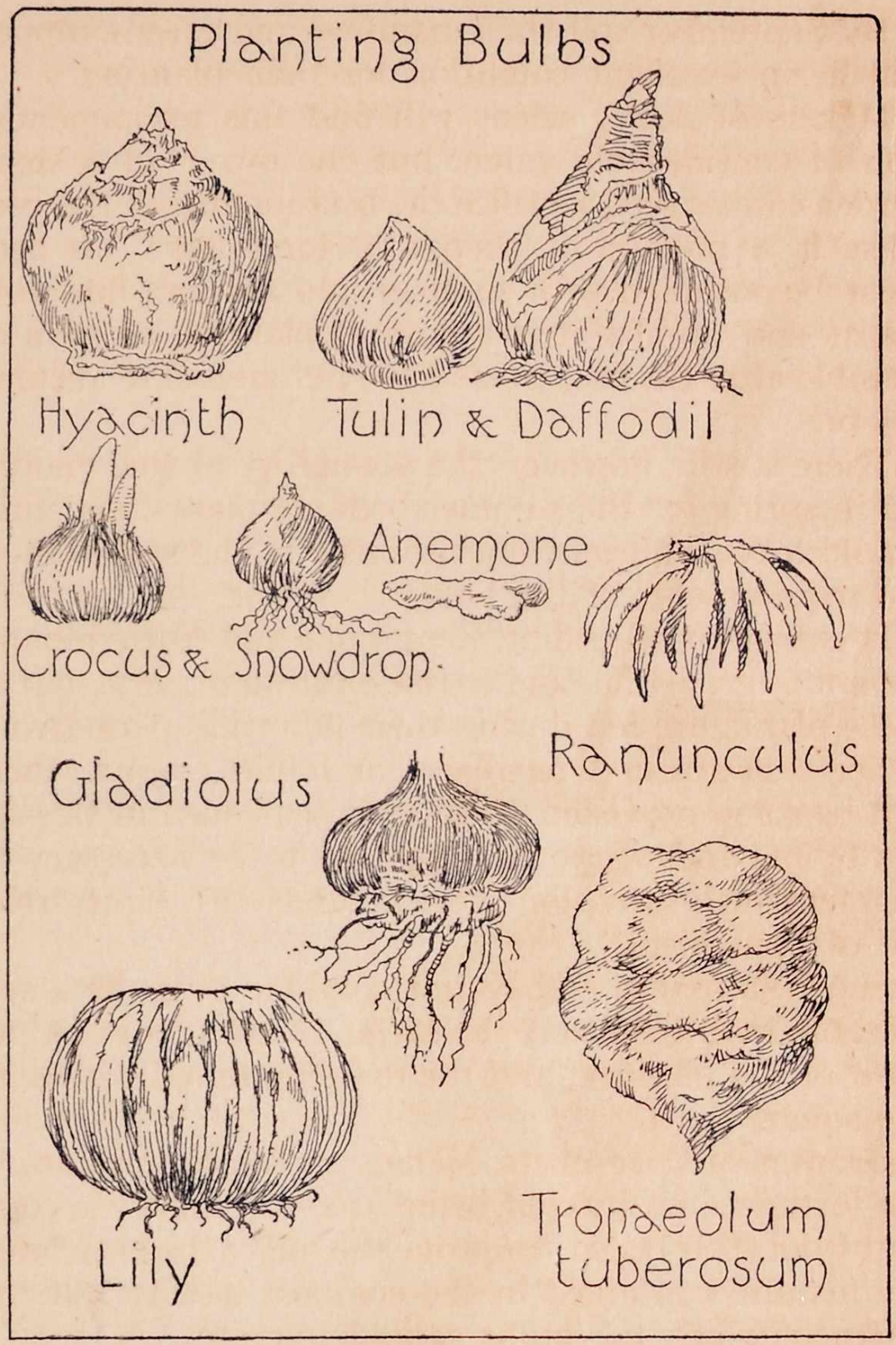
to draw upon their reserve store of nourishment, and have not available means of replenishing that which is expended the result must inevitably be exhaustion, and there cannot be a repetition of the performance the following year for the simple reason that no reserve store has been laid up in the bulb. For this reason it is desirable that the soil should so far as possible be thoroughly cultivated, and where this cannot be done it must be clearly recognized that it will be necessary to plant fresh stocks of bulbs each successive season.

There are those who confess they find no charm in the stiff formality and glaring colours of beds of Hyacinths, Tulips, etc. Some people do not care for ribbon borders of Crocuses, and to some Daffodils and Narcissi (I use the two names because I have not yet explained that one should suffice) are not pleasing flowers. I know no reason which would justify my presumption to question the good taste of these people. For them there are happily a well-nigh unlimited range of other and less formal bulbous plants, and many methods of planting and arrangement may be adopted besides that of the orthodox style of bedding. Candidly, it is not quite in accordance with my own ideas of gardening that beds should be marked out as with a compass and that bulbs should be planted to produce carpet-like designs, but the lover of careless freedom and natural effect errs when he would seek to impose his favoured style under all circumstances. The beds on a terrace, for instance, surrounded by formal architecture, intersected by paths in precise regularity, or even rectangular or circular beds cut out on a prim lawn would seldom be cleverly treated in the style of in-

formality and irregularity which is quite capable of being as incongruous and vulgar as the geometrical style of bedding is somewhat sweepingly averred to be by those who have no taste for it. It is sufficient for me to know that very many garden owners do love Hyacinths, Tulips, Crocuses, and the rest of the general run of Dutch bulbs for spring bedding, and furthermore that these bulbs may, with reasonable care and cultivation be made a glorious feature of the garden.

Readers have already been assured that poor soil need not debar bulbs from the garden, but it will surely be the desire of all to make the most of the means at disposal to achieve the best possible results. The problem is how to improve a poor soil without heavily dressing with manure at planting time. The matter would be simple if it could always be dealt with six months before bulb planting begins, for if soil is dug and well manured in April, and immediately sown with a green crop such as mustard, rape, or rye, this crop will absorb the dissolving constituents of the manure, and hasten decomposition. When the green crop has made considerable growth it should be dug in, and allowed to rot, thus returning to the earth the nourishment that was extracted and also increasing the humus (decomposed vegetable matter) which is an indispensible component of fertility.

Stiff clay soil is cold and heavy, and humus helps to make it lighter and warmer. Gravelly or sandy soil is prone to become excessively hot and dry, but humus holds moisture as a sponge, and thus materially moderates heat.



VARIOUS FORMS OF BULBS AND TUBERS, SHOWING RIGHT WAY UP FOR PLANTING

By September soil thus manured and green-cropped will be in excellent condition for bulb planting.

Makers of new gardens will find this recommendation of considerable value, but the owner of a small garden cannot well sacrifice the best months of the year to such a method of preparing for bulbs; his beds must be occupied with summer and autumn flowering plants and usually it is a case of planting as soon as possible after the first frosts have put an end to autumn gaiety.

There is still, however, the possibility of well manuring in spring for the summer bedding plants, and they should leave sufficient nourishment in the soil to meet the requirements of the bulbs.

It is true that bedding Geraniums and Antirrhinums are apt to grow rank and coarse on fresh manure, but as these plants are fed during their flowering period with either concentrated fertilizers or liquid manure there will be some provision of nourishment even in this for the bulbs, and where it is deemed to be necessary to augment such provision there is safety in a light dressing of bone-meal.

Superphosphate and Kainit combine to make a serviceable bulb fertilizer, the latter to constitute 25 per cent. of the mixture, and the dressing may be 2 oz. to the square yard.

Growers of Cucumbers, Melons, or Mushrooms are in the fortunate position of being able to utilize the compost from their beds to improve the soil of the bulb beds, the manure contained in the compost having lost the rankness which the bulbs cannot tolerate.

All possible advantage of good soil will be nullified if

planting is delayed until nearly Christmastime. Bulbs will certainly make some growth, and produce flowers, but they will be weak, small, and often imperfectly formed. A brief rest after thoroughly ripening is beneficial to the general range of bulbs such as Hyacinths, Tulips, Crocuses, etc., and it is these with which we are at present dealing, but prolonged deprivation of soil and moisture is injurious, and the fact is so certain that argument is futile, yet we find both writers and dealers encouraging rather than discouraging the postponement of planting until November. That allegation may be challenged, but my contention is that direct instruction to wait until November is unnecessary *to proof* of my statement; condonation is ample in this case to constitute encouragement, for the amateur gardener is at the outset predisposed to delay planting until his annuals and half-hardy plants have absolutely collapsed, and what more encouragement is required than a word from an expert that "November is soon enough"?

November is soon enough to secure mediocrity, but it is altogether too late to secure the best of which the bulbs are capable. To those who dispute this point I will put one question: Why do all the best growers for exhibition get their planting done by the end of September? To query their good judgment is folly, to say that what helps to produce the perfect exhibition bloom is immaterial to the success of a garden display is greater folly. Early planting should be strongly advocated, and instead of quoting November as the best time to plant it should be urged that delay beyond the end of October means deterioration which gains pace with each succeeding day.

No denial of the fact is made that amateurs who do not clear their beds to plant bulbs before the middle of November will still have a show of flowers in spring, but the purpose of this book is not to advocate subjection of bulbs to all the hardships they will endure nor to encourage the reader to be content with half the success which might be within easy reach, therefore September and October are unhesitatingly recommended as better for planting than November.

CHAPTER III

BEDDING SCHEMES

NOTHING emphatic or dogmatic will be found in my remarks concerning bedding schemes. Ready-made plans and designs for beds or borders of bulbs are of very small account, and unless colour schemes strike a note of originality and have some aptitude in relation to environment, they are nothing. If authority is possessed by any Master of Art to say Thou shalt, and Thou shalt not associate these colours and those, it is not I who claim that possession. Quite recently I read in a book that red and rose and scarlet are colours which blend nicely together, but I shall not plant my Tulips or Hyacinths accordingly, neither will the assertion that crimson and orange is an offensive mixture wean me from my affection for the alliance of some flowers which are crimson with some that are variously described as golden or orange. We gardeners have always one comforting consolation, the colours of natural flowers seldom strike discords comparable with the colours of dyed fabrics; were this not so, the vendors of mixed Tulips would be deserving of punishment for crimes. Nevertheless there is seldom the charm in a medley of diverse colours there is in the predominance of one shade relieved or accentuated by the judicious

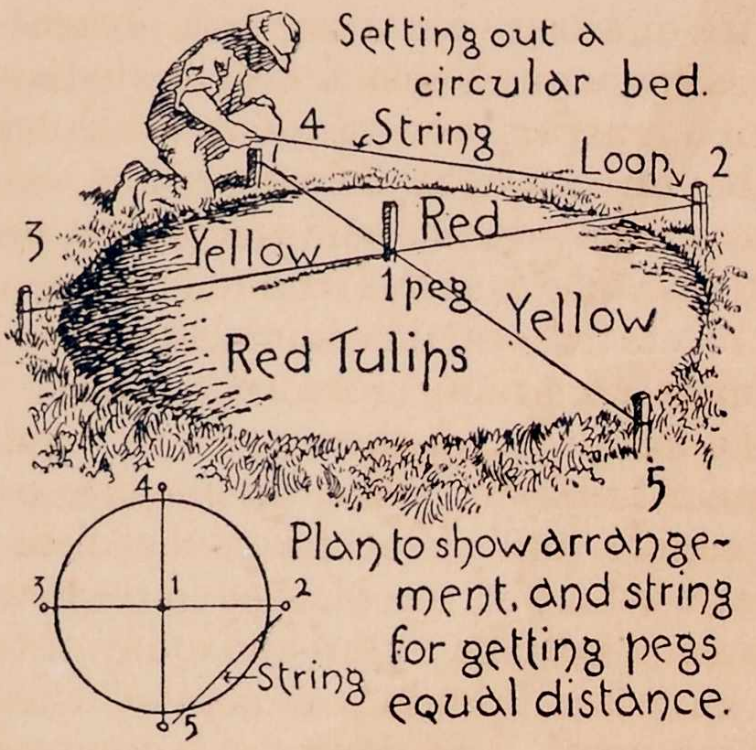
use of some other colour, but whilst any number of suggestions may be made in regard to pleasing colour combinations the degree of pleasure they may give is ultimately dependent upon individual conception or what is commonly called personal taste, and that fact puts dogmatism out of court.

Those who have had but little practice in designing beds of bulbous flowers may be well advised to adopt simple rather than complicated and intricate designs. Scroll work, Mosaic patterns and figured patterns simulating gorgeous Turkish carpets may look admirable upon paper, but there is much risk of the whole thing ending in fiasco through the varieties of bulbs used failing to bloom simultaneously, maintaining their strict uniformity to the required height or expanse, and any irregularity or unevenness in the development of such " pattern " bedding makes the whole thing disappointing, and often ludicrous.

As a general rule bulbs may well be planted in lines running parallel with the edges of a bed, although an alternative method of planting everything in straight lines may frequently be equally pleasing. A circle, for instance, may be divided in wedges like a transverse section of an orange, in which case each wedge may well correspond in colour with that directly opposite. Unless the bed is very large four quarters will usually present a finer effect than division into eight, and another good plan with a small circle filled with, say, a deep crimson Hyacinth is to cut the circle into quarters with single lines of a good pure white variety carefully chosen to flower simultaneously.

Whenever a formal design is decided upon, it is

imperative that it shall be carried out with the utmost care. Lines which should be straight but are not, circles which are not precisely round, centres which are ever so slightly removed from the correct spot, are exasperating in their irritating effect upon the artistic eye, but it often happens that in eagerness to complete planting in a brief period of available time the temptation is to dispense with the correct methods of



measurement and marking and trust more or less to guesswork, generally a risky and treacherous method.

A glance at the illustration of a circular bed will show how unsatisfactory would be the result if the quartering lines crossed at a point even slightly removed from the actual centre. The accuracy of measurements is best ensured by adoption of the peg-driving and string-stretching method clearly shown in

the drawing, and with a fair knowledge of geometry the marking out of beds in this manner is a simple matter.

Those who know not geometry will be well advised to conquer reluctance to admit their shortcoming and to seek the assistance of a competent friend. It is better that one friend shall be acquainted of one's little weakness than that a badly designed bed shall proclaim it to the world at large throughout the season.

A pleasing effect may be produced by a small clump in the centre of a bed with a fine bold, bright-coloured variety, massing a quieter colour all around, and finishing off with a marginal row of the small Dutch-Roman type in the same bright colour as the centrepiece. Hyacinths certainly do not lend themselves to irregular or informal planting, and it is wise to be content to treat them as subjects for formal bedding, a purpose for which they are most admirably adapted.

Dutch Tulips also lend themselves to regular rather than irregular lines, and never seem quite so pleasing as where square, oblong or triangular beds or long, straight narrow borders are planted in decisive colours. The Darwin and Cottage Tulips and many of the species are very different, producing capital effects when planted in moderate-sized groups of individual varieties at intervals in the herbaceous border.

An alternative plan to close massing, and one which has strong points in its favour, is that of planting somewhat sparsely, but still in uniform regularity and covering the intervening spaces with a neat, prostrate, or close-growing carpeting plant. Excellent subjects for this purpose are readily available and the choice may rest between a soft green carpet, a plant of silvery white-

ness, or a subject which will follow the bulbs in the matter of flowering, maintaining the bed in effective condition for a long period after the bulbs have finished. In such cases it is, of course, necessary that the faded flowers of the bulbs shall be cut off to preserve tidiness, but so long as the foliage is allowed to remain this is all to the benefit of the bulbs, and under some circumstances they may very well be left in the soil for a second season.

It is sometimes recommended that such plants as Wallflowers, Forget-me-nots, Arabis or Alyssum saxatile be planted between Dutch Hyacinths and Tulips, but these plants are likely to become rather too rampant and irregular if the spring happens to be a moist and mild period, and if the plants which are supposed to be a "setting" for the bulbs throw up coloured flowers among the latter the effect is likely to be disappointing rather than pleasing. True there are very dwarf Forget-me-nots which are serviceable under tall white, cream, flesh or china-pink Hyacinths, and there is the dainty little lavender-coloured prostrate Wallflower (*Cheiranthus linifolius*) which makes a good carpeter for golden yellow flowers, but for the most part quite dwarf, close-growing or prostrate plants with stalkless or very short-stalked flowers are the most suitable subjects.

Acænas are very useful, A. Novæ Zealandiæ or A. microphylla are exquisite under such colours as will tone with their metallic tints, but where any doubt regarding colour effect is entertained A. Buchanani almost white, with a tinge of blue in the leaf, may safely be used, for it is a shade that will quarrel with nothing. Ajuga

reptans variegata with white and pale green foliage spreading flat upon the soil makes a good carpet for early, bright-coloured Tulips. or for Hyacinths, and another very good silvery-leaved plant is Antennaria dioica tomentosa.

Anthyllis Montana has rosy pink flowers and whitish silky foliage. It makes a capital little companion for Darwin Tulips, flowering about the same time, but continuing much longer. Aubrietias are suitable for edging large beds of bulbs or for long borders where the breadth of the edging may run to a foot or thereabouts, and mauves and lavenders strike a pleasing contrast with yellow Darwin Tulips or Trumpet Daffodils, but if planted throughout the bed there is a tendency with the majority of Aubrietias, especially in tolerably good soil, to mound themselves into cushions of growth several inches in depth, and being dense they smother the bulb growth to such an extent that the necks of the plants are weakened, the flower stalks elongated, and with the weight of the flowers they are thrown down by the wind unless each plant is staked, and so far as it is possible to avoid staking, it should be avoided rather than made an imperative necessity.

Two or three of the dwarfest Campanulas make quite good carpets for beds that can be left undisturbed for a couple of seasons. C. garganica in either its blue or white form will flower for a very prolonged period, taking up the task immediately after the Hyacinths or even during the flowering of Darwin Tulips, and continuing until August. C. portenschlagiana and C. pusilla are other suitable kinds, the last named having also a white-flowered form. Dianthus deltoides, rosy

pink, prostrate, free flowering and very easy, is a good plant among late Tulips the colours of which should be chosen to agree with the pink of the carpet, which will usually brighten the surface of the bed while the Tulips are still in bloom, and will continue long after they have passed. Erinus alpinus begins to bloom before March is out, and if the rosy red varieties disagree with the colours of the bulbs the white variety " albus " will serve the purpose of an accentuator. " Gibraltar Mint " (*Mentha pulegium Gibraltaricum*) makes a thick carpet of close-growing foliage only about two inches high. It is a capital plant to undergrow Fritillarias, Scillas of the smaller kinds, Muscari. or the dwarf Dutch Tulips. A closer carpet still is made by Mentha Requieni which, however, is more adapted for association with rock-bulbs than for ordinary bedding.

Of Saxifragas many mossy kinds will make capital carpets so long as they are not burnt up by drought, but for open bedding Sedums are really more suitable, being succulent, surface rooting, and able to withstand unlimited sun heat whilst their growth keeps the soil cool and moist. The common " Stonecrop " (*Sedum acre*) is beautiful in the fresh green of its young foliage whilst in the season of its bloom the whole surface of a bed becomes an unbroken sheet of bright golden yellow. S. anglicum provides a white carpet at the height of summer, but its green foliage is just as delightful during the season of the bulbous flowers. The prostrate Thymes (*Thymus serphyllum*) are quite good plants for carpeting and may be had in purple, red, or white flowered varieties, but Veronica repens is still more delightful and is one of the best of all carpets for bulbs, its

bright green foliage and porcelain-blue flowers being wonderfully effective without being aggressive. V. Teucrium dubia, frequently named V. prostrate or V. rupestris, is another ideal carpet plant bearing rich blue flowers profusely and untiringly from spring until late autumn.

It will require no explanation that this system of carpeting bulb beds cannot be satisfactorily adopted where the intention is to clear the beds in time for re-filling with Geraniums, Begonias, or other summer bedding plants, but whilst it would be folly to launch upon a wholesale condemnation of that system of garden management it may be emphasized that in this book the purpose is to place bulbs foremost, and to urge within reasonable limits that they shall be cultivated to the best advantage, and not simply treated as guests of one brief season. Where restricted garden space renders it an absolute necessity to turn out the bulbs directly their flowers have faded the only course to pursue is to resign oneself to the custom of discarding the bulbs and buying fresh each season, for whatever may be said about lifting and heeling in an odd corner to ripen, the effect of the disturbance is to stop the process of garnering nourishment in the cells of the bulb which should be stored for the upbuilding of next season's flower spike, and it cannot be expected under these conditions that the second season's display will be of first-class quality.

CHAPTER IV

KINDS AND VARIETIES OF BULBS, TUBERS, ETC., FOR BEDDING AND GENERAL PLANTING

MERE lists of names, even accompanied by descriptive notes, would not constitute the best material with which to fill this book. An attempt to provide a complete list of all the varieties of Hyacinths, Daffodils, Tulips, Crocuses and other bulbs that are or should be used for bedding would be a gigantic task, swelling the book to unreasonable dimensions, and in the end it would be but an imitation of tradesmen's catalogues, proffering information which they already provide, and becoming hopelessly out of date and in need of revision within a couple of seasons.

There are at the command of the reader annual editions of excellent catalogues which will provide details regarding names, colours, periods of flowering, etc., of the various kinds of bulbs, and all that is here required is information which may be of assistance in the task of selecting from those catalogues bulbs that are capable of fulfilling the purposes to which they may be assigned. The general appearance of the popular kinds of bulbs is familiar to most, and description of a Hyacinth or a Tulip would be superfluous, but in most

families of bulbous plants there are various types possessed of characteristics which differ in greater or lesser degree from those of the rest of the family, and it is with these distinctions we may here deal with some advantage.

Hyacinth (*Hyacinthus*)

The Hyacinth, which is so popular both for bedding and for pot-culture, and is commonly called the "Dutch" Hyacinth, is so called by reason of the extent to which it is cultivated in Holland, and not because it belongs naturally to that country. Our present-day Hyacinths are the progeny of a species named Hyacinthus orientalis, which grows wild over a wide area near the shores of the Mediterranean Sea. The skill and care of plant breeders has so developed the size and improved the symmetry of the flowers, at the same time multiplying the shades and variations of colour, that a plant of the original wildling bears small resemblance to its descendants. The so-called "Roman" Hyacinth is a miniature form of the same species, its correct name being Hyacinthus orientalis albulus. It is very dainty, and being of snowy whiteness is extremely valuable for cutting, and is forced by commercial growers on a very large scale, but it is not a good variety for bedding.

In a good bulb catalogue one generally finds a list of what are termed "prepared" Hyacinths. These are intended for forcing, having been submitted to a process which ensures early ripening with the result that the bulbs will be in a condition to respond to forcing in time for Christmas trade. It would be futile to use

"prepared" Hyacinths for bedding. There will also probably be lists of "extra large" and "first sized" bulbs which are usually intended for pot-culture and are by reason of being specially selected for their size and quality more expensive than those which follow under various headings such as "second size," "bedding" Hyacinths and "miniatures."

When for some special purpose a particularly fine lot of flowers is desired and the little extra cost does not seriously concern, the extra large bulbs will produce bigger spikes of bloom. This is sometimes of importance where a bed occupies a conspicuous position on a terrace or in the immediate vicinity of the house front; or again, where large pedestal vases, tubs, or window-boxes have to be filled. As a general rule the "second-size" bulbs are abundantly satisfactory for bedding purposes, whilst the cheaper "miniatures" and "mixed-bedding" Hyacinths will naturally yield proportionately smaller spikes. In a list of named varieties prices will be found to vary considerably, but this is due more to newness or scarcity of the variety than to quality of the bulbs.

When unnamed Hyacinths are offered in separate colours it may frequently happen that a sample hundred will contain several different kinds although of "blue," or "red," or any other specified shades of colour. The quality will generally be quite good, but it is well to bear in mind the probability of variation in shades and also in period of flowering. This may be no disadvantage in many cases, but where it is important to secure simultaneous flowering, and uniformity of colour a named variety will be safest.

"Multiflorus" Hyacinths are a comparatively modern development. Their special distinction being capability of producing several spikes of bloom from a single bulb. These are admirably adapted for growing in bowls, but are less suitable for bedding, the stems being less substantial and development less uniform.

Hyacinthus amethystinus is a small, slender, blue-flowered kind which will make a good edging to a bed of the larger Hyacinths, and is also quite suitable for planting in small groups in the Herbaceous border, a position where the ordinary Dutch Hyacinths in their vivid colours and formal outline do not seem quite appropriate.

Tulip

Tulips provide us with several quite distinct groups of flowers some of which are pre-eminently subjects for formal bedding while others are well adapted for positions where less formality prevails.

The early spring Tulips are the real "bedders," and both singles and doubles are available in great variety. The Darwin Tulips are of taller growth, producing large cupped blossoms of wonderful colours. May is their flowering month, and they are gorgeous when growing in large beds or massed in a long border. They may also very suitably be distributed in groups of varying size, containing from six up to a score of bulbs in the herbaceous border.

A magnificent group of May-flowering Tulips which are called "Cottage" Tulips embraces a wide range of varieties which differ considerably in form as well as in colour. They cannot claim to be a race of pure-blooded

aristocrats among Tulips like the old English Florists' Tulip, for the truth is the Cottage Tulips have to a great extent been literally found in Cottage gardens where their owners have cherished them for years and would readily give a few surplus bulbs to other growers in exchange for some of another colour. Scotland was a fertile hunting ground for those who sought to gather together, name, and propagate these fine old-fashioned Tulips, but the Midlands and North of England, and also Ireland contributed their quota, and to the total of the British finds have been added others secured in similar fashion by wanderers in France and other continental countries. It is no uncommon thing for trade as well as amateur growers to call a Tulip a " Darwin " which in reality is a Cottage Tulip, and may have been in cultivation, although perhaps not in commerce, long before the evolution of the Darwin race created a sensation throughout the horticultural world. The Cottage Tulips are decidedly flowers for herbaceous borders and for bold irregular masses, while they will do grand service if scattered informally on a broad expanse of grass which need not be too closely and regularly machine mown.

Miscellaneous species of varied size, height, form and colour are particularly pleasing when planted in broad pockets on the rockery, and the choice named Tulips of the old florists' type are the flowers for connoisseurs or fanciers if any such are left. Very few to-day understand the subtleties and distinctive characteristics of the Bizarres, the Roses and the Bybloemens, the Flames, Breeders, and Feathers among show Tulips which half a century or a century ago were as highly

esteemed as the choicest of hybrid Orchids are by the present generation.

Nothing to the disparagement of the modern developments of Tulips is necessary or justifiable, but one is inclined sometimes to fear lest present-day diversion of interest should result in irretrievable loss of stock which posterity will sadly mourn.

Anemone

Colour and elegance are so conspicuously identified with Anemones that it is doubtful whether any fresh eulogy could add to their existing reputation in this respect; their glories are widely known. Brilliant displays of bloom are seen in florists' shop windows and at even the mid-winter shows of the Royal Horticultural Society the famous Reamsbottom strain of St. Brigid Anemones seldom if ever fail to put in an appearance and provide colour effects unsurpassable in their rich intensity, and in the successive seasons of the whole year round these gay flowers are always prominent at all the leading shows.

Sometimes grand displays of Anemones are seen in gardens, but it has to be admitted that the "sometimes" are not so numerous and frequent as could be desired nor as the merits of the flowers would justify.

The reasons why all gardens do not contain flourishing beds or drifts of Anemones are worthy of consideration. It is not a case of apathy or lack of appreciation, but rather is it the lamentable fact that many have tried and failed, ultimately giving up the attempt, with the firm conviction that they who write that Anemones are easy to grow are guilty of misleading the public.

The remark has frequently been overheard that "Messrs. Reamsbottom are so successful with their Anemones because they grow them in Ireland, but the firm has conclusively proved that the flowers will grow as well in England, for they have of recent years produced a large proportion of their exhibition blooms at their English nursery, West Drayton, Middlesex.

Anemones would be grown with great success if a few very simple requirements were recognized and if also care were taken in securing vigorous stock of a good strain. Much of the disappointment arises from the supposition that all Anemones are of similar character, and will thrive under similar conditions, and again many disappointments are the inevitable result of buying the cheapest tubers procurable, irrespective of the source from whence they come, the size and substance of the roots and the manner in which they have been handled and stored.

Anemone fulgens, the vivid scarlet Windflower, loves a comparatively dry, porous soil through which water runs as through a sieve. It is a good plant for hedge banks, provided the bank is not choked with nettles, docks and thistles. It may also be grown in beds where soil is light, and the surface is raised slightly above the surrounding level, and if planted in early autumn, decidedly the best time, it will appreciate a sunny aspect, and will produce its brilliant flowers well before the sun acquires great power. Quite different are the St. Brigids, and surely these are the premier favourites of the tribe, with their large semi-double flowers, with gaily coloured petals some of which are twisted and fluted, some broad and flat, with a cushion-

like central disc of indigo blue with an admixture of black. These are lovers of cool moisture, but this does not necessarily mean they must be planted in a puddle, for that they cannot stand. Where a garden fortunately offers a wide selection of sites the ideal situation for St. Brigid Anemones would be a slight depression like a little valley between higher slopes of ground but not sufficiently hollow to become stagnant with the drainage from surrounding elevations. Doubly fortunate it would be to find the natural soil here a nice friable loam with sufficient fibre to make it fairly open. Ideal soils are not always at our feet, but a tenacious clay must be ameliorated by cultivation and by incorporation of grit, burnt earth, sand, and leaf-mould, and if a soil is stony gravel with insufficient humus it must be improved by deeply burying rough siftings of peat and leaf mould, a little rotten manure, and also by creating a slight depression which will prevent welcome rain running off the surface. Only where there is danger of stagnation should the surface of beds for St. Brigid Anemones be raised above the level, and the amount of sunshine they will enjoy will be in proportion, so to speak, with the abundance of moisture at the roots. If the situation tends toward dryness shade will be grateful, but grand results may be obtained where foliage and blossoms are kissed by sunbeams while the roots lie in cool moisture. The illustration of St. Brigid Anemones is furnished by courtesy of Messrs. Reamsbottom & Co., West Drayton, Middlesex, who are the great specialists in these incomparably gay flowers. The extraordinary capabilities of their strain are fully demonstrated by the fact that throughout the whole

year they are exhibited in all the purity and brilliance of their wide range of colours; and so far at any rate as sheltered Southern gardens are concerned, St. Brigid Anemones are to be had in bloom even during the winter months, whilst in less favoured districts they ask no greater protection than that of a cold frame for the winter batches. Successional flowering is of course secured by planting at regulated periods, but it is advisable to purchase tubers when required for planting rather than to risk loss of vitality by simply leaving stock to shrivel in unsuitable storage for an inordinate length of time. The single and double "poppy" Anemones (*A. coronaria*) are very beautiful, bearing large gay flowers on stems a foot long. The single varieties are plain-petalled, cupped, and backed by elegantly cut green leafy bracts; the double ones are filled in the centre with sharp-pointed petals.

The tubers of A. coronaria cannot endure excessive moisture in winter, and as they do require liberal supplies of water in spring it is prudent to plant them in well-drained situations and rely upon periodical soaking from early April onward.

The Peacock Anemone (A. hortensis), another highly coloured tribe, with many extremely beautiful varieties, must have well-drained soil, porous with grit, and in a warm sheltered situation. The tubers should be planted in September, surrounding them well with sand. After the season's growth is completed and the foliage has died down the tubers of A. hortensis should be lifted, dried, and stored until September comes round again.

Crocus

Their very earliness is sufficient explanation of a good deal of the popularity of bedding Crocuses, and the clearness and brightness of their colours is a strong point in their favour, but it is sometimes urged that their season of flowering is too short compared with the length of time the corms occupy the ground. Admittedly a crocus comes into bloom and passes out of bloom within a brief space of time, but while it lasts the beauty of the flower is great, and embraces several very striking features. Petals of exceptional fineness and satiny lustre borne on such slender tubes appear far too frail for February's bleak days, but a little glimmer of sunshine opens out the flowers to display still more lustrous colouring and reveal another wonderful feature in the brilliant stamens. This last is perhaps the crowning glory of the flower, and should be more frequently the subect of eulogy.

Disappointments occur with Crocuses, and may be due to one or more of several causes, of which deep planting is one. In a light soil a couple of inches is not too shallow to plant the corms, and in a stiff, resistant soil they need not have much more than an inch of covering. Crocuses are one of the comparatively few subjects that pay for close planting, and even for edges a double or treble line is infinitely more pleasing than a single, thin line. The great mistake is the craze for lowest possible prices, for this means small, poorly grown corms of commonplace varieties. Anyone who has always been content to buy the cheapest Crocuses advertised has doubtless had yellow flowers or white,

striped, purple as the case may be, but the flowers are insignificant as compared with the lovely named varieties of which fine strong corms are available. One really good corm will surpass the show produced by three little weakly corms of the cheap nondescript class.

Cloth of gold is the greatest yellow to plant whilst Kathleen Parlow or King of Whites are superb and satiny white. Bleu Celeste, pale azure blue with a powdered silver sheen on the inner surface of the flower and richest of orange stamens is a real gem, and other first-class varieties are Hero (purple) purpureus grandiflorus, and the beautifully striped varieties Daybreak, Edina, Madame Melba and Minerva.

Plant Crocuses as early as possible, and in addition to using them as edgings or as ground work for formal beds they should be much used for naturalizing and for planting in grass.

Corms need not be lifted so long as they do not become so crowded that they deteriorate in size.

Iris

The most serviceable bulbous Irises for bedding are the so-called English Iris and the Spanish Iris. The first named is botanically Iris xiphioides, bears large broad-petalled flowers of great beauty on stems averaging about 18 inches in height, and usually a couple of flowers, closely succeeding, on a stem.

The colour range extends from pure white to rich plum purple with lavender and various shades of mauve, rosy lilac, and violet, whilst many varieties have beautifully pencilled, splashed or blotched flowers. The normal flowering period is from about the longest day

to the middle or third week in July, season and situation being capable of effecting variability in both commencement and duration of the blooming. These Irises enjoy a rich soil, but not fresh manure, but where planting must perforce be done on land known to be hungry it is well to dig in a dressing of chemical fertilizer about a fortnight before planting.

The great thing is to plant the bulbs as early as possible, for an extra week or two in the ground at the commencement of Autumn makes a vast difference to the strength and extent of the root system and therefore of the growth and flowers. The Spanish Iris (I. *xiphium*) is a smaller flower than the last named, but grows several inches taller, the stems being comparatively slender, but wiry and strong. This Iris in its many delightful colours is very largely grown for cutting both outdoors and under glass, but for bedding where a show is required in the month of June Spanish Irises are admirable, and being among the cheapest of bulbs may be planted on a large scale. Neither these nor the English Irises should however be closely crowded. From 9 inches to a foot is close enough, and the surface of the soil should be carpeted with a dwarf, close-growing plant with neat foliage and small stemless or short-stalked flowers. The same remarks in regard to early planting may be repeated, and indeed with emphasis, because the bulbs of the Spanish type are neither so large nor so solid as those of the English, and if long out of the ground quickly become soft and shrivelled.

Muscari

The Grape Hyacinths as the Muscari are popularly

called, are small, neat and pretty little flowers which are extremely useful for ground work between taller bulbs, for edging beds, for clumps in front of the border or on the rockery or for planting steep banks or mounds of either bare or turf-covered soil.

There is no difficulty about the culture of Muscari ; they thrive in any soil, and whether they are in sun or shade is simply a governing factor in the matter of early or later flowering. Bulbs may be left undisturbed for several years, and when tending toward crowding the little spikes of close-set bells make the more effective show.

The blue of M. botryoides cæruleum is rich, but " Heavenly Blue " is brighter still. There are white and pale pink varieties of M. botryoides, but the blue is the real gem. M. moschatum is sweetly scented, but in point of colour it is dull, opening with a slatish tint and fading off to a rusty yellow. M. plumosum is of quaint and uncommon appearance, the inflorescence taking the form of grotesque feathery plumes with *tousled* filaments in place of bells ; the colour is a reddish violet.

Ranunculus

Precise in form as tiny pompom Dahlias, rich, glowing, and decided in colouring as the most brilliant Poppies and Anemones, the Double Turban, Persian, and Giant French Ranunculus will make a brave show if only they are given a reasonable chance, which, however, is by no means invariably the case.

The roots of Ranunculus are peculiar little clawed tubers united to a central crown, and in the dormant

state they appear to be black, lifeless little chips rather than reservoirs of nourishment from which foliage, stems, and flowers may spring. In point of fact the tubers frequently are wellnigh lifeless before they are planted, the trouble being that because the Giant French type are safer if planted in February than when planted in late autumn the notion has obtained that spring is the time to plant Ranunculus, and often dried, shrivelled tubers are planted in March, and sometimes even in April, and are expected to be in bloom in May and June.

All except the Giant French type should be planted in autumn ; the earlier the better, and the soil should be rich, but very well supplied with sand. Planted claws downward, completely surrounded by sand, and buried not more than 2 inches below the surface the tubers will send out roots before winter sets in, and if the surface of the beds can be covered with gorse, heather or loose hedge trimmings during frosty periods spring will find the plants growing vigorously.

About March or April mulch the soil with hops, grains, old sifted mushroom bed compost, or with coco-nut fibre refuse, and if May should be a dry month soak well with water. A grand show of clearest yellow, brightest scarlet, cheeriest rosy pink, or purest white will be the result. After ripening, about the end of July lift, dry, and store the tubers in trays of dry sand, but do not leave them lying about uncovered, for that involves loss of vitality. The usual custom is to buy the tubers in colour mixtures, but the best firms offer them in select colours and that is by far the better way to plant them. About 4 inches apart is a good distance for tubers,

to well furnish a bed which should be in a sunny position.

Scilla

Apart from the "Blue Bell" (*Scilla festalis*) there are a number of very serviceable species of this tribe, variously known as Squill, Blue Bell, or Wood Hyacinth. All are beautiful, free, and capable of flowering in shade as well as sunshine, in fact are among the very best of bulbs for planting under trees, among shrubs or in drifts at the foot of overshadowing hedges. S. sibirica (Siberian Squill) is dwarf, its flower spikes being only about 3 or 4 inches. It blooms as early as February with great indifference to weather. Its variety taurica is even earlier than the type. S. hispanica (Spanish Squill) grows about a foot, and flowers in May, closely following our own Blue Bell (*Scilla festalis*). Blue is not the only colour in the Scillas, for white forms of all are equally plentiful, and pink varieties are also obtainable and very pretty. Although the Scillas make a good show in beds, and S. sibirica is excellent for edgings they are above all bulbs for massing in irregular drifts in the informal garden and wilder pleasure grounds.

Plant in September about 6 inches deep, except S. sibirica, for which 3 inches is ample. There is no need to lift the bulbs until they become densely crowded.

CHAPTER V

NARCISSUS OR DAFFODIL

THE importance, popularity and extent of this family justifies an independent chapter. So general is the use of the common name "Daffodil" that it is treated as having legitimate standing, and frequently takes precedence over the correct botanical name Narcissus. Indeed, many speak of Daffodils *and* Narcissus as though the two were distinct, and it is not uncommonly asserted that Daffodil is the proper name of the large trumpet flowers and Narcissus that of the flat small-crowned type, of which Narcissus poeticus is a familiar example.

The truth is, Narcissus is as much the botanical name of the biggest trumpet flower as of the smallest-crowned poeticus variety. The whole tribe is wonderful, and embraces so many valuable attributes that none can fail to appreciate their value nor require to be regaled with a categorical description of their points of merit.

The more plentiful, and therefore cheaper, varieties, which are usually called "bedding" or "naturalizing" bulbs, are imported from Holland in millions every season, and certain well-defined varieties are very largely imported for forcing, but apart from all this

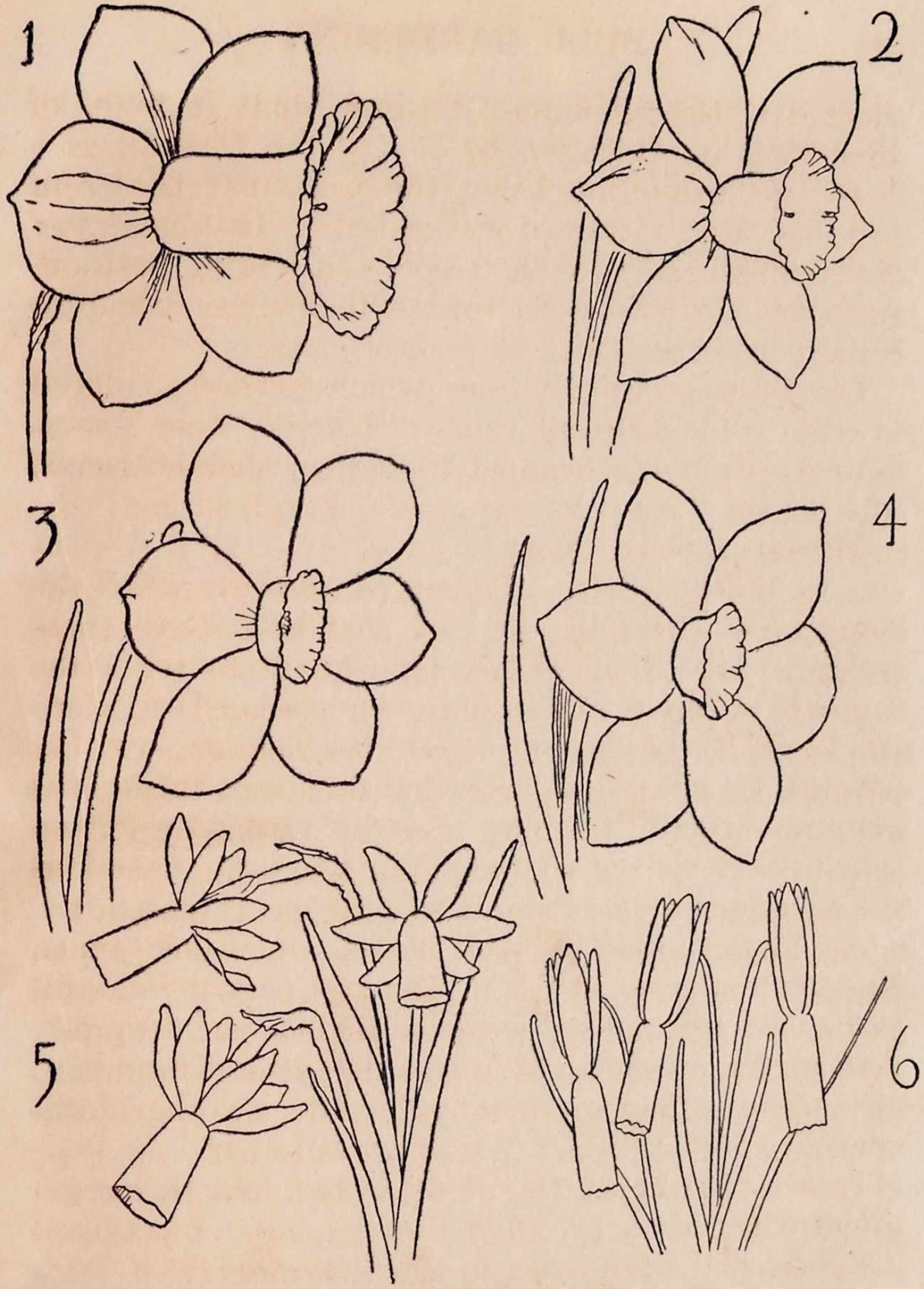
there is a vast amount of business done in bulbs of altogether higher class, the cult of the Daffodil as a flower for exhibition being the particular hobby of quite a large circle of enthusiasts. In this latter direction British specialists hold the leading position, and even Dutch bulb growers themselves come to Britain to secure stock of highest class.

The three group divisions which formerly sufficed to classify the different types of Narcissi were Magni-coronati (the large trumpet Daffodils), Medio-coronati (the shorter " cupped " type), and Parvi-coronati (the small flat-crowned class).

Cross breeding has so influenced and diversified the forms and characteristics of Daffodils that three divisions proved altogether inadequate to serve the required purpose, and to-day ten specified divisions are found necessary for proper classification, with an eleventh for a few odd kinds that do not fit themselves well into either of the ten. For the purpose of following the definition of characters in the various sections it is necessary to understand that the term " perianth " refers to the circle of back petals, which are joined directly to the neck-stalk. The crown is the central portion of the flower, variously called the trumpet, chalice, cup, or eye, according to its size and form, and this indeed is the main factor which decides the allocation of a flower to one division or another.

Thus a " **Trumpet** " Daffodil is required to have a crown which is longer than the segments or petals of the perianth. (See No. 1 in the illustration.)

The **Incomparabilis** division is composed of those flowers having a cup-shaped crown shorter than the



CLASSIFICATION OF NARCISSI

No. 1. Trumpet
No. 2. Incomparabilis
No. 3. Barrii
No. 4. Leedsii
No. 5. Triandrus
No. 6. Cyclamineus

segments of the perianth, but not less than one-third their length. (Fig. No. 2.)

In the **Barrii** division the flowers have cupped crowns less than one-third the length of the perianth segments. Many Barrii varieties have yellow or lemon, cream, or more or less tinted perianth and yellow cups, with frequently orange or red margins. (Fig. No. 3.)

Leedsii is the name of a section with chalice-cupped or short-cupped crowns which are either white, cream, apricot, citron or orange-buff, but the perianth must be white. (Fig. No. 4.)

Triandrus is the specific name of a very distinct species of Narcissus. It produces trumpets which are comparatively small, but look long because they are narrow, whilst the perianth segments grow back in the opposite direction to that of the trumpet. The species has been largely used for hybridizing, and many of the hybrids retain unmistakable family likeness to the parent. Triandrus is consequently used as the divisional name for the whole group of hybrids as well as the varietal forms of the true species. (Fig. No. 5.)

A similar but smaller group is **Cyclamineus.** Narcissus cyclamineus is a liliputian among Daffodils and a very dainty little flower. Its tubular crowns are very narrow and pendant, whilst the perianth segments, also narrow, stand up close and erect. Hybrids of this charming little gem also retain the form which inseparably attaches them to the type and thus these are grouped together. (Fig. No. 6.)

Similarly the **Jonquilla** division embraces the hybrids which have originated from the Jonquils as well as N. jonquilla, and N. odorus. These are all rather small-

NARCISSUS CORDON ROUGE

A choice "Giant Barrii" variety raised by F. Herbert Chapman, Esq.

flowered, more or less clustered, bright yellow, and sweetly fragrant. (Fig. No. 7.)

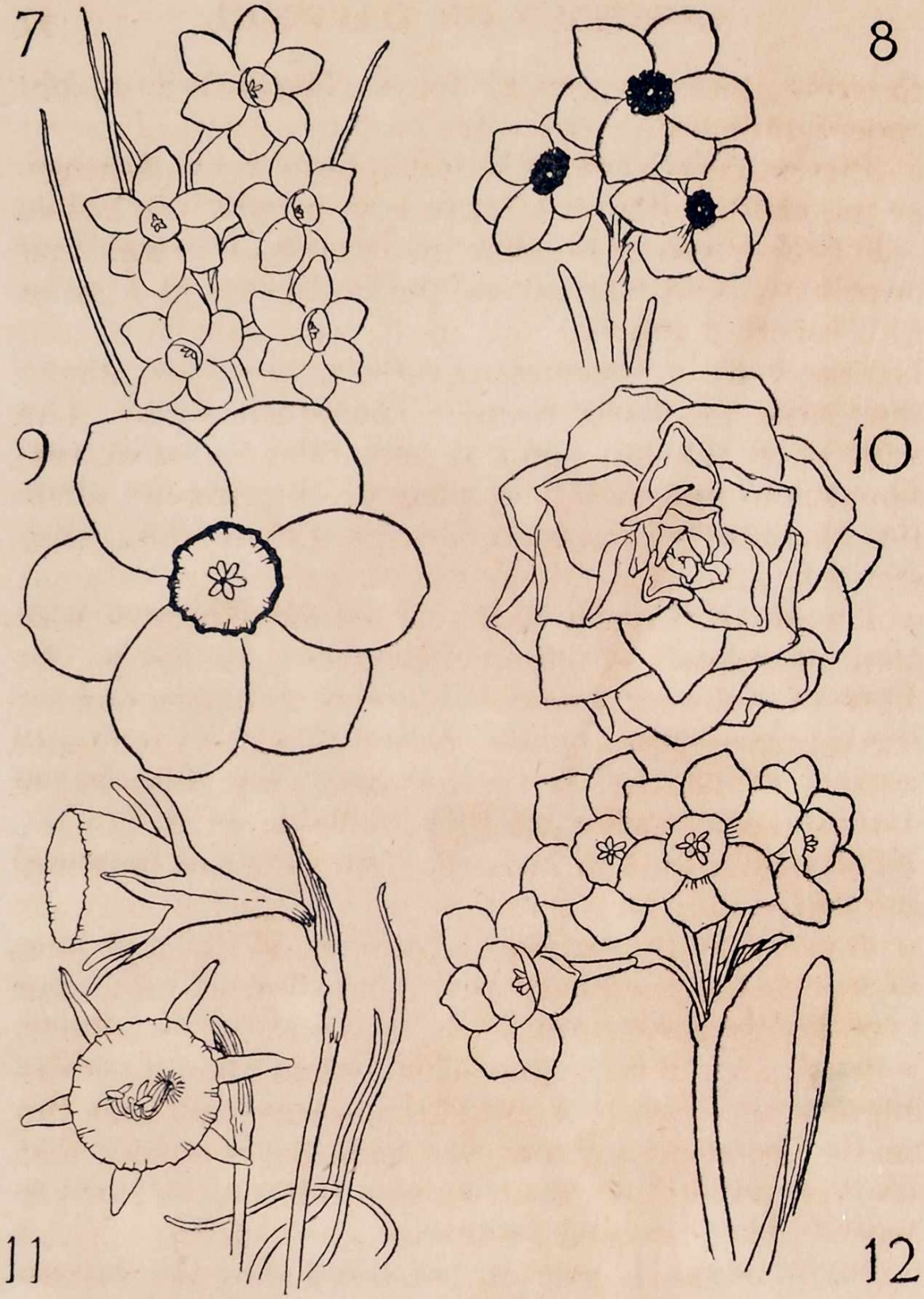
Tazetta is the division to which belongs the bunched, or polyanthus-flowered types and varieties, including the poetaz and other tazetta hybrids, bearing three and sometimes more flat-crowned flowers in a truss. (Figs. Nos. 8 and 12.)

The next division is **Poeticus,** the true Poet's Narcissus, popularly called " Pheasant's Eye." This type is so popular, and has been bred so highly that choice and particularly fine-named varieties are abundantly sufficient to justify a division of its own. (Fig. No. 9.)

The tenth division is for all **Double-Flowered** varieties, including the double trumpet Daffodils, the Phœnix or rose-flowered, the double Jonquils, and the double Poeticus. In the miscellaneous or eleventh section we find the Hoop-Petticoats, the Rush-leaved Daffodil, and such little rock daffodils as N. gracilis, N. serotinus, N. Tenuior, and a few others of botanical interest.

It is not surprising that with such diversity of form in this extensive genus, the cultivation of which has been highly specialized by a large number of experts, some of the most successful of the producers confine themselves chiefly, if not entirely, to one or perhaps two of the principal groups, and find ample within that scope to occupy all the time and space at disposal as well as never-waning interest.

Furthermore, it may be remarked that the various types or classes adapt themselves in marked degree to particular purposes, so that the cultivator who wishes



CLASSIFICATION OF NARCISSI

No. 7. Jonquilla Nos. 8 and 12. Tazetta No. 9. Poeticus
No. 10. Double-Flowered No. 11. Hoop-Petticoat

to grow flowers specially for cutting will probably choose quite a different range of varieties, and these of a different class from the selection of the rock-gardener, or the planter of a series of beds in front of the house.

For the purpose of forcing under glass for commercial or private use the Trumpets, the Poeticus, and a few of the Tazettas provide the most serviceable material because certain varieties in these sections are among the earliest to bloom, and consequently are best adapted to forcing. For the maintenance of successional flowering, however, there are serviceable varieties among the Incomparabilis, the Barrii and Leedsii sections, whilst for outdoor planting there are varieties which are particularly well adapted for naturalizing or planting in grass by reason of the fact that they will go on successfully for a number of years without requiring replanting. This applies specially to the Jonquilla section, whilst the Barriis are also very suitable for naturalizing, as also are the double-flowered.

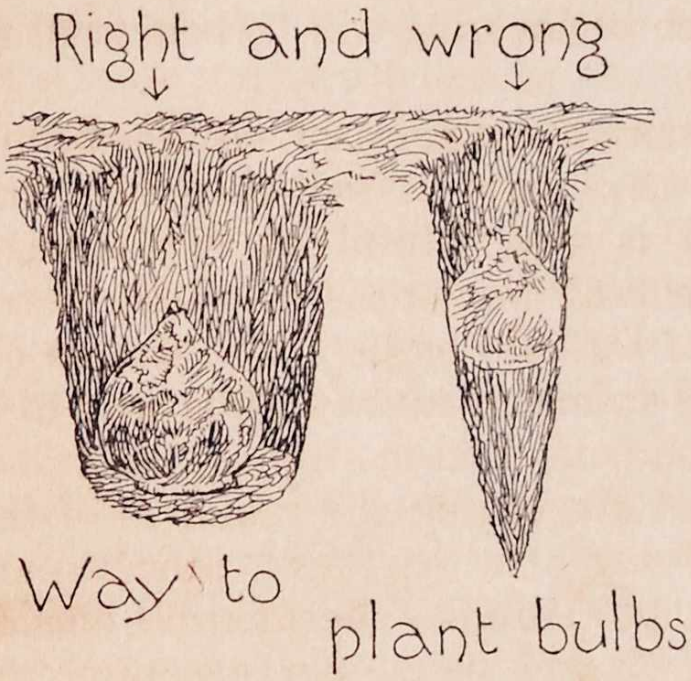
For bold effects in beds the Trumpets are supreme, and by a judicious selection of varieties it may be arranged that the period of flowering shall be of long duration, for there are early, mid-season, and late varieties in great profusion.

Emphasis cannot be too strongly laid upon the great importance of early planting, for thus only can the finest blooms and strongest stems be obtained, and another important point is planting at the correct depth. The size of the bulb and the character of the soil must be taken into account. A good general average is that the point of the bulb may be 3 inches below the surface of the soil, but this is assuming that the soil

is of good medium character, neither too stiff a clay nor too loose and sandy in character, and that the bulb is about 2 inches in depth from tip to base. Some few varieties make considerably larger bulbs than the average, and require planting deeper accordingly; others never attain 2 inches depth of bulb and must not be so deeply buried. On heavy clay soil it is advisable to keep the bulbs nearer the surface whilst on a loose sand an extra inch of covering will be beneficial rather than detrimental.

The question of soil nourishment has been dealt with elsewhere, but it may be well to repeat that whilst a hungry soil is not helpful to development of fine flowers fresh rank manure is distinctly detrimental to the health of Daffodil bulbs. The system of following a dressing of animal manure with a crop of mustard is one I have no hesitation in strongly recommending; it is a means of dissipating the rankness of the manure, and conserving its virtues. Furthermore, green mustard undoubtedly has considerable effect in driving away many ground pests, not excepting wireworms, and that is a distinctly good reason for digging it in prior to the planting of bulbs. For the improvement of a stiff, heavy clay soil a dressing of basic slag applied at the rate of 4 oz. to the square yard may be dug in a fortnight or more before planting commences, but apart from nourishment the great need is to open up such soils by the aid of sharp grit and sand. A capital plan is to make a series of "smother" fires upon which sufficient quantities of the clay can be burned to provide a surface dressing of an inch depth. The burnt earth, together with ashes of wood and other materials con-

sumed in the fires, will greatly improve porosity of the soil, and also furnish a certain amount of potash. Always allow a week or two to elapse between digging and planting, but postpone surface-raking until the actual planting time, for the looser and rougher the surface the greater will be the sweetening influence of the air upon the soil.



Small quantities of bulbs in beds or borders are best planted with the aid of a trowel, pointed dibbers being prone to leave awkward, tapering vacancies under the bulbs. For large areas of daffodils grown for supply of cut flowers the most satisfactory method is to mark out beds 5 feet in width with narrow paths between. If rows run lengthwise a planet junr. Hoe may be used for cultivation of the surface, and in planting it will be more economical to open out trenches than to use trowels.

Failures of Daffodils in grass are frequently due to the supposition that because the effect aimed at is that of wild freedom and irregularity, rough, careless methods of planting are good enough. That is entirely wrong ; the bulbs used for naturalizing are the same in character and constitution as those planted in the flower garden or in pots, and it is essential that they shall have a fair start by being planted properly. The best method is to cut the turf from the area to be planted after the manner adopted when cutting for lawn making. The soil should then be forked over, and broken up, and it is a good plan to apply a dressing of bone-meal or horn shavings, these being soil enrichers of a lasting character. The bulbs may then be strewn thinly over the ground and pressed into the soil, points upward where they fall, the surface should then be raked and the turf re-laid.

An alternative to this plan is to scatter the bulbs over the grass, which should previously have been cut short, and then use a " Barr's Bulb-planter." This implement cuts and lifts circular pieces of turf, creating holes large enough for one bulb. The pieces of turf are re-fitted to the holes after the bulbs are placed in position, and with gentle pressure will regain their root-hold. This is a real labour-saving tool, and is infinitely better than the large dibbers of similar pattern to the old-fashioned potato-planter. Successful work with this bulb planter is dependent upon a reasonably moist condition of the soil ; it is not wise to attempt its use when the ground is hardened by drought or when thoroughly saturated by continuous heavy rain.

Selections of Daffodils for various purposes.

Popular Trumpet Daffodils for General Garden Purposes

INEXPENSIVE VARIETIES

Cornelia. *Canary yellow, good size. Mid season.*

Emperor. *Rich yellow trumpet; primrose perianth. Fine large flower. Mid season.*

Glory of Leiden. *Large, deep-yellow trumpet, paler perianth. Moderate height. Mid season.*

Golden Spur. *Rich yellow throughout. A good serviceable flower. Early.*

King Alfred. *One of the finest Golden Daffodils. Tall, bold, distinctive. Early.*

Maximus. *Golden yellow, twisted perianth segments. Early. (Plant deeply.)*

BICOLOR TRUMPETS

Having white, or nearly white perianth and yellow or lemon trumpet.

Cygnet. *Twisted perianth, frilled trumpet. An artistic flower. Late.*

Empress. *Most serviceable and popular. Mid season.*

Grandis. *A good flower, valuable because one of the latest to bloom.*

Horsfieldii. *An old favourite. Dwarf, effective. Early.*

J. B. M. Camm. *A splendid flower. Dwarf. Late.*

Princeps. *Popular and serviceable. Medium height. Very early.*

Choicer, but Reasonably Priced Trumpet Daffodils for Exhibition or for Pot Culture

YELLOWS

Admiral Togo. *A fine mid-season flower.*

Beethoven. *Pale yellow. Mid season.*

Cleopatra. *Grand form. Winner of many honours. Late.*

King Alfred. *An ideal exhibition flower.*

Lord Roberts. *Tall, large, noble flower, constant prize winner. Mid season.*

Michael. *A beautiful flower of much substance. Mid season.*

Monarch. *Perfection of form and substance. Tall. Mid season.*

Olympia. *Extra large. Tall, impressive. Mid season.*

Van Waveren's Giant. *Massive flower, popular. Mid season.*

WHITE TRUMPETS

An elegant and choice group

ALICE KNIGHTS. *A good variety. Early.*

LOVELINESS. *Refined but substantial. Late.*

MADAME DE GRAAFF. *A favourite, and a cheap variety. Late, but forces gently.*

MRS. GEORGE H. BARR. *Fine quality, a model flower. Late.*

MRS. ROBERT SYDENHAM. *Dwarf, good form and substance. Late.*

PETER BARR. *Worthy of its name. Mid season.*

WHITE KNIGHT. *Very graceful and charming. Late.*

BICOLOR

DUKE OF BEDFORD. *Large, early, and very handsome.*

GWENDOLIN. *Beautiful form, pale yellow trumpet. Mid season.*

HEROD. *Fine upstanding flower of beautiful form. Late.*

SPRING GLORY. *A good variety for pots. Very early.*

VICTORIA. *An improvement on Empress. Early, forces well.*

WEARDALE PERFECTION. *One of the largest and best. Late.*

INCOMPARABILIS VARIETIES FOR GENERAL GARDEN PURPOSES

BEAUTY. *Perianth, sulphur yellow; cup yellow, margined orange-scarlet. Mid season.*

C. J. BACKHOUSE. *Yellow perianth. Orange-red cup. Early.*

E. G. QUICK. *Perianth primrose, elegantly twisted; cup yellow. Mid season.*

FIRELIGHT. *Bright yellow, flushed with orange red. Early.*

GLORIA MUNDI. *Rich yellow, stained orange-scarlet. Mid season.*

HOMESPUN. *Pale yellow perianth, deeper crown. Mid season.*

LADYBIRD. *perianth yellow; crown flame-red shaded gold. Mid season.*

LUCIFER. *Perianth white; cup flame red. Mid season.*

LULWORTH. *Perianth white; cup orange-red. Late.*

SIR WATKIN. *A great favourite. perianth primrose; cup rich yellow. Early.*

WILL SCARLET. *perianth cream; cup fiery red, large, striking. Very late.*

YELLOW GIANT. *Yellow, large and bold. Early.*

A Few Choicer Incomparabilis Varieties of Reasonable Price for Exhibition and Pot Culture

Bedouin. *White perianth; fiery orange cup. Late.*

Citriona. *Perfect form; soft citron-yellow. Late.*

Crœsus. *Primrose perianth; deep red crown, large, tall. Late.*

Golden Apricot. *White perianth; crown apricot on yellow ground. Late.*

Great Warley. *White perianth; clear yellow crown. Late.*

Michael Angelo. *White perianth; canary yellow crown. Mid season.*

Seville. *Particularly striking. White perianth, crown flat, fluted, seville-orange shade throughout. Mid season.*

Barrii Varieties for Bedding and Naturalizing

Albatross. *White perianth; cup citron yellow, edged orange-red. Late.*

Blood Orange. *Cream perianth; orange-red cup. Late.*

Conspicuus. *Yellow perianth; cup edged orange scarlet. A general favourite. Late.*

Firebrand. *Creamy perianth; fiery red cup. Mid season.*

Lady Godiva. *Perianth white; cup yellow, edged orange scarlet. Late.*

Mopsa. *Perianth creamy white; cup lemon, edged red. Late.*

Leedsii Varieties for Bedding

Ariadne. *Large saucer-like cup; ivory white. Mid season.*

Bridesmaid. *White, except for frilled margin of cup, which is pale primrose. Mid season.*

Duchess of Westminster. *Cup long, canary yellow, fading to almost white. Late.*

Mrs. Langtry. *A delightful flower and prolific, almost white. Late.*

Royal Lady. *Strong and tall, cup pale lemon. Very late.*

Waterwitch. *Pure white, pendant flowers, a beauty. Mid season.*

Leedsii Varieties Specially Recommended for Pot Culture and for Cutting

Amazon. *Cup canary yellow, free and good form. Late.*

Evangeline. *Cup citron-yellow. Late.*

Fairy Queen. *Cup creamy white. Early.*

Maid of Athens. *Cup sulphur, margined buff. Late, but forces well.*

Queen of the North. *Cup lemon, frilled and fluted. Mid season.*

Salmonetta. *Cup apricot, shading to peach, very distinct and lovely. Late.*

Southern Gem. *A large flower, crown pale citron. Early.*

White Lady. *Cup pale canary yellow, daintily crimped, fragrant. Late, but forces a favourite market variety.*

Leedsii Varieties for Exhibition

Chamois, Corallina, Czarina, Empire, Ivorine, Lord Kitchener, Mermaid, Sir Galahad, St. Olaf, Sweet Dorothy, Venus, White Slave.

Cheap Poeticus Varieties for General Planting

Cassandra, Edna, Epic, Glory of Lisse, Herrick, Minerva, Horace, Queen of England, Poeticus Recurvus (Pheasant's Eye), Ornatus (Early Pheasant's eye).

Six Poeticus Varieties for Exhibition

Cædmon, Epic, Homer, Ibis, Oracle, Socrates.

A Brief List of Daffodils for Rock Gardens

Narc. Triandrus Albus (Angel's Tears). *A sweet little white flower with globular cup and reflexing perianth, borne in clusters on 7-inch stems. Give shade, gritty compost, free drainage, and leave undisturbed.*

Narc. Triandrus Concolor, *of similar description to albus, but of a soft yellow.*

Narc. Triandrus Calathinus, *like Triandrus albus, but about twice the size. It requires a light compost of peat, leaf mould and plenty of grit.*

NARC. CYCLAMINEUS. *The earliest daffodil to bloom, and one of the daintiest of bulbous flowers. This and its hybrids are worthy of the cosiest little pockets available on the best of rockeries.*

NARC. JONQUILLA (SWEET SCENTED JONQUIL). *May flowering, with clusters of rich glowing yellow flowers on* 1 *foot stems.*

NARC. ODORUS (ORANGE QUEEN). *Very early. Golden orange flowers, two or three on a stem. Height about* 15 *inches.*

NARC. BULBOCODIUM (HOOP-PETTICOAT). *There are white, yellow, and sulphur varieties of these extremely pretty little flowers. They require pockets of sandy soil with some peat, and plenty of moisture, but some contrivance for warding off July and August rains will assist proper ripening of the bulbs.*

NARC. JUNCIFOLIUS. *A tiny little rush-leaved, flat-crowned Narcissus with yellow blossoms on* 4*-inch stems, sweetly fragrant. Provide a pocket backed by high mossy or overgrown stones.*

NARC. MINIMUS. *A Trumpet Daffodil in miniature; the tiny flowers are borne on* 3*-inch stems in February. They are rich yellow, and very prim and dainty.*

NARC. MINOR *is slightly larger, but also extremely pretty with twisted perianth segments and frilled trumpet on* 6*-inch stems. It flowers early and requires a sheltered nook.*

NARC SEROTINUS. *Silvery white star-shaped perianth, and diminutive golden cup; two or three flowers on a* 9*-inch or* 10*-inch stem. Fragrant and very refined. Should be loosely covered with bracken in winter.*

NARC TENUIOR (SILVER JONQUIL). *A slight and slender little plant with straw or sulphur tinted flowers, fairly late in spring.*

The names in the foregoing lists of Narcissi have been selected from the extensive and famous collection of Messrs. Barr & Sons, Taplow, whose catalogue contains full descriptions of a vast number of varieties. No claim is made that any of these selections are ex-

clusively the best of their sections, but they are picked from the host with a view to variety and proved merit whilst avoiding the very expensive varieties, which are the quest of connoisseurs who have already gained experience with the older and cheaper varieties. By starting with any of the varieties in the lists the reader may be assured of laying a useful foundation of a good collection, which it will be a simple matter to augment as experience is gained.

The breeding of choice Narcissi is an occupation which engages many enthusiasts, and the latest novelties season by season excite a never waning interest, whilst the finest productions frequently command high prices, which, however, do not necessarily mean huge profits to the raisers who have to spend years of patient labour in bringing along seedlings of which probably a very small proportion eventually justifies propagation or attains fame.

F. Herbert Chapman, Esq., of Rye, Sussex, is one of a group of hybridists and breeders who have maintained the prestige of British Daffodil experts. The illustrations of Narcissus Cordon Rouge is one of Mr. Chapman's triumphs, and depicts a flower of the Giant Barrii class of remarkable quality and refinement. To Mr. Chapman I am also indebted for the illustration of Mitylene, a lovely Giant Leedsii variety which was raised by the Rev. G. Engleheart, another enthusiast whose success with Daffodils has long been conspicuous.

NARCISSUS MITYLENE

A superb "Giant Leedsii" variety raised by Rev. G. Engleheart

(By courtesy of F. Herbert Chapman, Esq., of Rye)

CHAPTER VI

INFORMAL BULB GARDENING.

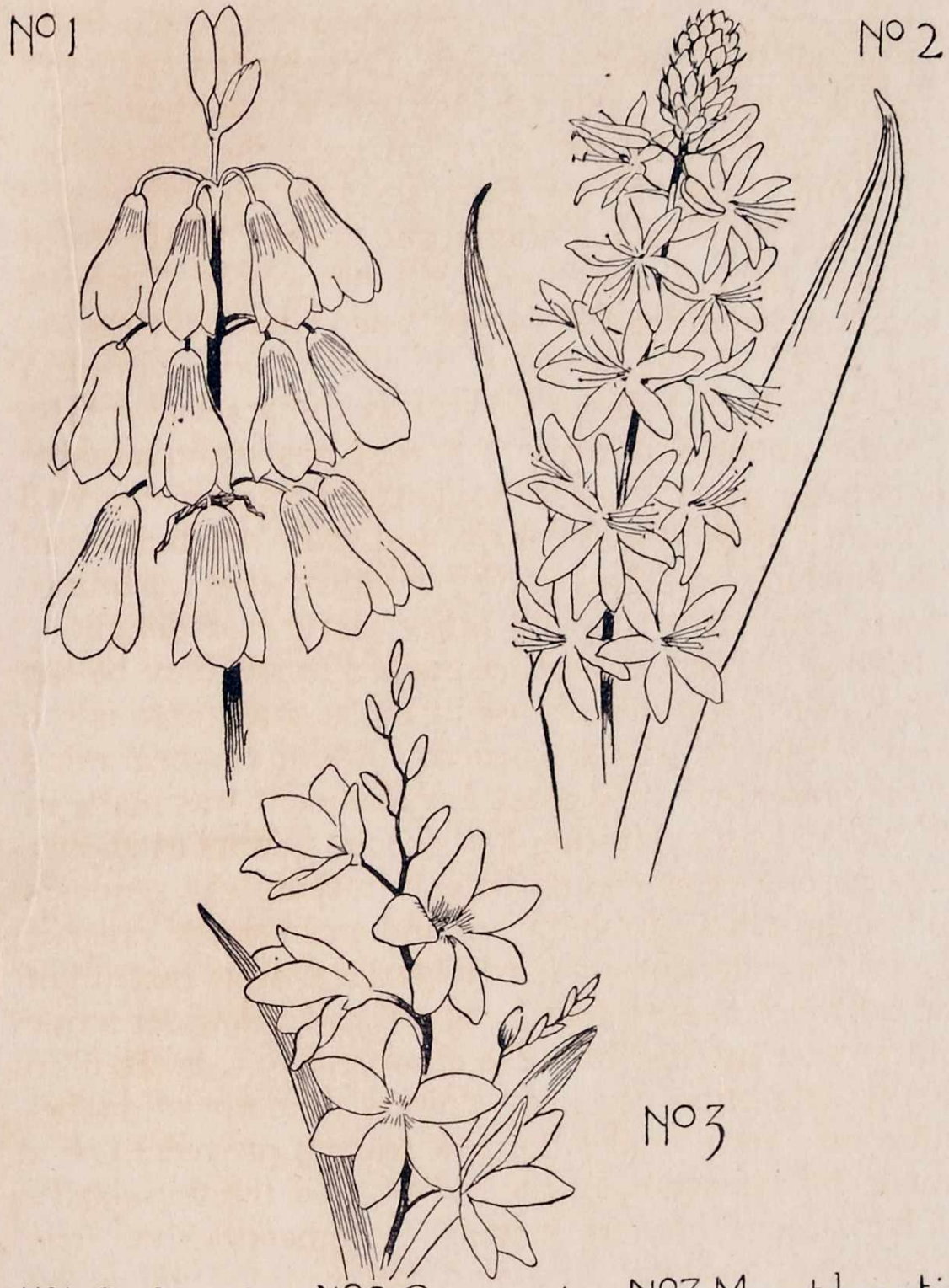
GREAT as the serviceability of bulbs for bedding may be there is an altogether wider scope in the theme of informal bulb gardening. The range of kinds and varieties of bulbs that are adaptable to planting in colonies, drifts, clumps or small patches in the Hardy Flower border, among shrubs, under trees, on hedge-banks, or in the wild garden, on rockeries, or in grass is of vast extent, and their characters, forms, seasons and capabilities vary to an extent which justifies the assertion that there is scarcely a soil or environment for which some appropriate bulb, corm or tuber cannot be selected and planted with every prospect of success.

Starting with the Winter Aconite and the earliest of the Snowdrops in January, fresh treasures are weekly ushered in until by March and April the glorious range of Daffodils is accompanied by an ever-increasing variety of other lovely flowers. The early Tulips are closely followed by the Darwin, Cottage, and other late flowering groups and species and simultaneously among the extensive and bewitchingly lovely Iris tribe species follows species and even overlap in eagerness to maintain an incessant and glorious floral display. By June the early Lilies adorn the garden and for the three best

summer months they reign supreme amidst such faithful companions as Fritillarias, Calochortus, Alliums, Tigridias and the noble Gladioli, which will themselves outrun the Liliums and carry on until the September Colchicums and Autumn Crocuses take up the task of sustaining the floral panorama, and even when the latest of these have faded there will be winter flowering Cyclamen to bridge the gap between them and the reappearance of the January Aconites, thus securing a perfect cycle of bulbous flowers as the seasons rotate.

Some among this array of floral gems are invaluable for cutting, many possess the charm of fragrance as well as beauty of form and colour, and there are bulbs and tubers which would be worthy of cultivation for foliage effects alone had they no other feature of delight.

Rich as borders of herbaceous perennials may be the added charm a judicious use of bulbs can create is too great a thing to be disregarded. About the beginning of the present century great advancement was made in the methods of exhibiting herbaceous flowers at shows. Enterprising show committees, in response to requests and suggestions of exhibitors and enthusiasts, created classes for collections of hardy border flowers instead of for twelve or twenty-four bunches, and the wider scope and greater interest of these classes gave a great fillip to the exhibition of hardy flowers. Competition became very keen, whilst the new feature proved to be a wonderful attraction to the public, and the popularity of herbaceous borders increased tremendously. The time came, however, and that before long, when exhibitors found it necessary to request show committees to exclude bulbs from collections of herbaceous flowers,



No 1 Galtonia · No 2 Camassia · No 3 Montbretia

Three particularly good subjects for bold clumps in the Herbaceous Border

and readers are asked to take particular note of the reason, which was that an exhibit containing a few good bulbous subjects scored a great advantage over collections which contained no bulbs. This was quite a legitimate request for exhibitors to make, and at some of the leading shows separate classes were subsequently provided for bulbous flowers and the herbaceous perennial exhibits were placed on a level basis.

The significance of this point is that if an exhibit of cut flowers containing bulbous subjects is outstandingly superior to an exhibit which omits bulbs, and that fair judgment between them is practically impossible, then a border of growing plants containing bulbs must be vastly better than a border without them ; and since no questions of fair competition arise in respect of a garden which is desired to give the maximum of delight to its owner the logical conclusion is that the omission of bulbs from our collections of hardy border plants is an error of judgment. Lest some critic deems it necessary to demur at the suggestion that herbaceous perennials may be spoken of as exclusive or independent of bulbs which are themselves both perennial and herbaceous, it should be noted that the contention of the exhibitors was not that bulbs are outside the limits of scientific classification or definition as herbaceous perennials, but that for purposes of practical comparison they stand on a different plane to the general run of herbaceous plants which are not of bulbous-rooted character, and that is abundant evidence of the indispensability of bulbs in the herbaceous borders of our home gardens.

Mention has already been made of the fact that there

INFORMAL BULB GARDENING
CHIONODOXAS MASSED UNDER DECIDUOUS SHRUBS

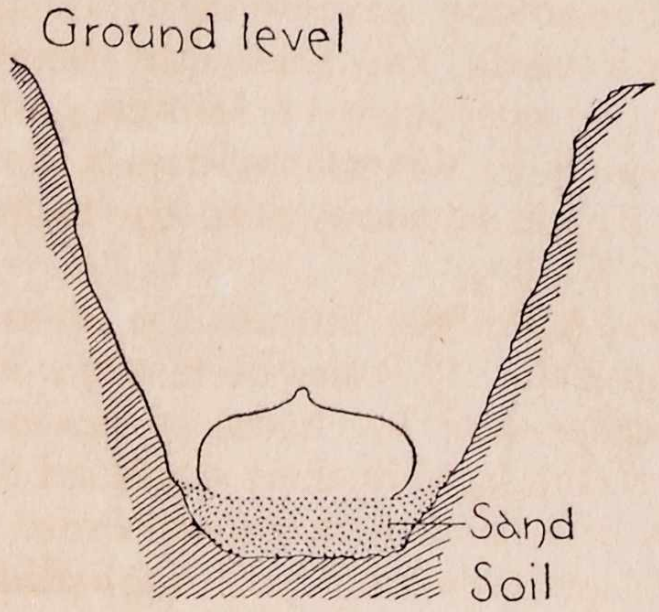
are bulbous or tuberous flowers for every season of the year, indeed for every month, and there are also kinds for every position and exposure, sunny or shady aspect, and for every conceivable colour scheme. Some few kinds are sufficiently fastidious to require certain conditions and to refuse to accommodate themselves happily to others, but a great number are extremely moderate in their cultural demands and will render a good account of themselves where many of even the coarser annuals and perennials fail.

Some little discretion is necessary in the matter of arrangement of bulbs among the other occupants of the border. Objection has sometimes been raised that by scattering bulbs among other plants it is made impossible to fork over, mulch, hoe, and otherwise afford proper attention to the border lest bulbs be disturbed or injured. That objection rather indicates an unwise system of planting. It should not be considered the correct thing to approach an already planted border, trowel and bag of bulbs in hand, and to push in a bulb wherever a foot of bare earth suggests that "here is room for one." The bulbs should constitute a recognized and essential part of the original planting scheme, positions being allocated to groups, clumps or masses of particular subjects having regard to their adaptability for association with their near neighbours, and those positions should be as clearly defined as those of Pæonies, Delphiniums or Campanulas. Seldom should an individual bulb be stuck in between clumps of other kinds of plants. Rows are not pleasing in association with irregular clumps of Heleniums, Pyrethrums, Pinks or Aquilegias, but it is quite a good plan to make

studied combinations of bulbs and other subjects, such, for instance, as a dozen of English Irises spread over a square yard of space with Polyanthus or Violas between, or the tall white Galtonia candicans interspersed with a dark coloured Phlox of not too tall a growth. Liliums almost invariably thrive more happily when they rear their heads over a carpet of close growing plants, Mimulus, Heucheras, and Iberis, or some of the dwarf Ericaceous plants such as Cassandra, Cassiope, Andromeda or Dabœcias being capital associates for various kinds of Liliums; whilst even Pæonies, especially P. Moutan varieties and the hybrid Astilbes, will live in harmony with the taller kinds of Lilies.

The tuberous Anemones are not too often seen in a really flourishing state. It has been well said that one never fully realizes the loveliness of Anemones until they are seen naturalized in their woodland homes, but the possession of a small herbaceous border instead of extensive woodlands leaves us still hankering after the charm of a few Anemone appenina, or A. nemorosa, to say nothing of the gorgeous St. Brigids and the brilliant A. fulgens. Let us then contrive to give these gems a setting they will appreciate. There is no regulation to deny us the privilege of introducing a trio of Daphne mezereon, one or other of the hybrid Cytisus, Deutzia gracilis, or Perovskia atriplicifolia or some other shrub into our herbaceous border, and around the base of these shrubs, even close enough to intermingle with their roots, and to nestle under their shade, the Anemones will establish themselves and be more at home than when given a favoured bed to themselves. There is quite a

lot to learn about the partiality of various bulbs for intimate association with the roots of other plants, especially trees and shrubs, the secret no doubt being that the latter keep the soil sufficiently well drained to enable the bulbs to go to their rest without risk of decaying in stagnant or superabundant moisture. There will, of course, be necessity to make due provision



PLANTING GLADIOLUS CORM

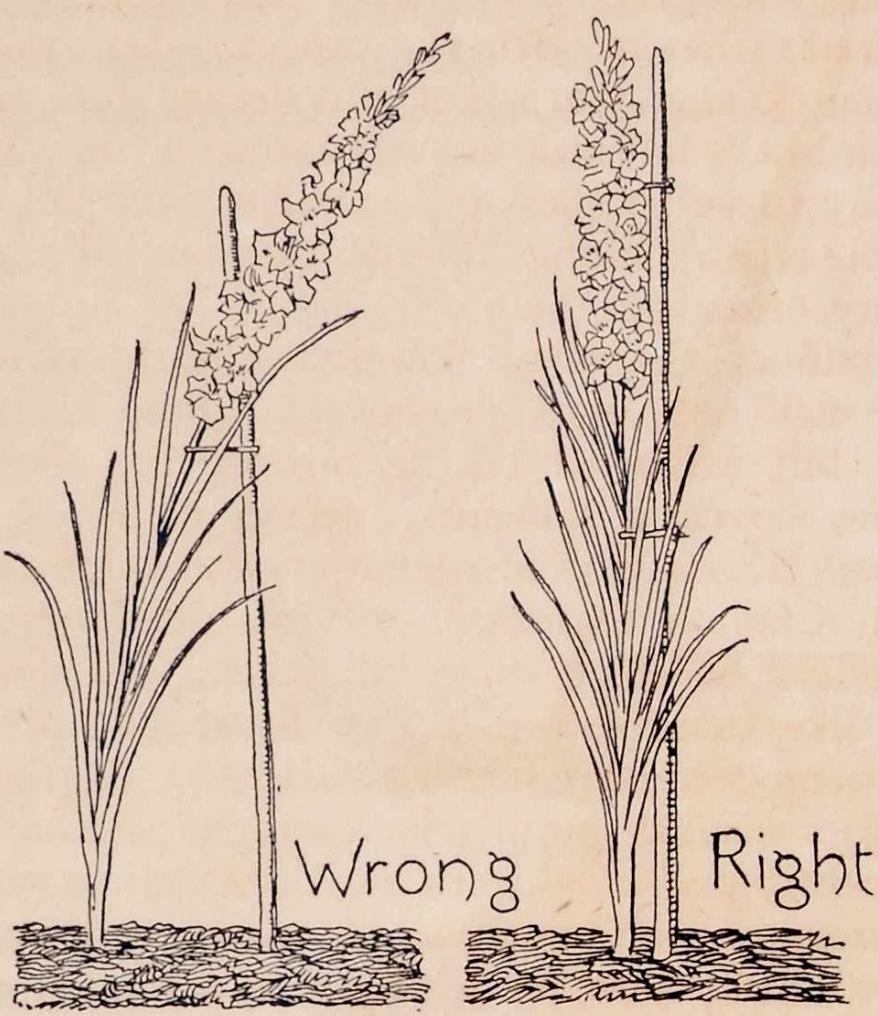
for nourishment of bulbs in such positions, but that may be quite simply done by means of periodical mulching.

Gladioli grown for garden adornment find their best position in the herbaceous border, but when grown for cutting they should be given independent quarters, where the removal of their flowers will not affect the display of the mixed border.

To grow Gladioli really well a good, deeply-dug soil is essential, and the corms should be planted as soon after the beginning of March as conditions will permit ;

or even in late February in southern gardens when the soil is light.

Open out good holes with a trowel, about 3 to 4 inches deep. Cover the bottom of the hole with sand,



STAKING GLADIOLI

and upon this place the corm, as shown in the accompanying drawing.

Take care that the soil with which the corms are covered is free from large stones.

Be particularly careful with staking Gladioli, for whilst it is very necessary that the tall and weighty flower stems shall be secured, it is also necessary that

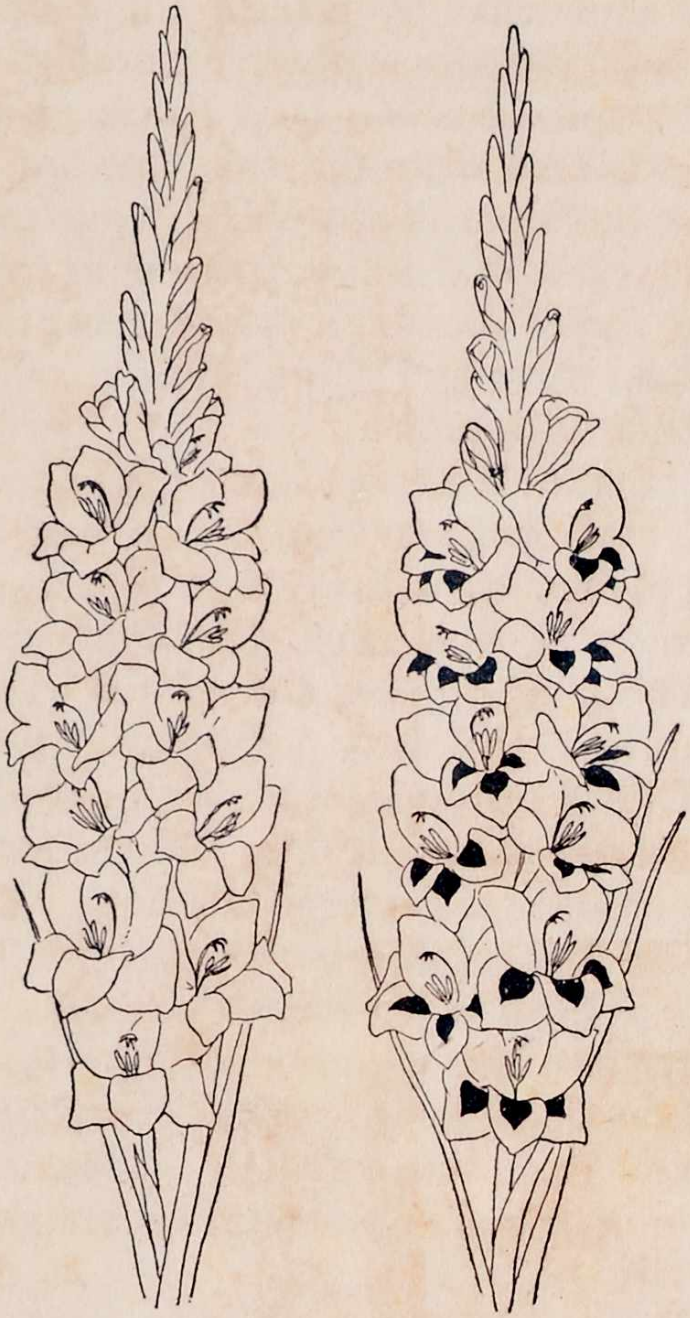
the stakes shall be neat and inconspicuous. A glance at the accompanying examples of right and wrong staking will show that by placing the cane as near to the plant as possible without piercing the corm, fastening the spike by two neat ties, a pleasing result is secured; whereas with the cane too far away, and with one tie, the stem is not only drawn from an erect position but is left still to sway about in the wind, and probably to suffer damage. Similar neatness will be desirable when staking Liliums, Galtonias, Camassias, and any other tall bulbs.

Gladioli of the large flowered and the primulinus types will not only provide a grand display of colour, but will with a little care in the selection of varieties cover a flowering period of nearly three months. Those who grow flowers for exhibition will find in Gladioli extremely serviceable flowers. The aim should be to produce tall, even, well developed spikes like those shown in our illustration of typical spikes of modern large flowered Gladioli. To those who wish to specialize in this increasingly popular flower, the recently published work entitled *Gladioli* will make an extremely useful companion volume to this general work on Bulb Gardening. From every point of view the culture of Gladioli is exhaustively dealt with in the separate volume, and few subjects are more worthy of specialization.

Bulbs in Grass

Where a level, formal lawn is to be kept regularly mown, rolled and swept, it is asking too much that it should also grow bulbs, for either the lawn or the bulbs

must suffer. Grass banks that need not be too closely trimmed until the foliage of the bulbs has withered,



TYPICAL SPIKES OF MODERN LARGE FLOWERED GLADIOLI

approaches to shrubberies, orchards, and all semi-wild areas of grass may with every good reason be planted with patches and drifts of Crocuses, Snowdrops,

DAFFODILS EFFECTIVELY GROUPED IN GRASS

Daffodils, Scillas, and Ornithogalums. The fact that objection is raised against close cutting of the grass does not imply that the proper course is to select the very roughest patches of coarse grass and rank weeds and there to plant bulbs, condemning them to an incessant and unequal struggle for existence ; it is not indeed that fine grass is too good for the bulbs, but simply and solely that if bereft of their foliage before it has ripened their early collapse is inevitable. Many errors are made in planting among which the most prevalent are allowing an inadequate quantity of bulbs to make a pleasing display, and the insertion of them in small holes pierced in the turf with a dibber or gauge. A dozen Daffodils may make quite an effective little patch when planted in close proximity to other plants in a border ; a clump of Snowdrops producing a little posy of bloom is a dainty little item on a small rockery, but on a broad expanse of grass, such would be puny, insignificant, and futile ; it must be a matter of big patches and large numbers to be of any service. The only proper method of planting is to cut and roll back the turf, fork up and pulverize the soil, incorporate a reasonable quantity of coarse bone-meal or hoof and horn shavings, about 4 oz. to the square yard, level down, plant the bulbs from an inch to 3 inches deep, according to their size, then replace the turf and finish off with a light roller. Distances between bulbs should roughly approximate those allowed in ordinary planting, but anything approaching measured formality would be totally out of place.

Bulbs on Hedge-banks.

Where hedge-banks are clear of nettles, dandelions,

and other coarse weeds and grass they may be made beautiful by planting hardy Cyclamen, Muscari, Ornithogalums, Fritillarias, Snowdrops, Colchicums, and Daffodils. It is desirable that before planting the bank shall be dug over, and if it can be manured during the spring preceding planting both the hedge and the bulbs will benefit accordingly. The necessity for frequent weeding, and periodical clipping will be obvious; for if the bank is choked with weeds, or the growth of the hedge is allowed to overhang the bulbs to the exclusion of light and the benefit of rains there will be no charm in the bulb-planted bank. Hedges are invariably ravenous, and where banks are steep they become excessively dry, but mulching will be of great service under such conditions.

Naturalizing Bulbs in Woodland, Meadow, and "Wild" Garden

Who does not know a wood where Blue Bells grow? and knowing it, who can resist the yearning to tramp in that wood on a cheery day in May when the swaying spikes of dangling bells among the strap-shaped leaves of green give flat contradiction to the fashion artist's dictum that "Blue and green together should never be seen"?

Scilla festalis—such is the botanical name of the Blue Bell—is one of the grandest of the bulbs that may be naturalized in woods, grass lands and plantations of shrubs, and in all lists which give abbreviated hints to cultivators "Soil ordinary" will curtly indicate that this flower of grace and beauty accommodates itself to conditions after the manner of the sturdiest of our native

INFORMAL BULB GARDENING
NARCISSUS "SEAGULL" IN A WOODLAND GARDEN

plants. In grass lands it grows best on porous, gritty soils, but among the ramifying roots of trees Blue Bells will grow in putty-like clay, and on the harshest of stony gravels. There are whites and pinks of various shades in Scilla festalis, interesting as variations, but the blue is the best beloved, and deservedly so.

Wherever a stretch of land is planted with forest trees some Blue Bells should be introduced, not too plentifully, but thinly scattered that they may have scope for development without becoming speedily overcrowded. The way to plant Blue Bells in a wood is to open out trenches a spade's width and half a spade's depth, digging backwards without heeding the crooked lines of the trenches. Dribble the bulbs irregularly along the opened trenches and cover in; the rest they will do for themselves.

In grass land rip up patches of turf, fork over the soil beneath; throw the bulbs helter-skelter over the dug surface and then press them (points upward) into the soil wherever they fall, and relay the turf. Daffodils should be likewise treated, and in shady spots among the grass the tall Ornithogalum pyramidale may be distributed at from a foot to 2 feet apart. Tulips are not suitable for this manner of planting, but on the banks of a stream or a wet ditch Leucojum æstivum will grow if the soil be fairly strong loam.

In the woods or the wild garden where grass is not too rank Anemones should be a special feature, and each of the appropriate kinds should have a breadth to itself. Those with rhizomatous rather than tuberous roots require a certain amount of care in getting them established. The imported roots which are sent over

with bulbs from the Continent are of little worth, for having been grown in a rich but porous black sand they have made flabby growth, and the life is half dried out of them before they reach our hands and can only be nursed back to vigour by a season's care in sand-beds or pots. Native roots lifted and transplanted just as they are awakening to activity at the birth of the new year, or plants which have been well established in pots, are the only satisfactory material for naturalizing, and my only reason for mentioning them in this book is that trade custom so frequently classes them with bulbs that it is necessary to explain that their treatment as bulbs is calculated to produce failure. Their incomparable elegance is such that the possibility of frustrated effort to establish wood Anemones in suitable quarters must be guarded against at all costs. Shady nooks in the wild garden should accommodate Ornithogalum nutans and O. umbellatum, and, of course, Snowdrops are foremost among wild garden bulbs. Allium neapolitanum is at home in woods or in shady drifts in the wild garden, and Eranthis hyemalis (winter Aconite) is a gem for naturalizing.

CHAPTER VII

BULBS IN ROCK GARDENS.

LAVISHLY as rock gardens may be adorned with the Aubrietias, Campanulas, Dianthus, Gentians and Saxifrages, Sedums, Primulas, and the rest of the delightful Alpines and their kin, it would be a grievous blow to the vogue of rock gardening if by some means bulbs were rendered unavailable for planting in the hollows and recesses of rockeries. Fortunately we have no need to contemplate such a misfortune, but rather may we rejoice in the fact that there is a wealth of superb material at our disposal by means of which the March and April flowering Alpines may be preceded or accompanied whilst the latest of the summer blooming kinds may be followed by still other charming little bulbs and corms. Indeed the rock garden is the ideal home for many of the most delightful gems in the whole array of bulbs, tubers and corms, a goodly number of which indeed are natives of the Alps, the Pyrenees and other mountainous regions where they are the natural companions of the very cream of rock plants.

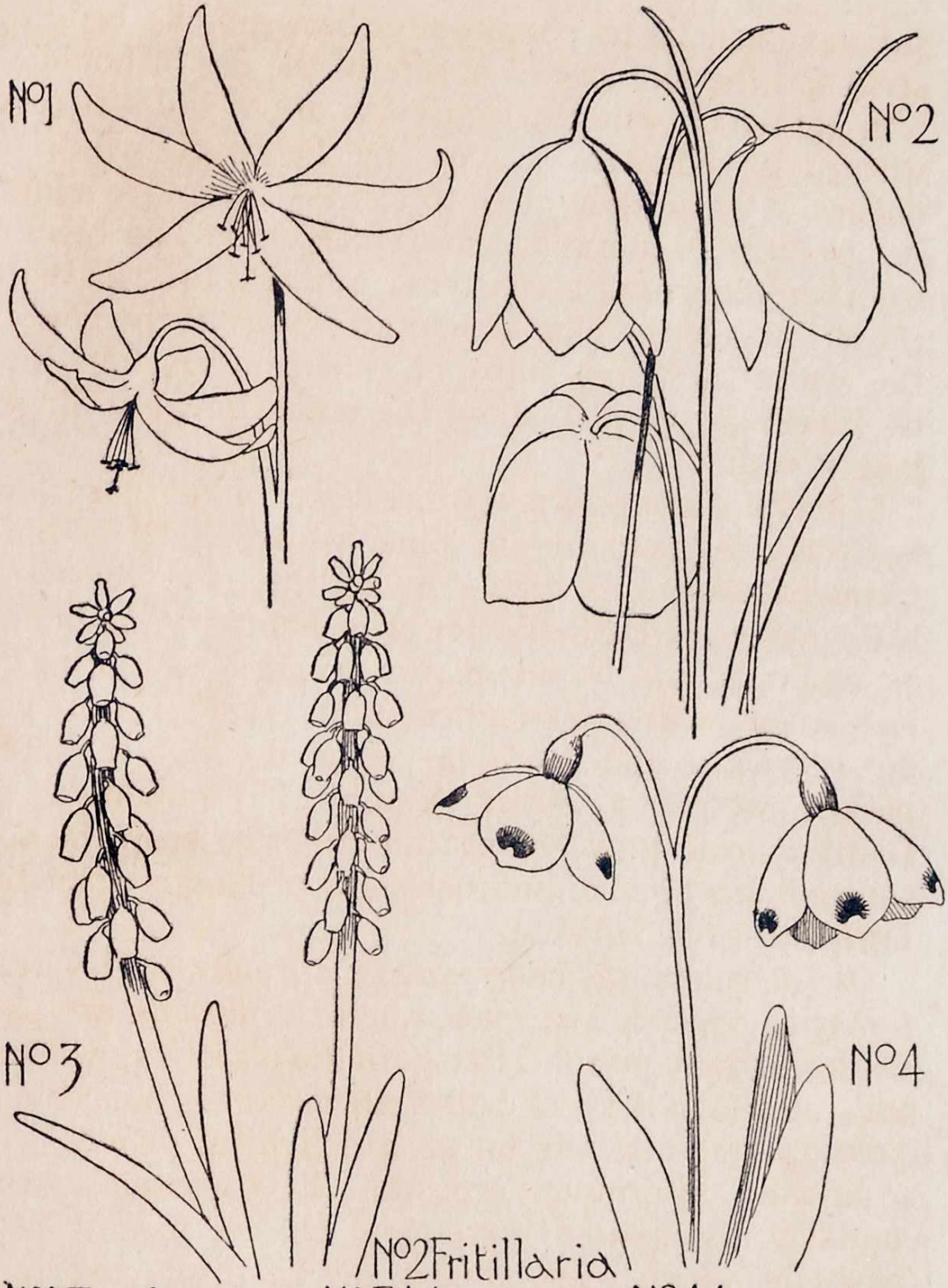
It is true that sometimes the style in which Hyacinths, Tulips and Spanish Irises are planted around the margins of a rockery savours of incongruity,

for there can be no compromise between the bedding style and the mimicry of nature in the use of boulders of rugged rock, but the legitimate use of bulbs is seen when Iris reticulata braves the February wind, or dodges it by nestling close to a moss-covered boulder. A carpet of Arenaria balearica keeps the Iris blooms from becoming mud-bespattered, and as if to accentuate the richness of the blue-violet and orange of the flowers the white, nodding bulbs of Galanthus Fosteri and G. Ikariæ arrive just about the same time, but linger longer with us.

Scilla bifolia præcox is another flower of February, and is closely followed by the blue, white, and rose-pink forms of the bifolia type. A few tiny, but charming little species of Daffodils flower in February, including N. minimus, and N. moschatus, whilst March brings a host among which N. triandrus albus must certainly not be overlooked, and should be provided with a sheltered pocket where a dwarf Veronica, Campanula or Dianthus can grow among the bulbs to keep the soil covered and provide another show of bloom when the Daffodils have faded.

Of Cyclamen we have spring, autumn, and winter flowering species, and even when the flowers are past the beautifully marbled foliage of the majority, will sustain interest in the cool, half-shaded recess which should provide snug quarters for such delightful plants.

Equally charming are the Erythroniums with fantastically spotted leaves and chaste, modest little blossoms which seem almost shy of displaying their delicate tints and dainty forms, but groups of the varied colours which range from cream to yellow pink and

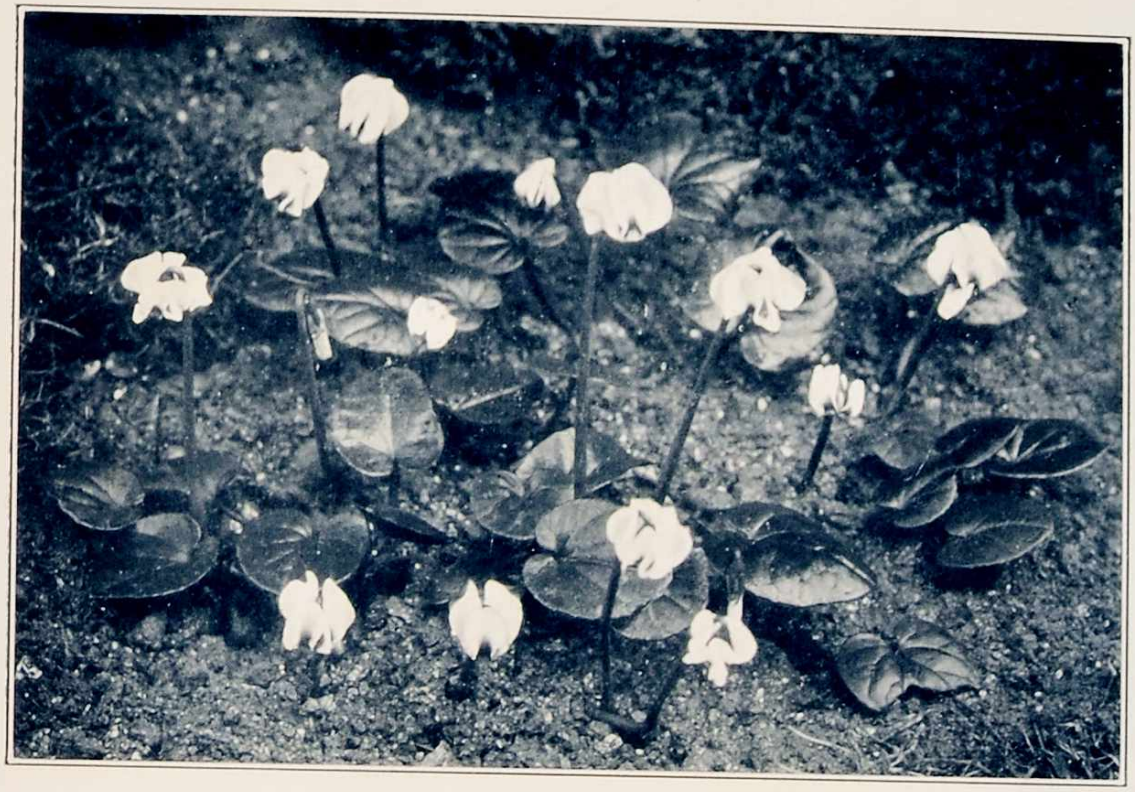


No2 Fritillaria
No1 Erythronium · No3 Muscari · No4 Leucojum

purple will prove irresistibly fascinating. They require shady nooks with good soil in which leaf mould plays a part.

True blue is to be found in Muscari armeniacum and M. botryoides, but perhaps M. conicum is even brighter, whilst other species of Muscari give us white, rose, purple and other shades. Their perky little spikes, standing erect between their narrow leaf blades, are much improved by a groundwork of silvery foliage, but it must be a miniature plant which snugs the ground, like Antennaria tomentosa or Acæna Buchanani. The Muscaris like sunny positions. Although one rather has a dislike of lines or rings of the ordinary Dutch Crocuses for the rock garden there is no hesitation in strongly recommending little patches of both spring and autumn species such as the black and white Crocus biflorus, C. Imperati, C. reticulatus or C. Sieberi, which are but a few at random of the spring-flowering kinds, whilst C. iridiflorus, C. nudiflorus, C. speciosus, and C. zonatus are a few autumn-blooming species of which there are many more. These Crocus species like well-drained, gritty soil, and it is prudent to surround the bulbs, when planting, with clean sharp silver sand.

The smaller Fritillarias, such as the bright yellow F. armena which grows only 5 or 6 inches high and flowers at mid-summer, F. coccinea (scarlet) in May, F. liliaceæ, about 8 or 9 inches high, white, and also flowering in May, and F. moggridgei, in June, with purple and yellow flowers on 8 inch stalks, should be planted in a good depth of light sandy soil, burying the bulbs 4 inches deep, allowing about 8 inches between the plants, and covering the space between them with



BULBS FOR THE ROCK GARDEN
HARDY CYCLAMEN

BULBS FOR THE ROCK GARDEN
SCILLA SIBIRICA ALBA AMONG ROCKS

Sedum glaucum or with the little annual "Diamond" Flower (*Ionopsidium acaule*), which is easily raised by scattering seeds over the soil, or again with the blue-flowered annual Sedum cæruleum similarly raised from seeds. Once planted, the Fritillarias should not be disturbed until they show signs of deterioration from overcrowding.

There are taller Fritillarias which may appropriately be given large pockets and prominent positions on the rockery, and the compact mossy saxifragas or sedums (where the position is too hot for the former) will make suitable carpets over which the nodding, tessellated bells will show themselves to good effect. Colchicums in autumn, and Sternbergia colchiflora and S. lutea in September keeps the sequence of bulbs for the rock garden unbroken well into autumn, and thus again we draw round to Cyclamen europæum and later to C. neapolitanum, C. coum, and C. cilicicum, which will see the old year out and nod its greeting to the earliest flowers of Eranthis hyemalis in January.

In a later chapter various kinds of bulbs are separately dealt with, as being suitable for cultivation in unheated glass structures. A considerable proportion of these—such, for instance, as the hardy Cyclamen, the Erythroniums, Crocus species, and various others—are admirably adapted for planting in the rock garden, and in order to avoid as far as possible splitting up of cultural instructions, notes regarding outdoor planting are given together with the instructions for potting or putting up in pans.

This may not be considered an ideal scheme of

arrangement, but the alternative of dealing with various phases of culture under two or three separate headings could not well be carried completely through the whole range of subjects without extending the book to a greater length than is practicable.

As a general rule the porous, gritty soil of the well-constructed rock garden is excellent compost for bulbs and tubers, and where peat is advised as an ingredient of potting mixtures it may be calculated that it will also be an advantage to incorporate some peat in the soil of the rock garden pocket in which the same kinds of bulbs are to be planted. Those, too, which are to be placed in sunny positions under glass will also enjoy cosy nooks on the rockery where the sun will reach them.

ABBREVIATED LIST OF BULBOUS AND TUBEROUS-ROOTED PLANTS FOR THE ROCK GARDEN

NAME.	COLOUR.	FLOWERING PERIOD.	HEIGHT IN INCHES.
Allium acuminatum .	Rose-pink	July	7–9
,, azureum or cæruleum	Blue	June–July	24
,, Karataviensis .	Rosy lilac	May	6
,, Moly . . .	Yellow	May–June	12
,, ostrowskianum .	Rose	June–July	6–9
,, pedemontanum	Red	July	12
,, rosenbachianum	Purplish-lilac	June–July	24–30
,, sub-hirsutum .	White	June–July	12
,, triquetrum . .	White and green	June–July	12–15
Anemone fulgens . .	Scarlet	Midsummer	12
,, ranunculoides	Yellow	March	6
Babiana	Mixed	April–May	6–9
Brodiæa grandiflora .	Blue	June	6

Name.	Colour.	Flowering Period.	Height in Inches.
Bulbocodium vernum .	Rosy-purple	Mar.–April	6
Chionodoxa luciliae .	Blue, white centre	March	4
,, ,, alba	White	,,	,,
,, ,, rosea	Rosy-lilac	,,	,,
,, sardensis .	True blue, white centre	,,	,,
,, Tmoli . .	Blue, white centre	April	,,
Colchicum (autumn crocus)	Various	Autumn	6–9
,, agrippinum	Chequered, rosy-purple, on white ground	,,	,,
,, autumnale .	Purple	,,	,,
,, autumnale album	White	,,	,,
,, autumnale album plenum	White (double)	,,	,,
,, Bornmulleri	Rose, white centre	,,	,,
,, byzantinum	Rose	,,	,,
,, cilicicum .	Pink	,,	,,
,, giganteum .	Rose, white centre	,,	,,
,, Parkinsoni .	Chequered rosy-lilac on white ground	,,	,,
,, speciosum .	Rosy-carmine	,,	,,
,, speciosum album	White	,,	,,
,, speciosum illyricum	Rosy carmine	,,	,,
,, speciosum Ruby Queen	Wine-red, white centre	,,	,,
Crocus. Autumn, winter and spring-flowering, too numerous to name individually.			

Name.	Colour.	Flowering Period.	Height in Inches.
Cyclamen cilicicum .	Pink, carmine base	Autumn	6
,, coum . .	Rosy-pink	February	4
,, ,, album	White, purple base	February	4
,, europæum .	Crimson	August	4
,, ibericum .	Rosy red	Feb.–Mar.	3
,, ,, album	White, crimson base	,,	,,
,, neapolitanum	Rosy-pink	Autumn	4
,, album	White	,,	4
,, repandum .	Crimson	April–May	4
Eranthis hyemalis . .	Yellow	Jan.–Feb.	3
,, tubergeni . .	Primrose yellow	,,	4
Erythronium albidum .	White and yellow	Spring	4
,, americanum	Yellow	,,	3
,, californicum	Yellow and orange	,,	9
,, ,, White Beauty	White, yellow base	,,	9
,, citrinum .	Yellow, sometimes yellow and pink	,,	4
,, dens canis (Several distinct varieties of Dens canis available)	Rose-pink	,,	3
Erythronium grandiflorum	Golden yellow, white anthers	,,	9
,, Hartwegii	Sulphur	,,	6
,, Hendersoni	Pale lilac, and purple	,,	6
,, Howelli .	Yellow and orange	,,	6
,, Johnsoni .	Rose pink	,,	6
,, purpurascens	Yellow, orange and purple	,,	4
,, revolutum Watsoni	Creamy white and yellow	,,	6

Name.	Colour.	Flowering Period.	Height in Inches.
Fritillaria armena . .	Yellow	April–May	6–8
,, aurea . . .	Yellow and reddish brown	May	6–8
,, citrina . .	Yellow and green	May	8
,, coccinea . .	Red	May	8
,, kamschatica .	Almost black	May	9
,, latifolia . .	Red	May	12
,, meleagris and varieties	Variously mottled	May	12
,, recurva . .	Orange scarlet	May	12–18
Galanthus (Snowdrop)			
,, nivalis . .	White	February	4–6
,, Elwesii . .	,,	Jan.–Feb.	8–9
Hyacinthus amethystinus	Amethyst-blue	Spring	8–9
,, fastigiatus	Amethyst-lilac	May	6
Iris [1]			
Leucojum autumnale .	White, with pink tinge	Autumn	4
,, roseum . .	Rose	Autumn	4
,, vernum . .	White, green-tipped	March	6
,, ,, carpathicum	White, tipped yellow	March	9
Lilium concolor . .	Scarlet	July	12
,, coridion . .	Lemon, spotted purple	July	24
,, rubellum . .	Pale rose	June–July	18
,, tenuifolium . .	Scarlet	June	18
Muscari Argæi . . .	Purple-blue	Mar.–April	4–5
,, azureum . .	Cambridge blue	February	4–6
,, botryoides cæruleum	Blue	Mar.–April	4–6

[1] Many dwarf Irises are well adapted to culture on rock gardens; I. reticulata, persica, histrio, and several others being bulbous, but many are of rhizomatous rather than bulbous character, and these should be procured from hardy plant specialists rather than from dry-bulb merchants.

Name.	Colour.	Flowering Period.	Height in Inches.
Muscari botryoides album	White	Mar.–April	4–6
,, Heldreichii	Blue	April	6
,, moschatum	Purple, passing to dull yellow	,,	6–8
,, neglectum majus	Blackish blue	March–May	6
,, Heavenly Blue	Sky-blue	March–May	6
Narcissus bulbocodium citrinus	Citron yellow	April	6–8
,, bulbocodium monophyllus	White	February	6
,, cyclamineus	Yellow	March	6
,, gracilis	Yellow	May	14
,, jonquilla	Yellow	May	12
,, juncifolius	Yellow	April–May	3–4
,, minimus	Yellow	February	3
,, triandrus albus	White	March	6
,, triandrus Queen of Spain	Canary yellow	March	12
,, serotinus	White and yellow	May	10
Puschkinia scillioides compacta	White and light blue	April	6
Scilla bifolia	Blue	March	3
,, ,, carnea	Flesh pink	March	3
Scilla sibirica	Blue	February	3–4
,, ,, alba	White	February	3–4
,, ,, taurica	Blue	February	3–4
Tulipa Batalini	Soft yellow	May	4
,, biflora major	Cream	March	8
,, clusiana	Outside red, inside white	April	8
,, dasystemon	Yellow and white	April	8
,, Greigii	Orange scarlet shading to yellow	May	9

Name.	Colour.	Flowering Period.	Height in Inches.
Tulipa ingens . . .	Bright red	April–May	12
,, kaufmanniana .	Carmine and yellow on white ground	March	6
,, montana . .	Scarlet	May	8–9
,, persica . . .	Outside bronze, inside bright yellow	May (late)	4–6
,, primulina . .	Cream	April–May	9
,, saxatilis . . .	Rose, yellow centre	April	8
,, turkestanica .	Outside rosy red, inside yellow, petals twisted	March	9
Zephyranthes candida .	White	Autumn	8

CHAPTER VIII

LILIUM

A CHAPTER is the very least that can be devoted to the glorious and superb Lilies, but think not that justice may thus be done to a family of widely varying and always lovely flowers; a bulky volume would be required to approach anywhere near such a goal. The loveliness of Lilies needs no word of description, but their many differences in form and character, capabilities, and cultural requirements, provide material for close study and will prove of sustaining interest to all who desire to excel in the cultivation of choice plants.

Our present purpose is to deal with Lilies out of doors, for their pot culture is elsewhere touched upon. There is an extensive range of variety in the types of Liliums that may be quite successfully grown in the majority of British gardens, but let not this statement be confused with any suggestion that good selections may be found thriving in the majority of British gardens, for indeed and alas! this is not the case, and one casts about for explanatory causes. For the most part the cost of Lilium bulbs is not extravagant when their decorative capabilities are duly recognized. Importations of many of the most suitable kinds are considerable in extent, and several British trade growers pro-

duce extensive batches of bulbs. There must, therefore, be a big demand, and with these facts before us the inevitable conclusion is that through some cause or causes a large proportion of the bulbs distributed prove to be short-lived. That is by no means a natural character of Liliums as a family, and therefore the suggestion confronts us that many who attempt to establish colonies or collections of Liliums in their gardens fail through some defect in their methods of culture.

Undoubtedly many mistakes are made, and some of these it will be well to indicate.

In the minds of some the idea exists that Liliums are lovers of sunshine and warmth, and in consequence bulbs are planted on a border facing south, where the sun shines with all its power. On the other hand, there are those who believe that Liliums love a cool atmosphere and a damp root run, and their bulbs are planted in some shady recess where sun can never scorch the plants. Both are entirely wrong. The stems, foliage and flowers of Liliums enjoy the sunshine, but the roots require cool conditions and moisture, but without stagnation. It is one of the greatest secrets of success to contrive that these two essentials shall be provided, and obviously the only practical method by which this can be done is to select a sunny position, but to plant between the Lilies some dwarf-growing plant with spreading foliage which will shade the soil but will allow the stems and foliage of the Lilies to rise above and enjoy the benefits of sunshine. Hence it will be seen that it is not a good plan to plant Liliums in beds by themselves nor even to form clumps wherever there may be a yard or two of clear space in the herbaceous

border. Beds of dwarf Rhododendrons, Azaleas, Kalmias, and ericaceous shrubs are admirable sites for many kinds of Liliums which prefer a peaty soil, and they are numerous, whilst those which like a friable loam will be happy among such plants as Thalictrums, Astilbes, Actæas, Hypericums and other plants of similar habit. Some kinds of Liliums prefer their stems and blossoms to be partially shaded rather than fully exposed to the hottest sunshine, and these may well be accommodated in the foreground or convenient bays of the shrubbery.

For general convenience the customary plan is to allocate Liliums to one of three groups, the first of which would be for the types and varieties that are of easiest culture, and which can accommodate themselves to most soils and situations.

The second group should comprise the lilies which require a good free loamy soil, with the addition of a moderate proportion of leaf mould and peat, together with the ground-shade already referred to. Herein will be found some of the most delightful members of the whole tribe. The third section is for the moisture and shade lovers, which for the most part require also shelter from wind, and special conditions, such as an all-peat root run, or a mixture of peat, leaf mould and sand, stream-side positions, or particularly favoured gardens, such as may be found in Ireland, the valleys of West Wales, or the West of England and Scotland.

Imported bulbs, no matter to which section they may belong, require careful handling before they are committed to the soil, and many failures result from lack of knowledge upon this particular point. The importa-

tions cannot invariably come to hand at the natural season for planting, neither are the bulbs received in first-class condition after their prolonged period of storage in packing cases of dry fibre. This is especially important in regard to Lilium auratum and other choice Japanese Lilies which reach this country in the winter season.

Detailed instructions as to treatment required are given in the chapter dealing with the pot culture of Liliums. It is unnecessary to repeat the whole of that information, but the process of starting in trays, and potting up is the only satisfactory method of preparing imported stock for planting in spring. Home-grown bulbs should be lifted when quite dormant, and re-planted before the bulb-scales begin to show signs of shrivelling. Whilst we may be heartily glad that importations of choice Liliums enable us to procure cheap stock the fact that home-grown bulbs need not be subjected to the weakening effects of prolonged separation from the soil should be warmly appreciated by buyers and should be a sufficient incentive to great development of the commercial production of Lily bulbs in Britain. Preparation of the site is of great importance, but presents no real difficulty when new beds are to be made and the Lilies and shrubs can be handled in combination. It is a different matter when the desire is to introduce and establish Liliums in beds of old Rhododendrons, or in shrubberies already well developed. One cannot afford to mercilessly rip up the roots of good shrubs in order to provide the Liliums with a good bed ; at the same time it is folly to expect the bulbs to thrive if simply placed in little holes opened in soil which is

hardened and impoverished. Sometimes vacant spaces may exist among the shrubs which permit of a square yard or so of soil being excavated and well prepared for a small colony, and as an alternative it may be advisable to sacrifice here and there a shrub of minor importance to make room for the Liliums. In either case it must be borne in mind that large shrubs with ramifying roots will have drained the soil of nourishment, and it will be essential not only to excavate to a depth of 2 feet or even 3, but to work in a liberal quantity of good fresh soil and manure, and this should be done at least a couple of months before the Lilies are to be planted. When working on a stubborn clay subsoil break up the bottom and work into it a mass of broken bricks, and porous rubble to improve drainage, and even when planting moisture-loving varieties it is well to introduce drainage, for anything like stagnation will be detrimental to the bulbs. When improving soil by the introduction of peat, leaf mould, or manure mix the additions as thoroughly as possible with the staple soil; large chunks of peat lying among unbroken lumps of earth will not be of much service, nor will a 6-inch layer of solid manure be useful. Chop and turn over the whole compost two or three times, and then having filled in the bed allow time for settlement for planting. Fairly large pieces of charcoal are serviceable, especially for the wet situations. In planting it is sufficient to allow 2 to 3 inches from the top of the bulb to the natural surface of the bed, but later on a mulch will be required, and this is doubly important in the case of those Liliums which produce stem roots, for upon the proper sustenance of these depends the quality of the flowers and

Photo *Vasey*

LILIES AND YEW TREES

the upbuilding of the bulbs for the following year.

Whatever the kind of lily, and in whatever soil or situation it may be planted the bulb should be completely surrounded with clean sharp sand; an inch thickness all round, beneath and above the bulb is little enough, such a layer of sand being capable of ensuring a considerable amount of protection against stagnant moisture and the unwelcome attentions of various grubs and insects.

Staking, feeding, spraying for insect pests are all matters of routine which must not be neglected, and copious watering throughout the summer period is the more essential by reason of the amount of rain the foliage of the "cover" plants will keep from the soil and the quantity of moisture the roots of the shrubs will absorb. The top dressings of light soil should be regularly applied in thin layers at intervals rather than in one thick dressing, and that will provide an excellent opportunity for feeding, as a different fertilizer in small quantity can be mixed with each successive layer of top dressing.

For the convenience of readers the names of the principal Liliums are classified in accordance with their soil requirements as previously described. Those with an asterisk (*) preceding the name are stem-rooting.

GROUP I

Liliums which Thrive in Good Average Garden Soil, and Most Situations

*Batemani. *Rich apricot merging to red. Aug.–Sept. 3 feet.*

Callosum. *Slender and elegant, orange scarlet, reflexing petals, late summer. 2 feet.*

CANDIDUM. *The well-known white Madonna Lily. Midsummer.* 4 *feet.*

CHALCEDONICUM. *Rich bright scarlet. Turk's cap Lily. July.* 3 *feet.*

*CROCEUM. *Orange merging to red, spotted deep crimson. June.* 4 *feet (taller when established).*

*ELEGANS. *A Japanese species, of which there are several fine named varieties, all of dwarf habit, from* 1½ *feet to* 2½ *feet, and usually bearing flowers of rich orange and apricot shades. The variety sanguineum is crimson with darker spots. Summer flowering.*

HANSONI. *The yellow Martagon Lily. Bright yellow with rich maroon spots. June.* 3 *feet.*

*LONGIFLORUM FORMOSUM. *A good form of the white Trumpet-lily so popular for forcing, but may be successfully grown in the open where the atmosphere is clean and pure.*

*LONGIFOLIUM EXIMEUM. *Of similar character, and very prolific.*

MARHAN. *A hybrid Martagon. Yellow, streaked with brown and spotted with crimson. Midsummer.* 3–4 *feet.*

MARTAGON. *Faint rosy purple. Turk's cap flowers in pyramids. Black spots add to the attractiveness of the flowers. July.* 4 *feet.*

MARTAGON ALBUM. *Pure white. A beautiful and hardy lily. July.* 4 *feet. Thrives the better for a liberal supply of leaf mould.*

*PSEUDO-TIGRINUM. *A fine Chinese Lily. Orange-red, spotted. Aug.–Sept.* 4 *feet.*

PYRENAICUM. *Yellow Turk's cap. Peculiarly attractive flowers, yellow, shaded with green, and spotted black, anthers of conspicuous scarlet. June.* 3 *feet.*

*SPECIOSUM. *The species is of Japanese origin, and is the type which produces flowers shaped like reflexing star-fish. The variety album is pure white, and there are several varieties with rosy or red lines and prominent spots on a white ground.* 3 *feet. Aug.–Sept.*

SZOVITZIANUM. *Turban-shaped flowers, citron yellow, spotted black. June.* 3 *feet.*

TESTACEUM. *Pale, clean apricot, with scarlet anthers. A very lovely flower. June–July.* 4 *feet.*

*TIGRINUM. *The well-known Tiger Lily. Orange scarlet, spotted mahogany. Aug.–Sept.* 3 *feet or over.*
The varieties Fortunei giganteum, Flore-pleno (double-flowered) and splendens are greal improvements on the type.

GROUP 2

EMBRACING VARIETIES WHICH PREFER AN OPEN, POROUS LOAM, WITH AN ADDITION OF PEAT, AND WHICH SHOULD HAVE A COOL, SHADED ROOT RUN, AND LIBERAL MOISTURE IN SUMMER

*AURATUM. *The ever popular, and most magnificent of Lilies, with huge trumpet flowers rayed with yellow and spotted with crimson on a white ground. Plant among Azaleas, Rhododendrons, Tree Pæonies, or Herbaceous Pæonies. Mulch, water, and afford protection from wind; it is a lily that will thrive and increase in strength until it may attain a height of 6 feet. There are several distinct varieties. The flowering time varies with situation, aspect and season.*

*BROWNII. *Handsome trumpet flowers, white inside, chocolate outside. July. 3 feet.*

*BROWNII ODORUM. *Yellow, changing to cream; outside streaked dark brown, delightfully fragrant. July. 3 feet.*

COLUMBIANUM. *Small, deep orange flowers, spotted crimson. July–Aug. 2½ feet.*

*CONCOLOR. *A small Lily suitable for cosy recesses on the rockery. Flowers vivid scarlet with dark spots. July. 1 foot.*

CORDIFOLIUM. *An uncommon Lily with rounded foliage and long trumpet flowers; white with dark interior markings. Should be planted a foot deep in peaty soil, moist situation but well drained. Aug. 3–4 feet.*

*CORIDON. *Lemon-yellow, spotted purple; small and elegant; suitable for rock garden. July. 2 feet.*

GIGANTEUM. *A real giant; foliage large, heart-shaped. Flowers very long. Trumpets, white. 10–12 feet when established.*

HUMBOLDTI. *Golden yellow, spotted crimson. July. 5 feet when established. The variety magnificum is much superior and freer flowering than the type.*

KELLOGGII. *Pink flowers, uncommonly beautiful. Fragrant. 2½ feet.*

*LEICHTLINI. *Golden yellow, purple spots. Aug. 3 feet.*

*MAXIMOWICZII. *Like Leichtlini, but red. Sept. 4 feet.*

*REGALE. *A superb Lily with waxy white trumpet flowers lit up with yellow inside and broadly washed with wine-red on the outside; golden anthers fragrant. Young bulbs flower at 3 feet and gain height annually up to 6 or 7 feet. Flowers in July.*

*RUBELLUM. *A small and dainty little flower of pale rose-pink with golden anthers. Give partial shade. Leaf mould and loam with porous stones and sand. The rock garden is a suitable home for this lily. July.* 1½ *feet.*

RUBESCENS. *A Californian Lily of slender growth with tubular flowers of distinct appearance. White, spotted purple, fragrant. Requires friable soil with good fibrous peat, and no defects in drainage.* 4 *feet.*

SULPHUREUM. *Extra long trumpet flowers; interior white shaded chrome yellow, outside cream overwashed with delicate rose. Must have a sheltered spot and liberal supply of leaf mould and peat. Aug.–Sept.* 4 *feet.*

SULPHUR-GALE HYBRIDS. *Lilium sulphureum and L. regale are the parents of a lovely, variable hybrid stock to which the name Sulphur-gale hybrids has been given. These are hardier and more easily grown than L. sulphureum, and the colours of the trumpet flowers vacillate between the colours of the two parents. Late summer.* 4–6 *feet.*

*TENUIFOLIUM. *Another Lily of small and slender parts; native of Siberia. Flowers scarlet. June.* 1½ *feet. Useful on rockery.*

*UMBELLATUM. *A hardy and free-flowering European species of which there are several varieties bearing spotted flowers in orange shades of varying intensity. Average height* 2–2½ *feet. Flowering June.*

*WILLMOTTÆ. *A graceful Lily with elegant, narrow foliage and orange-red flowers, which are finely dotted with brown. Summer.* 3–4 *feet.*

GROUP 3

LILIUMS REQUIRING PEAT, LEAF-MOULD AND SAND, IN COOL MOIST SITUATIONS, PARTIAL SHADE

The bulbs should be well bedded round with sand. Where sloping margins to water are available, sheltered by Willows, etc., groups may be planted with gratifying results.

BURBANKI. *A hybrid between L. pardalinum and L. parryi. Flowers orange yellow, tipped with a crimson stain and spotted with chocolate. Fragrant. July.* 4 *feet.*

CANADENSE. *Flowers hang like bells, yellow; sometimes orange, with blackish maroon spots. July.* 3 *feet.*

GRAYI. *Georgeously handsome. Blood red with a*

mellow flush of gold and blackish spots. July. 4 feet.

*KRAMERI. *Delicate pink flowers, very refined. July. 2 feet.*

PARDALINUM. *Scarlet, shaded with yellow, spotted with purple. July. 5 feet.*

PARDALINUM JOHNSONI. *A distinct form with much darker flowers.*

PARRYI. *Bright yellow, lightly dotted. Fragrant. July. 3 feet.*

PARVIFLORUM. *Orange yellow, dotted with brown. July. 3 feet. Likes the sunny side of a stream or pond.*

PARVUM. *Bright yellow with red shading and spots. Small bell-shaped flowers. June–July. 3 feet.*

PARVUM LUTEUM. *Orange, dotted maroon. June–July. 3 feet.*

ROEZLII. *Flowers in racemes. Yellow, spotted maroon. June. 3 feet.*

SUPERBUM. *Colour ranges from orange to crimson, spotted brown. Petals recurve in graceful manner, the whole plant being of imposing appearance. Plant near water. Flowering season Aug.–Sept. 4 feet, and taller when established.*

Other Liliums might be added to these lists, but with an ample selection from which to start a collection or furnish a garden the enthusiast will be able to extend with the aid of specialists' catalogues. The whole of these mentioned are listed by Messrs. Barr & Sons.

PART II
CONCERNING INDOOR CULTURE OF BULBS, CORMS AND TUBERS

CHAPTER IX

GENERALITIES OF BULB CULTURE IN POTS

THERE is a variety of interests and purposes in the cultivation of bulbs, corms and tubers in pots, and details of treatment necessarily vary in relation to the class to which the plants belong and the purpose the cultivator has in view. Many perfectly hardy bulbs which normally belong to the open flower garden respond so readily to the forcing effects of artificially maintained high temperature that they are forced by commercial florists on a scale which brings this phase of flower production into the foreground of the horticultural industry. Private growers not only grow such bulbs for winter and early spring decorations but also pot many other bulbs which, although unsuitable for forcing, are extremely useful for decorative purposes either in conservatories or in the rooms of the dwelling-house. Such bulbs are particularly serviceable to people who possess greenhouses which are not artificially heated, and moreover the winter flowering bulbs which in gardens situated in the suburbs of large manufacturing towns are too frequently spoiled by smuts and smoky fogs can with the accommodation of a cold greenhouse or even a garden frame be grown in pots or pans and kept in clean, unblemished condition.

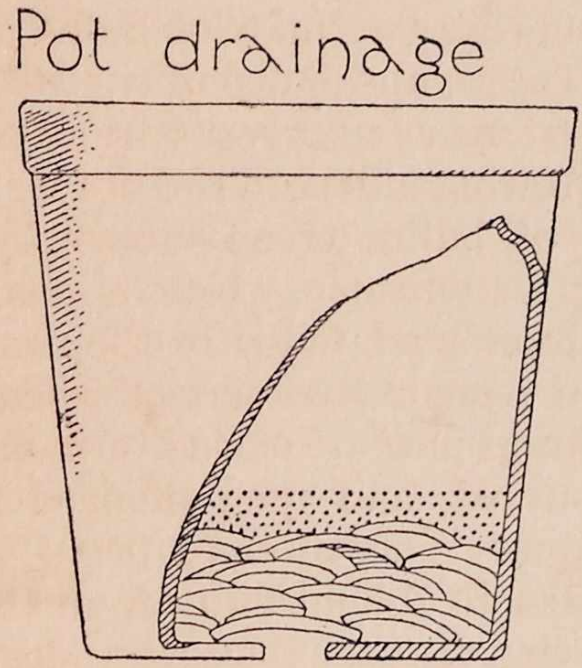
There are, of course, still other bulbs which are too delicate for outdoor culture and must be treated as hothouse or greenhouse plants. Each of these groups, and in varying degree each family, may have certain individual requirements in regard to cultural details, but there is much that is common to most, and may fittingly be treated under the heading of generalities.

Pots and Drainage

Whatever may be the kinds of bulbs it is essential that pots shall be clean, and carefully crocked. It may appear a trifling fancy to suggest that an old pot which has been scrubbed clean is better to use for bulbs than a perfectly new pot, but differences so marked have been observed with a frequency which is convincing that there is more than mere fancy in the contention that growth is more regular and perfect when bulbs grow in old pots than in new. Consider a moment. Bulbs are potted, watered, and then plunged in a bed of ashes, and the new pots at once begin, as new pots always do, to absorb the moisture from the soil in the pots so that during the time they are under cover of the plunge bed the roots are endeavouring to work into a soil which is daily drying out with no chance of moisture being replenished unless rainstorms literally soak the plunge bed, which is not likely to happen if a suitably pitched position has been chosen. Naturally root development under these conditions is slow and weak, and when the time arrives for housing the bulbs in a warm temperature the roots are not in a condition to respond to a forcing temperature. Bulbs which are to be grown on gradually without artificial heat will have

a better chance of recovery, but it is a pity to inflict upon them necessity to recover from a handicap they need not suffer.

The majority of bulbs require just sufficient crocks, placed regularly overlapping each other to cover the whole area of the bottom of the pot. A few flakes of spent hops may cover the crocks and a small spoonful of bone-flour may be sprinkled over the hops, and this



is all the solid manure or fertilizer the potting compost should contain. Some will recommend that cow manure should be mixed with the loam, but the safer course is to use good oak or beech leaf mould with fibrous loam of good heart, and a liberal admixture of clean sharp sand. Silver sand is quite good, but clean river sand or sea sand is equally so. Except for very small pots loam and leaf mould which is free from stones, sticks and rubbish requires no sifting ; it will be

better chopped down with the spade and used in a moderately coarse state.

There is not usually necessity for allowance of extensive root run for bulbs, for the bulk of their nourishment has been stored up in the bulbs during the previous season's growth, and so long as there is room for root development and moisture supplementary nourishment can be supplied in the form of liquids when the time arrives.

Five-inch pots are a useful average size for such bulbs as Daffodils, Tulips, and bulbs of similar size, and five bulbs is the customary number to use in such pots. A large strong-growing kind will require a 6-inch pot for that number of bulbs, the Trumpet Daffodil "Emperor" being an example. Good Hyacinths will be comfortably accommodated if one bulb is placed in a 5 inch pot, but some extra large bulbs are given 6-inch pots, whilst three bulbs are often grown in a 7-inch pot. Seven, eight or nine Tulips or Daffodils in a 7-inch pot, the precise number depending upon the size of the bulbs, will make good bold potfuls, and are often thus grown for shows.

The Polyanthus Narcissus, of which several varieties are largely used for forcing, have much larger bulbs than the other types, and they consequently require more room; but if three, four, or five bulbs can be pressed, touching, half their depth into the soil of a pot they will be quite happy.

The miniature daffodils are better accommodated in pans than in pots, and a suitable depth for the pans is 4 inches, whilst 8 inches is a convenient diameter. The bulbs should be fixed with their points just showing at

the surface of the soil, and the very smallest kinds may be placed about an inch apart, the distance increasing as larger bulbs are handled up to about 2 inches. The miniature daffodils do not force as well as their larger relatives, but they are extremely beautiful little subjects for the unheated greenhouse or frame.

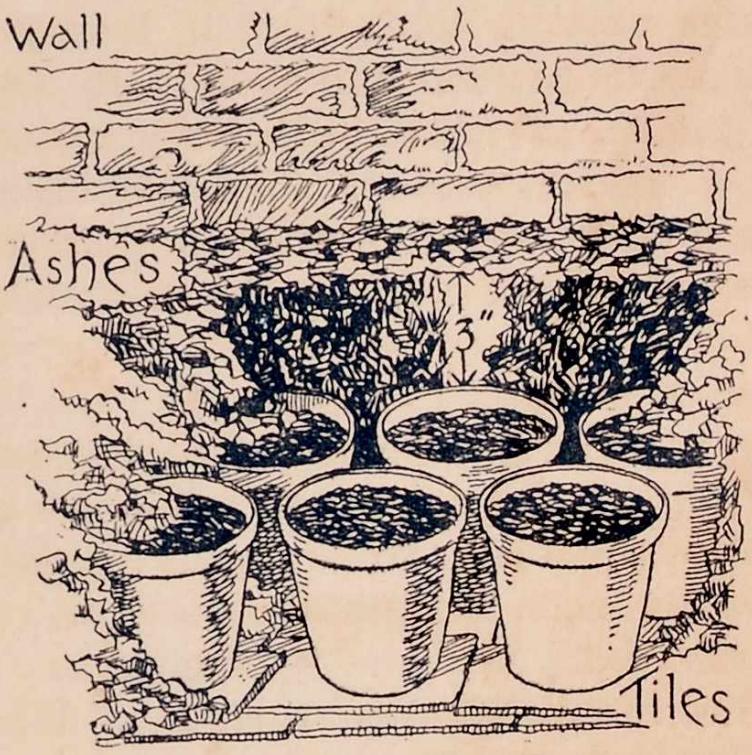
When one comes to such small bulbs as Freesias eight, ten, or even a dozen may go into a 5-inch pot, and for tall growing flowers like Spanish Irises, Gladiolus, "The Bride," four or five will be as many as the 5-inch pot should hold. With these few suggestions and the exercise of a little discretion there should be no difficulty in deciding what will constitute a good pot of the average greenhouse or hardy bulbs that may be grown in pots.

There are small bulbs of kinds that are suitable for association with pots and pans of Alpine plants either for exhibition or for frame and unheated greenhouse culture. Iris reticulata and quite a number of other very early bulbs, including Chionodoxas, Leucojum vernum, the finer Snowdrops, Muscari, and choice Fritillarias will usually make their best show in pans, but often three bulbs in a 3-inch or $3\frac{1}{2}$-inch pot will prove very useful and decorative and much more dainty in appearance than larger numbers in 5-inch pots.

Liliums, large-flowered Gladioli and Crown Imperials are in a class quite apart from the foregoing, and for such tall, strong-growing plants large pots are quite an unavoidable necessity.

All the bulbs thus far dealt with, omitting the Liliums and Gladioli which were just mentioned by the way, are ready for potting in early autumn, and for the

most part the earlier the work is taken in hand the more successful the bulbs will be. September potting is not too early because even those subjects which will endure high temperature must first be thoroughly well rooted, and the further advanced they may be before they are subjected to heat the more readily will they respond to its influence.



PLUNGING NEWLY POTTED BULBS

Bulbs and corms, but not always tubers, require covering with sifted ashes or coco-nut fibre immediately they are potted. The stronger kinds may be plunged in a sheltered position outdoors, the smaller and more fragile being afforded the protection of a cold frame.

The importance of the covering is not always appreciated, and it is sometimes asked why bulbs in pots should require ashes heaped over them when those

planted in the open ground are left to themselves. The point is that when planting bulbs are buried under 3 or 4 inches of soil, and underneath there is soil into which the roots can descend perpendicularly to practically any depth to which they are likely to go. In pots the bulbs are wellnigh upon the surface of the soil to begin with, and almost as soon as roots strike downward they meet the resistance of the crocks and the roots as they grow contrive to make room for themselves by forcing the bulbs partially out of the soil. By covering with 2 or 3 inches of ashes this heaving out of the bulbs is prevented, and the roots are turned to the sides of the pot. The pots or pans should be sufficiently well watered before burying them in the ashes, which by the way should be old and weathered rather than fresh from stove or furnace.

No definite period can be named as the correct length of time for the bulbs to remain under cover; it depends entirely upon the rate of progress, which must be ascertained by periodical examination of one or two pots of each kind. The first month, at any rate, may elapse before examination is necessary. When growth has penetrated into the ashes—the conical shoots usually being pale yellow instead of the normal green, owing to lack of daylight and air—the time has come for removal. Some care is necessary in shaking off the ashes, as a slight bruise will seriously damage the tender young shoots. For the first two or three days the pots should be placed in a cool shady place, but safe from frost. Heat must not be given for some little time yet; in fact the flower spikes should begin to rise before heat is applied, and then it should be quite moderate to com-

mence, gradually increasing as progress in growth is discerned. Countless failures have resulted from undue haste to submit perfectly good bulbs to heat, for it is easy to cause the buds to run blind instead of increasing their pace of development.

Water will be abundantly required during the period of forcing, and it should be warmed to a temperature equal to that of the atmosphere. Feeding begins when buds begin to rise from the crowns of the bulbs, and may take the form of liquid guano, or liquid sheep or cow manure, weak and often being the prudent course rather than strong doses.

The same routine will be followed with the bulbs which are to be grown on without artificial heat, but will of necessity be taken in a more leisurely manner. Remember always that healthy growth and development demands good ventilation ; there is no advantage in getting a house or frame warmed up by shutting out fresh air. As soon as the flowers are open they should be inured to a cooler temperature, not with a sudden drop from 60 or 65 degrees to 40 degrees, but by a gentle reduction. If only a few pots are to be handled they may for the first two or three days be removed from heat in the morning and returned in the evening, afterwards remaining day and night in a temperature comfortably above freezing point. Where large batches are concerned the freer use of ventilators (avoiding draughts) must be the first move, followed by judicious reduction of fire heat.

Where bulbs are forced for the express purpose of cutting the flowers boxes are more serviceable and economical than pots. A convenient size is 4 inches

deep, a foot wide and of any length up to 3 feet. With good drainage holes in the bottom of the box a layer a spent hops in the bottom is all that will be required under the compost of loam leaf-mould and sand. Always be cautious in lifting the boxes about that there is no decayed wood or loosened nail to cause the bottom or side of a box to give way and precipitate the contents of the box in a heap on the floor.

CHAPTER X

TENDER AND HALF-HARDY BULBS AND TUBERS

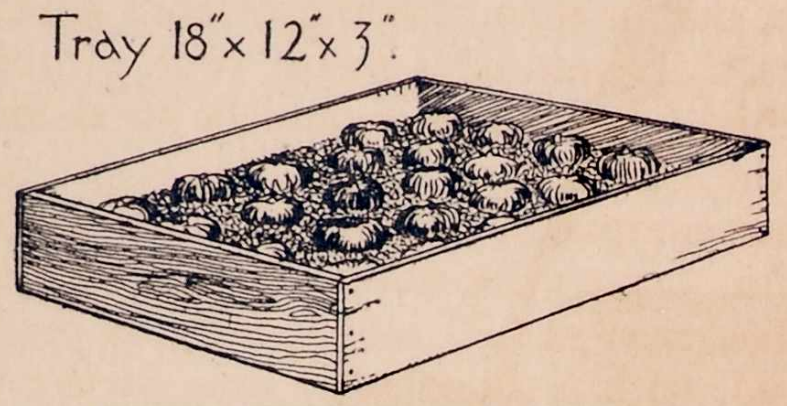
QUITE in a separate class from the previously mentioned bulbs are the varied subjects which are reckoned among the permanent occupants of heated glass-houses. The Hippeastrums, commonly called Amaryllis, the Gloxinias, Gesneras, Lachenalias, Pancratiums, Eucharis, the Persian Cyclamen, and also the tuberous Begonias are included in a range of plants of remarkable beauty and great utility. There cannot be expounded a plan of management which will be adaptable to all these subjects, for their characters, methods of growth and requirements differ so widely that each must be dealt with independently. Some require almost stove temperature, some a "warm" greenhouse, and some only sufficient heat to exclude frost. Some may be started into growth at different seasons of the year to enable a successional display of bloom or to time their flowering for some special occasion. For convenience of reference the more popular kinds, which are calculated to be of general service, are given separate paragraph headings, whilst in cases where allied groups require similar treatment they are amalgamated in the notes to obviate reiteration of instructions.

Tuberous-rooted Begonias

Whilst in no way desiring to disparage the tuberous Begonia as a summer bedding plant it must be candidly admitted that the very best strains for outdoor planting must of necessity be of a stiff, compact, erect habit and should be noteworthy for the freedom with which they produce flowers of moderate size and of clear, bright colours, for it would be folly as well as extravagance to plant in the open, to be exposed to thunderstorms, wind and scorching sun, the exquisitely modelled, delicately tinted varieties of highly bred strains which justly rank among the very choicest of flowers for the moderately heated greenhouse. This last is essential where a reasonably early display of bloom is required, but it must be added that many remarkably fine collections of Begonias are grown in houses which are entirely unheated, but that, of course, means a later start, a shorter flowering season, and accommodation for the safe storage of the tubers out of the reach of frost in winter.

Assuming that a start is to be made with tubers of some good varieties, and that a greenhouse can be maintained at a night temperature of about 55 degrees the tubers may be started in February. Shallow wooden trays should have about 1½ inches of fresh, moist coco-nut fibre, and upon the surface the tubers should be gently pressed until the top of the tuber is about level with the fibre. Allow a space of 2 inches between them, and place the tray on a stage where light is good. Keep just comfortably moist, but by no means saturated. In the course of a week or two little

pink sprouts will appear in the centres of the tubers, and as soon as these have developed into tiny young leaves it will be necessary to transfer the tubers to pots, This is rather an important point in the cultural routine. for upon this first potting much depends in regard to ultimate development of the plants. It will be found that many fine, brittle young roots have permeated the fibre, and care must be taken to prevent the slightest breakage of these roots. No fibre should be shaken from them, and for comfortable lifting it is advisable that the tray should be watered the day previous to



BEGONIA TUBERS IN TRAY OF FIBRE

potting. It is necessary that the soil for the first potting shall be light, porous and not rich, for the young roots which started in fibre must be gradually inured to substantial soil. The next important point is that the pots should be just broad enough to take the mass of roots without bending or jamming the ends, and no more. Obviously it would be wrong to cram the roots into too small a pot, but it is perhaps less obvious but just as important that the pot shall not be a bit larger than is quite necessary. The sooner the first pot can be comfortably filled with roots the sooner a little

stronger compost can be given, and that is of great help in encouraging sturdy development. The next shift should be only one size larger, for the aim should be to get as many shifts as possible until the final pots are reached in which the plants are to flower.

Thus, if the first pot is $2\frac{1}{2}$ inches in diameter the second may be $3\frac{1}{2}$ inches, the next 5 inches, and the flowering pot 7 inches, if the plant is of strong character, or for smaller growers the shifts may be into 2-inch, 4-inch, and 6-inch pots.

Bulbs which are two or three years old may be so large that the first pot must be as much as 4 inches in diameter, but in that case the bottom part should be filled with soil containing 50 per cent. of fibrous loam, whilst a lighter compost should be used for filling in around the fibre clump.

The first compost should consist of 60 per cent. good leaf-mould, 30 per cent. fibrous loam, 10 per cent. silver sand. The next should have nearly as much loam as leaf-mould, with a slight reduction in the proportion of sand, and the final potting about 10 per cent. reduction of leaf-mould made up with hop manure. Take care always to keep the tuber at the surface, and pot so that adequate room is left for water, Begonias requiring liberal supplies of moisture throughout the summer.

Slight shade is required from the month of April onward, and although a night temperature of 60 degrees should be maintained ventilation must be attended to on all but cold, wet days. Should flower-buds appear during the early stages they should be removed, and as soon as roots are through the soil in the flowering-pots

feeding may commence with weak liquid manure or weak doses of guano.

By the time the first flowers open it should be possible to reduce fire heat to a minimum, using it only to dispel stagnant moisture on wet, dull days.

Neat stakes are necessary for Begonias, but take care not to allow the stake to pierce the tuber.

At the latter end of the season water must be gradually reduced, until eventually it is withheld and the plants allowed to ripen off. When the growth is quite withered the tubers should be carefully shaken out of the soil and placed in trays of dry fibre storing in a frost-proof place.

Begonias may be raised from seed, and if sown early in the year (January or February) the plants will bloom during the first summer and autumn, and will make strong tubers for the second year. Begonia seed is exceedingly small, practically as fine as snuff, and requires careful handling. It is useless to try to raise seedling Begonias without the accommodation of a well-heated greenhouse.

Five-inch pots are the most convenient vessels in which to sow seeds. They must be half filled with crocks, with a layer of moss or leaves over them to keep the fine soil from trickling down among the crocks.

The soil itself must be perfectly sweet, consisting of light loam, leaf-mould, a liberal supply of silver sand and a sprinkling of powdered charcoal. It must of necessity be finely sifted, and pressed very evenly, but not too hard into the pots. A useful presser may be

made from a piece of smooth wood, cut to fit inside the pot with a handle fixed to the back.

When the pans are thus filled they should be drenched with boiling water through a fine nozzled syringe to scald any fungus or insects in the soil. They must then be allowed to drain until the following day.

The seed is so extremely fine that the only way to ensure thin distribution is to put about four times its bulk of fine dry sand with the seed ; close the packet and shake to thoroughly mix the seed with the sand. The mixture is then evenly distributed over the surface of the pot, and no further covering is required. A square of glass should be placed over each pot, and the pots should be plunged to the rims in coco-nut fibre, this precaution against rapid drying of the soil in the pots being of importance. The position in which the pots are placed should be shaded from direct sunlight, but not dark, for care must be exercised to prevent the seedlings becoming "drawn." Suitable temperature will be round about 65 degrees. Turn the glasses daily to prevent condensed moisture dripping back upon the seeds. Whenever the surface shows the slightest sign of drying dip the pot to the rim in tepid water until the soil just begins to reveal moisture, then allow to drain before returning the pot to its plunge-bed. As soon as possible after germination prick out the tiny seedlings into other pots prepared exactly as for seeds, cover again with glass for a few days only. When the plants have a leaf spread as wide as a shilling transplant in trays of light soil, allowing each seedling an inch of space around it. When the plants touch they will be ready for 2-inch pots. So far the young seedlings will

require a warm temperature, round about 65 degrees, and should be fairly close to the glass but free from draughts and direct sunlight. Thenceforward potting and treatment will correspond to that advised for tubers, but 5-inch, or at most 6-inch pots will be the maximum size for the first year's flowering. For bedding purposes one-year-old tubers are best. They should be started in trays in March, potted, grown on for awhile in gentle warmth, then transferred to a cold frame to harden, and planted when all fear of frost is past.

Rotten stable manure or spent hops should be dug into the beds a month before planting, and if the situation is exposed to the sun a good mulch of old coco-nut fibre over the whole bed will be a great boon. At the first slight frost in autumn lift the tubers, place in flat boxes, and allow the ripening off to be completed in a cool but frost-proof shed. Remove no stems or foliage until quite dead, then clean the tubers, but do not skin them in efforts to remove roots, and store in shallow trays.

Caladiums

Grown exclusively for their gay and handsome foliage, Caladiums were immensely popular during the flourishing era of the " stove " house. Varied circumstances combined to compel or induce the majority of garden lovers to turn their attention to other and hardier subjects, the War, and subsequent steep increases in fuel prices, being largely responsible for the break up of many collections.

One material advantage about Caladiums is the fact

that these lie dormant during the winter, thus requiring no heat during the most extravagant period of the year, and when they want a brisk warmth in early spring the raising of seedlings, rooting of spring cuttings, etc., simultaneously require fire heat, whilst during summer ample warmth is available without the aid of fuel.

Caladiums are, therefore, not extravagant in comparison with the majority of the fine foliage plants with which they associate, whilst in point of beauty extremely few plants excel them. Success with Caladiums is as much a matter of careful attention to little cultural details as of high temperature, and the start is a point of paramount importance.

Some contrivance by which bottom warmth can be secured is a necessity, and where no propagating pit exists one may generally be rigged up by partitioning off a section of the pipes at one end of the house, making a box-like enclosure with the pipes running through it. This enclosure should be filled with coco-nut fibre, and if the fibre is drenched with hot water, and then covered with thin woodwork the hot pipes will keep it warm.

The Caladium tubers should be potted into the smallest pots that will enable them to be half buried, the pots being well crocked, and a soil consisting of equal parts loam, leaf-mould, peat, and sand being used for potting. Plunge the pots in coco-nut fibre on the boarded hot-bed, syringe with warm water and cover with a garden light. Twice a day syringe the plunge-bed with warm water, but give no other water until young growth begins to issue from the tubers. Thence-forward watering must be regularly attended to, quantities increasing as growth develops. Pot on before the

roots become cramped, and for good specimens of large-leaved kinds repot to 8-inch or 9-inch pots. Maintain a good temperature and a moist atmosphere. Protect the plants from direct sunshine and never let the roots get dry throughout the summer. Flower stems may rise from well-developed tubers, but they should be removed, as the development of flowers will be at the expense of the leaves.

During autumn the foliage will begin to lose colour, substance and strength ; gradually withhold water and eventually dry off entirely and store the tubers (in the pots) in a safe, dry place. There is a wide choice of varieties of Caladiums, their names and descriptions being obtainable from catalogues of such firms as John Peed & Sons, Russell & Co., and others.

Crinum

Of handsome Lily-like character the large trumpet flowers of the Crinums are chaste and refined, albeit imposing and striking in appearance. They are borne on stout, stiff stems, several in a head, surrounded by long broad foliage.

Hailing from Africa, a few species are sufficiently hardy to survive our winters when planted alongside a warm greenhouse or similarly sheltered position. Crinum powelli, a rose-pink species, and its varieties, C.P. album (white), and C.P. rubrum, of a dark rosy tint, are about the hardiest, but C. Moorei and C. Yemense grow outside in some favoured southern gardens, the last-named being a particularly noble flower. Even these are well deserving of greenhouse culture, but the Sumatra species, Crinum amabile, demands a tempera-

ture in the neighbourhood of 70 degrees. This species has handsome red flowers which are sweetly fragrant, and another warm temperature kind is Crinum Kirkii, which has flowers of white heavily stained with red outside the trumpet. It is smaller and dwarfer in growth than the others, but being an autumn-flowering bulb it is of considerable value.

The Crinums make very large bulbs, and require large pots which must be well crocked, whilst the compost should be fibrous loam, a little peat and some good sharp sand. The loam and peat should be pulled to pieces, not too small, and should be firmed by the use of a ramming stick. March is an appropriate time for potting, and as soon as growth has well commenced plenty of water may be given, the quantity being gradually reduced after flowering until the bulbs go completely to rest, remaining dry throughout the winter. If well potted and perfectly drained there will be no necessity to disturb the bulbs for three years, as they may be fed with liquid manure during the growing season. The huge bulbs should never be completely buried in the soil, but should be set just deep enough to maintain a steady balance. The reason is first that they require a good sun-roasting before they go to rest, and secondly because their bulk would leave insufficient room in the pot for soil.

Cyclamen

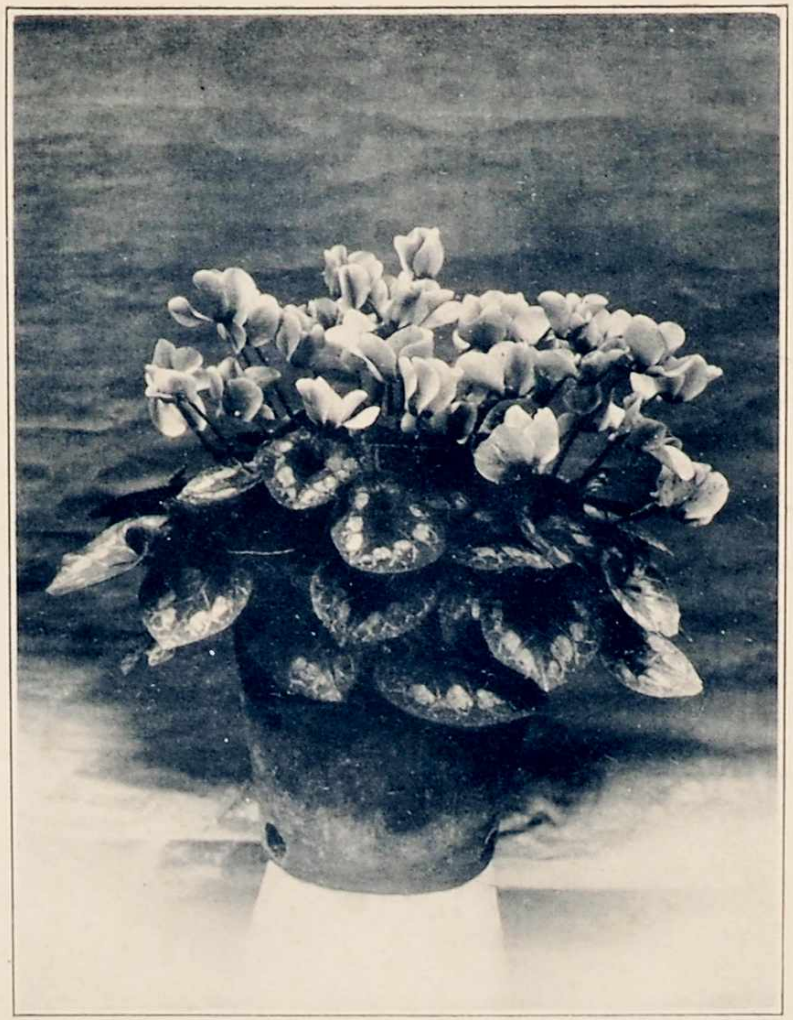
The Persian Cyclamen occupies an honoured place amongst greenhouse plants and is particularly valuable by reason of its capability of maintaining a grand display of bloom throughout the winter months.

Cyclamen latifolium, otherwise known as C. persicum, is not a plant which is conveniently obtained in the form of dry corms ; indeed half the failures which are frequently experienced when corms are more than a year old arise from the too prevalent custom of drying the roots off and submitting the corms to the heat of the summer's sun.

There is no doubt the finest flowers are obtainable from first-year seedlings, but clever growers produce magnificent plants which carry a wonderful profusion of flowers and handsome foliage for the second and even the third year.

Seed may conveniently be our starting-point, and the right offset is made when newly ripened seed is sown in the month of August. September is not too late, but those who advocate still later sowing are curtailing the chances of making really fine plants unless they are to be kept from flowering at the season during which the flowers are of greatest value.

Pans are the best receptacles for the seed, and the soil should be good throughout, the loam clean and fibrous, leaf-mould sweet and well broken, sand sharp, charcoal finely pulverized; the first three should be about equal in proportion, the charcoal just about a 10 per cent. addition to the whole. Crock the pans well, covering them with clean moss ; fill the soil in evenly, and make tolerably firm. With a large match make ¼-inch holes at intervals of an inch over the whole surface of the pan, and into each drop a seed. Close in the holes and water with a rosed can. The temperature should be about as near 60 degrees as it can be kept at the season of the year, but with the pans



BULBS FOR POT CULTURE
A WELL-GROWN PERSIAN CYCLAMEN
(Blackmore & Langdon's strain)

BULBS FOR POT CULTURE
A PERFECTLY MODELLED DOUBLE-FLOWERED BEGONIA
(By courtesy of Messrs. Blackmore & Langdon)

shaded from direct sunshine no harm will be done by a rise in the thermometer during the middle of the day.

Shortly after Christmas the seedlings will be benefited by a shift into fresh soil in thumb-pots, but a nice even temperature of 55 to 60 degrees. In March or early April 3-inch pots will be required, and early in June the plants should go into flowering pots, 5-inch or 6-inch pots being suitable unless a special effort is to be made to get a few plants as large as possible, when 7-inch pots may be used for the strongest. A frame will now be the best accommodation for the plants. Stand on tiles, and afford water with a liberal hand. The soil for potting will be similar in character to that used for seeds except that the proportion of loam may be increased to 50 per cent. of the bulk, the leaf-mould 35 per cent., and sand and charcoal to the balance. At the final potting a pound of bone-meal to a bushel of soil may be added.

The best position for the frame will be facing west, sheltered from mid-day sun, not shadowed from good light. It is not advisable to remove lights entirely as drying winds are harmful, but keep plenty of ventilation on, and in hot weather the tiles on which the pots stand should be frequently watered to create a moist atmosphere around the plants. As soon as young flower buds are observed nestling among the bases of leaf stalks, feeding with liquid manure may begin. Cow manure is best, but do not overdo the strength; an amber colour is about right for the liquid. If a leaf decays remove the entire stalk or the decay may go right into the crown of the corm.

By following these instructions plants should be ready for removal to the greenhouse by about the third week in September. Place on a stage with cinder ashes upon it, as the moisture they absorb will keep the atmosphere just right. Do not use a great amount of fire heat, but ventilate freely on all fine days. November should see the plants in bloom, and they should continue till about Easter, late-sown plants even beyond that time. Continue to water after flowering, but when possible remove again to the frame, and in June the lights may be removed entirely and watering curtailed to an extent that will just prevent the plants from becoming quite dry. That is the one point where many growers err ; they will persist in completely drying off the corms, a very injurious practice. By mid-August the plants should be turned out of pots, as much of the soil removed as will part without breaking live roots, the plants then being repotted in the same size pots, started by moderate watering, gradually increasing as new growth is made. Many will have sufficient vigour to require a shift into 7-inch pots during October, and from Christmas onward magnificent plants should produce an abundance of bloom. There are many good strains of Persian Cyclamen on the market in select colours such as salmon, scarlet, rose, cerise, crimson, and pure white. There are also giant forms, frilled and crested forms, and Messrs. Blackmore & Langdon, of Bath, who make a great speciality of Cyclamen, have among many fine varieties a great acquisition in a sweet-scented strain. One of this firm's fine Cyclamen forms the subject of our illustration facing page 126.

Eucharis

Time was when every young gardener who ventured to claim capability of taking charge of a range of glass houses in a well-appointed establishment would be asked the question, " Can you grow Eucharis ? " and indeed it was a very good proof of ability as a plantsman to be able to maintain successional batches of Eucharis, and even more so to be able to restore to health and vigour a batch of neglected and deteriorated plants of this extremely chaste, pearly white, and in many respects unique flower. Even up to and during the first decade of the present century Eucharis grandiflora (more generally called E. amazonica) was not only a cherished subject in all high-class private gardens, but was a constant and prominent feature on every flower market, some growers indeed making cut flowers of Eucharis their leading line of business. The flower has lost none of its charm and sterling merit, but nevertheless it has become insignificant as an article of commerce and a rarity in private gardens. One reason may be increased cost of production, for Eucharis must have high temperature for a considerable portion of the year —its home is Colombia—but another factor is the younger generation of gardeners have not the same interest in the cultivation of an admittedly difficult plant that their predecessors in the craft had. There would be some risk to-day in placing a big house of Eucharis in charge of a young foreman gardener. What a pity to allow one of the most charming flowers we ever possessed to slip into the background to be slighted and almost ignored ; what a pity to relinquish

the pride and enthusiasm in the cultivation of a plant which years ago was considered to entitle a man to distinction as a plantsman. There must surely be some amateurs who have inclination and facilities to take Eucharis in hand, and by bringing them again into prominence set the pace for professionals to reinstate them in their old position.

The starting point is the preparation of potting compost, and, contrary to common custom, that preparation should begin not the day previous to using the compost but the year previous. One may frequently read—compost should consist of one part loam, one part leaf-mould, one part peat and some well-rotted manure and sand. That is not good enough for Eucharis. The instructions should read thus—Select a patch of good turf on a yellow loam, where an abundance of fibrous grass roots form a mat several inches deep ; cut out the turf in squares and commence to build a stack. Over the second layer of turves spread dried manure from stall-fed oxen in a layer 2 inches thick. Cover this with more turf, and again cover the second layer with manure, and so on until the last layer of turf completes the stack. Should the presence of wireworm or other ground pests be suspected, sprinkle gasonite between the layers of turf alternately with the manure, using only a sufficient quantity to " pepper " the surface. Six months after turn the whole stack over, roughly breaking the turf and throwing the whole into a steep ridged heap. Thus, in a year, will a mellowed and enriched potting loam for Eucharis be prepared which, with the addition of sweet leaf-mould and fibrous peat combining to make half the bulk of loam used, and

a sufficient supply of sharp sand to keep the compost porous, will be infinitely superior to any mixture which contains freshly added manure, however " rotten " it may be.

Again, in regard to season for potting, do not slavishly follow the idea that spring is potting time. Eucharis may be had in bloom at varying seasons of the year by careful management, and the most suitable time for repotting is within a very few weeks of the fading of the last blossoms. When plants are well potted they will require no further disturbance at the root for three, and perhaps four years. Eucharis, it may be mentioned, although bulbous, are evergreen, and must not be completely dried off at any time. When the flowers have passed their best temperature may be reduced and water given sparingly, but not to the extent of withering the foliage. The soil must be carefully shaken away, and the intertwining roots carefully separated so that the bulbs may be pulled asunder and their offsets taken off without damaging the base of the bulbs.

Pot firmly, taking care that no spaces are left without soil. Water must be moderately given for awhile after potting, but syringing must be liberal and regular, for a high temperature must be maintained, and with the soil tolerably dry atmospheric moisture will be indispensable to the preservation of vitality in the foliage. It is from the month of April to October that the general batch of plants should be unstintingly supplied with water, but to induce early or late flowering variation of the watering programme is necessary and forms indeed an important detail in skilful culture.

By the time the high temperature (75 degrees is not

at all too high) and liberal watering and syringing have resulted in development of a luxuriant mass of well-developed leaves, temperature should be dropped 10 degrees, and a reduction in watering should be made, in fact the plants may be allowed to become dry enough to just show signs of flagging, then water and wait again until the leaves just show the effect of thirst, continuing thus for a period of two months. The object of this treatment is to check further development of foliage, and to harden growth, which is a means of inducing the formation of embryo flower spikes. When about two months " hardening " has been endured, once more increase temperature and watering, and very soon young flower spikes should make their appearance. From now until the first blooms open weak liquid manure should be given instead of plain water. It is essential at all times to be closely alert to detect the first appearance of Mealy Bug, a pest which is specially fond of Eucharis. Sponging the foliage with a soap insecticide or one of the lathery preparations of which there are many kinds on the market will with perseverance help to keep the pest under control, but regular syringing is a great aid to the preservation of clean foliage. The plants must not be neglected after flowering, but the whole routine with exception of re-potting will be retraced. There are several species besides E. grandiflora, all being white, but grandiflora is the most useful.

Freesia

For many years Freesia refracta and its white and yellow varieties have been grown both for cutting and

to provide pots of flowers for winter and early spring decoration. The individual plant is slender, with foliage like a fragile Montbretia on a small scale, and the flower stalks are thin, long and wiry. About 2 inches at the end of the stalk turns over almost at right angles and standing erect, touching each other in a row, four or five tubular flowers with widely expanding margins are placed along this bent portion of the stalk.

Freesia refracta is creamy white with a distinct yellow blotch on the inner tube ; the variety alba is whiter than the type and odorata is yellow. All are sweetly fragrant. Although singly Freesias are too slender and fragile to make an effective display, the size of the bulbs facilitates planting a number in a pot. Even the stoutest may be planted at the rate of eight or nine in a 5-inch pot, but smaller bulbs are frequently planted at a dozen or fourteen per pot. The soil should be light loam, leaf-mould, and sharp sand. Pots must well crocked, and the bulbs should be covered with nearly an inch of soil. Early potting is of great advantage, August being inducive to greater success than late autumn potting, although October and even November potting is frequently recommended for the purpose of securing successional batches to flower late in spring. Against this practice it may be urged that so far as ordinary stocks of Freesias are concerned they are of far greater value in winter and early spring than later, and when special stocks and choice modern varieties, of which there are now many, are required for exhibition or other particular purposes the best method is to raise young stock and grow on with practically no resting period until they bloom, or to keep matured stock

gently moving until the time arrives to encourage quick development. Apart from the advantage of being able to buy perfectly dormant bulbs with which to start a stock it is preferable to shorten the period of rest and pot afresh almost as soon as the old growth has withered.

When freshly potted, Freesias should be placed in a cold frame, watered, and covered with coco-nut fibre or finely sifted ashes to a depth of 2 to 3 inches. After about a month examine a few pots, and if the small young shoots are appearing through the soil, lift the pots, carefully shake away the covering material and place them on a shelf in the greenhouse, near the glass, or, if preferred, keep them for awhile longer in the frame, with ventilation on all fair days, but with a covering mat over the frame when the nights are cold. Water sparingly until the shoots gain about an inch in height, gradually increasing the water supply as growth advances, and when progress becomes rapid let water be abundantly given. The first sight of young flower buds should be the signal for feeding with weak liquid manure, but this must be regulated with a watchful eye; the slightest sign of yellowing foliage being a warning to restrain. No further feeding should be allowed after flowers have opened, but watering must still be maintained with a liberal hand. Where many cultivators fail is in their treatment of Freesias after flowering. It is a grave error to dump the pots either under the greenhouse stage or outdoors and leave them to fend for themselves with faded flowers, seed pods and foliage all thirsting for moisture. In the opinion of one of the most successful cultivators of Freesias the period immediately after flowering is even more important

than the previous period during which the bulbs are developing foliage and flowers, for, as explained in a previous chapter, the bulb has to store during the final stages of growth the nourishment required for the following season's start, and whether that start shall be vigorous or weak is largely governed by the wealth or poverty of the reservoir.

Obviously it will depend upon the season of the year at which flowering ceases whether the plants should remain in the greenhouse or be transferred to frames or the open ; it would be folly to turn out plants which have flowered in January or February in artificial heat to the rigours of winter in the open, or even to the sudden change of atmosphere in a cold frame. They should remain for a short time in the temperature in which they have flowered, then be inured to a cooler atmosphere, still kept moderately moist, and eventually put outside when fear of frost is past. Do not entirely withhold water while foliage remains green. Later batches may with safety be transferred to frames after flowering, or even direct to the open if the season is far advanced, and when all growth has completely died down the soil may for a short period be kept thoroughly dry, in a portion exposed to sunshine. By August the bulbs should be turned out of their pots, sorted into sizes, and repotted, or the smallest may, if required for increase of stock, be planted in boxes about 4 inches deep and grown thus for a season to attain flowering size.

When the advice to pot early is followed with one's entire stock successional flowering may be ensured by placing part of a batch behind a north wall, and by

keeping in a cold frame, shaded and cool, but not deprived of daylight after growth has made some headway, bringing into slight warmth when the earlier batches are already showing bloom. This is a more satisfactory method of treatment than keeping the small bulbs out of soil until wellnigh the end of the year. Formerly, and indeed until comparatively recently, the narrowness of colour limits was a handicap to the widespread popularity of Freesias: the largest flowers were those of the shades which wavered between white and yellow, the more decisive orange and yellow varieties being small flowered. Happily, there were one or two enthusiastic plant breeders who, gifted with the power of imagination, saw in the playful attempts of seedling Freesias to vary their colours, even though but slightly a hint of latent possibilities, took them in hand, and their patient labours have given us some very remarkable colour breaks. Mr. F. Herbert Chapman, of Rye, and Mr. G. H. Dalrymple, of Bartley, have both given us several varieties for which both gardeners and floral artists have reason to be profoundly grateful, the colours embracing real glowing golden yellow, dainty lavender and mauve, pink and rosy cerise. Up to date one of the finest in point of size, substance, and truly delightful colour is named Wistaria, an appropriately chosen name because the colour of the flowers is just like that of the glorious Chinese climbing shrub of that name. Other delightful varieties are already in commerce, but the evolution of Freesias is at a stage when the foremost of to-day will probably be eclipsed by the cream of further introductions within a short time, and in all probability Freesias will ere long show as remark-

able a range of colours as such flowers as Nemesias, or even Sweet Peas; then indeed will their value be inestimable.

Raising Freesias from seed is an interesting occupation. A good plan is to sow the seed as soon as ripe, and grow on the young plants without rest until the foliage shows spontaneous signs of dying off. After a brief period of thorough ripening in the sun, shake out, sort the bulbs and pot in two or even three sizes. The majority will flower the next season.

Gesnera

One may sympathize with the owner of a cosy little greenhouse who, owing solely to the cost of fuel to maintain an even temperature of about 65 degrees, has to forgo the pleasure of growing a good batch of Gesneras, for having once enjoyed the charms of these gorgeous plants of conveniently small size the memory of them is haunting, and one longs not only for the rich tints of their drooping bell-like blossoms, but also for the luxurious richness of their handsome leaves. The latter are shaped somewhat like the leaves of Gloxinias, but they have a velvet-like surface, are beautifully veined, and of rich metallic colours.

Several species are in cultivation and seedlings of each show considerable colour variation, but always in bright glowing tints. July and August is the normal flowering season of most, but Van Houttei, carmine and rose with some white in the flowers, is usually in bloom in September, and cardinalis, crimson, bright scarlet and white is about a month later. Douglassi, bright red and yellow, also flowers as summer fades into autumn, as

also maculata, which, as its name indicates, is freckled, purple being its predominant shade.

Exoniensis, Donklarii, and Lindleyii combine scarlet, orange and yellow in their gaily coloured flowers, and refulgens is violet, white and chamois. Gesneras, although warmth loving, may really be as easily grown as tuberous Begonias if "timed" to flower during the height of summer, when they will be dormant during winter; but where warmth is available it is well worth while to work a late batch by means of which even winter flowers may be obtained. It is an easy matter, without detriment to the tubers, to work successional batches, because the tubers may remain in their pots of soil during the resting period, and consequently do not shrivel as they would if shaken out for storage in trays.

The first batch may be shaken out of the old soil at the latter end of February, and the best method of starting is to place the tubers in shallow trays containing a mixture of coco-nut fibre and sifted leaf-mould with a sprinkling of silver sand around the tubers. Keep only slightly moist for the first week or ten days, then place on gentle bottom heat and increase the water supply. As soon as signs of growth are visible transfer to small pots, using about one-third loam to two-thirds of leaf-mould, fibre and sand. By the time roots show at the sides of the small pots the plants should be repotted in 5-inch pots. Loam, leaf-mould, sand, a small percentage of hop manure and a sprinkling of fine charcoal make a good compost, but some growers prefer to use peat with leaf-mould and a smaller proportion of loam. In such compost foliage will attain larger size, but growth is softer, and the plants do not seem to have

the same staying power unless kept in almost tropical house atmosphere.

A dwarf, compact habit will best be maintained when the plants are grown on shelves near the glass, but they must be slightly shaded from bright sunshine.

When flowering is over the drying off process may begin, but it should be very gradual, and when quite dormant the pots may be stacked on their sides in any convenient, dry, and frost-proof storehouse.

Batches may, where conditions warrant, be started at intervals up to the latter end of June, this last batch being for winter flowering.

Some feeding with weak liquid fertilizers will be desirable for the improvement of size and texture of bloom, but the earliest application should not be made until the roots are well through the soil in the 5-inch pots. It is sometimes recommended that three tubers should be placed together in a larger pot, but the amalgamation usually detracts from the beautiful symmetry of the radiating foliage and pyramidal cascade of drooping bell-flowers.

Gesneras may be raised from seeds treated after the manner of Begonias or Gloxinias, and stock of a particularly fine variety may be increased by means of cuttings of young growths taken off close to the tuber, inserted in thumb pots filled with sand, leaf-soil and fibre and placed in a warm propagating pot or under a bell-glass on bottom heat.

Gloriosa

Bulbous, or tuberous-rooted plants of climbing habit are comparatively few, and the Gloriosas are a family

of tuberous-rooted plants which in several respects are of unusual and highly interesting character. Their growth is slender and wiry, the vines attaining a length of anything from 5 feet to 8 feet, occasionally even 10 feet, and adapting themselves to roof climbing in a well-heated house, when the long-stalked flowers will hang suspended from the branches, or they may be trained round a wire balloon attached to the rim of the pot, when the blooms will assume a more or less erect, but by no means stiff appearance. In either case the unique form, peculiar elegance, and superb colouring of the flowers will be well displayed, and seldom fail to arrest attention and even unstinted admiration. The flowers are composed of narrow ribbon-like petals spreading in spider-leg fashion from a small centre. The blossoms and their stamens are slightly reminiscent of star-lilies, but their petals are quite narrow, very long, and twisted cork-screw fashion, whilst their colours are of bright shades of yellow, orange, and red. The best of the few species is Gloriosa superba, whilst G. simplex grandiflora is also a large and attractive flower, others being simplex (type) and Plantii.

The dormant tubers should be potted in the early weeks of the New Year, using loam, leaf-mould, peat and sharp sand in about equal proportions. If the loam has been prepared by stacking with old manure from oxen, as described for Eucharis, so much the better, but to mix fresh manure with the potting soil is not a good plan. The tubers, if to be grown singly, for training on greenhouse rafters, should be potted in 6-inch pots, but for balloon trainers four or five tubers in a large pot (about 10 inches diameter) will give better

results. Let the soil be just tolerably moist at potting time, and place the pots in a temperature of 70 to 75 degrees. Give no water beyond a light syringing with warm water occasionally until signs of growth are visible ; then commence gradually with tepid water, increasing the quantity as growth advances. Frequent syringing will benefit the foliage until, but not after, flower buds appear.

Follow the usual custom of feeding with liquid manure, and pay constant attention to tying in the growths. After flowering gradually reduce water, and when dormant keep the pots dry until the succeeding January, when the tubers should be shaken out and repotted. Old tubers may be divided, or young stock may be raised from seeds sown in a warm temperature in pans of light, sandy compost during early spring. The blooms of Gloriosas are frequently used with telling effect in competitive table decoration exhibits, and where their bright colours are adaptable to environment they make exceedingly artistic decorations in the home.

Gloxinia

There are several instances in horticulture where persistent effort on the part of botanists to displace a firmly established and familiar name of a plant for some other name which, although claimed to be correct, is unfamiliar, has signally failed to make an impression upon ingrained habit. To gardeners, for instance, Gloxinia is a well-known name of a highly esteemed plant ; Sinningia is practically disregarded, and despite the protestation of sticklers for botanical accuracy the

name of the gorgeous velvety, upturned bell-flowers which are ever popular with plantsmen remains "Gloxinia," and even the finest of catalogues name it thus, seldom even troubling to bracket with it the other name. In such circumstances I have no intention of becoming sufficiently pedantic to ask my readers to refer to Sinningia for notes upon this most desirable tuberous plant, but will be content to urge that whoever possesses the accommodation of a serviceable and moderately heated greenhouse should make special effort to grow a batch of Gloxinias, selecting a really good strain of seed from which to produce stock.

Cuttings and leaves afford possible means of propagation, but it is seldom necessary to resort to such forms of skill in the case of a plant which can be produced with far less difficulty from seed.

Prepare a compost of fine peat, leaf-mould, sand and some fine charcoal. Crock pans which, if 4 inches deep, should be half filled with crocks with a covering of moss, then filled with the compost, pressed even and firm with the level surface half an inch below the rim. Scald with boiling water and allow to drain until the next day. Sprinkle fine sand over the surface, and after mixing dry sand with the seeds distribute as evenly as possible, round the circumference of the pan rather than in the middle.

Neither cover the seed with soil nor water overhead, adopting immersion in tepid water as the only means of replenishing moisture. Cover the pan with a square of glass, which should be turned daily to prevent drip from condensed moisture.

Seeds sown in February or early March need not be darkened so long as they are in a position which gets no direct sunshine. Later sowings may be benefited by covering the glass with paper, but careful watch must be kept lest the germinating seeds are "drawn" to their permanent detriment. The temperature for seeds should be 65 to 70 degrees. At this temperature, if the seed is good and new, germination will be rapid, and as soon as it is possible to handle the tiny seedlings they should be pricked out an inch apart in pans of fresh compost prepared exactly like the seed-pans. When leaves meet, pot into small pots, and grow on near the glass in a warm temperature, 70 degrees being a good average. Repot in a compost of loam, leaf-mould, a little fibrous peat and some sand, and if growth is maintained at a good pace the February seedlings should begin to bloom by September. Many Gloxinias are grown in houses which have very little in the way of heating arrangements. The best method in such circumstances is to place reliance in one-year-old tubers, treating in just the same manner as tuberous Begonias. One may not expect such fine plants and flowers as are obtainable in adequately heated houses, but the second best is often a very good second best, and the flowers on plants grown steadily in a cool atmosphere are usually of stronger texture and brighter colours than those of the bigger plants which are grown in the stronger heat. The drying off process at the end of the flowering season should be gradual, but eventually the tubers must be kept perfectly dry until the following spring, when their starting in trays and potting will proceed as in the case of Begonias. Although a warm

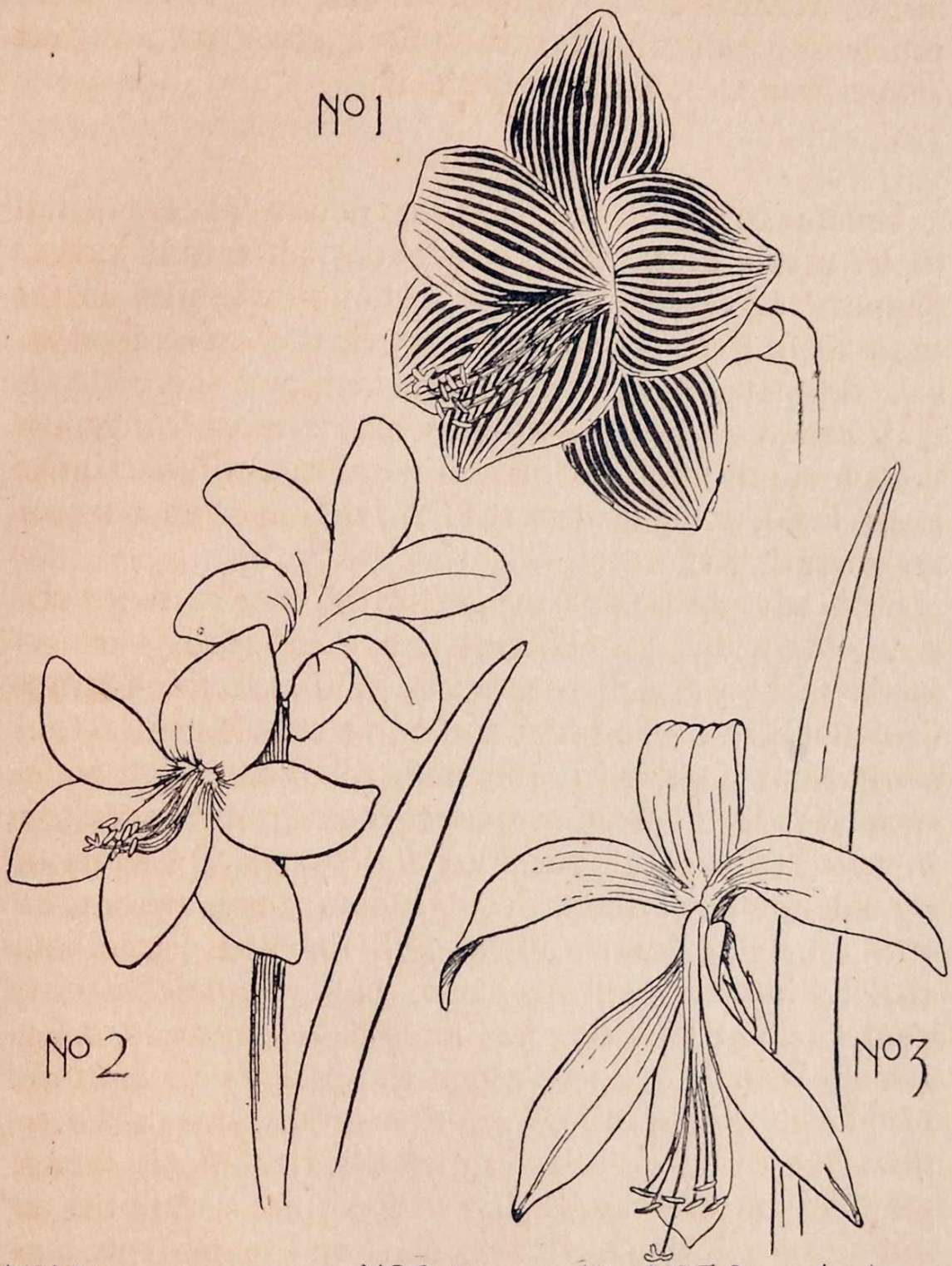
moist atmosphere is desirable during growth it is prudent to reduce both atmospheric moisture and heat whilst flowers are being carried.

Hippeastrum

Lovers of rich colours and of large flowers cannot fail to be much impressed by a batch of choice hybrid Hippeastrums. There are, it is true, people who do not admire these perhaps somewhat stiff, formal flowers, but they are surely in a small minority.

It cannot be said that they are as extensively grown to-day as formerly, but like other plants which require warm house temperature cost of fuel has been a factor to contend with.

Formerly and still very generally known under the name Amaryllis, the Hippeastrums are really very remarkable flowers. From a hard, solid bulb thick strap-shaped leaves rise in pairs, and in the centre a stiff, stout flower stalk rises erect, surmounted by immense wide-open trumpet flowers composed of outer and inner sets of three broad petals reflexing and assuming a more or less triangular outline. Vivid colours such as crimson with a velvety lustre, blood red, carmine, vermilion, scarlet, and varying shades of pink are laid on the petals in dense blotches, feathered flakes, or more or less sharply defined stripes, generally on a white ground; but there are also self-coloured varieties, and occasionally clean whites, an absolutely colourless bloom being, however, an extreme rarity. There are a number of species, one of which (H. reticulatum) is evergreen, and whilst this in other respects enjoys similar treatment to the rest of the tribe it must not be dried off.



No 1 Hippeastrum · No 2 Amaryllis · No 3 Sprekelia

For general cultivation, however, the hybrids are much superior to the various species from which they sprang, and these, both named and unnamed, are obtainable through trade channels in great variety.

Unless specially required to flower at particular periods the best time to pot dormant bulbs is in January or early February. About one-third of the bulb should remain exposed above the surface of the soil, the pots should be well crocked, and the compost may be two-thirds strong loam to one-third leaf-mould with a small addition of hop manure and some good sharp sand. A few pieces of lime rubble or oyster shell may overlay the drainage with advantage. The pots should vary in size according to the size of the bulb, a moderate-sized bulb will be comfortably accommodated in a 6-inch pot, larger bulbs requiring 7-inch or 8-inch pots. The best place to start their growth is on bottom heat, with the pots plunged in leaves or coco-nut fibre. A temperature of 60 degrees is sufficient in which to start, and beyond slight syringing watering should not start until green shoots appear from the crown of the bulb. From then onward water with steadily increasing liberality, and allow temperature to rise, but not higher than about 70 degrees. When growth is well advanced stand the pots on a stage, and feed with liquid manure. Continue to water after flowering so long as growth of foliage continues, then gradually dry off, and bring to a dormant state till the following January. Offsets from the main bulb may be grown on in small pots whilst seeds may be sown in a temperature of about 65 degrees. Seedlings should be

grown on continuously without drying off until they bloom, which is usually when the plants are about three years old.

Hymenocallis

Commonly called Pancratium fragrans, the plant, which is correctly named Hymenocallis ovata, bears some resemblance to a Eucharis, but the central cup is surrounded at regular points by long slender filaments which arch round in a most elegant manner. The stamens stand erect on long stiff columns, the whole flower being extremely chaste, pure white, having almost an appearance of extremely thin white china. The leaves are broad and long, almost like Aspidistra leaves in shape, and are plentifully produced. An added charm of the plant is the delicate fragrance of its flowers. It is an autumn flowering plant, and when potting is necessary, which will be about once in three years, March is a suitable month for the operation. A strong loam, which has been stacked for a year, with intervening layers of manure, and to which a liberal supply of sharp sand has been added, will suit the plants better than leaf-mould or peat, which tend to produce soft foliage. A temperature of 65 to 70 degrees will suit the plants, which also prefer a position where they will get some sunlight. Water is required in liberal quantity until flowering has finished, when it may be considerably reduced, but never quite withheld. There are two or three other species of Hymenocallis which require similar treatment, differing in the matter of temperature suitable to their needs from the true Pancratiums, and are very suitable plants for

conservatory or cold greenhouse culture. These latter are deciduous, and lie dormant during winter, when, of course, they require no water.

Lachenalia

There is an uncommonly quaint beauty in the Lachenalias or "Leopard Lilies" which are South African bulbous plants with long frequently mottled foliage and narrow tubular flowers hung with precise regularity in tiers upon erect stalks. The colours embrace a considerable range, and many bewitching combinations of red, orange, clear yellow, amber and green.

Lachenalias do not require very high temperature at any time, and are particularly useful subjects for moderately heated amateurs' greenhouses.

August is the time to pot the bulbs ; six in a 5-inch pot will make a good potful, and the compost may be ordinary potting mixture of loam, leaf-mould and sand. Drain the pots well, and place the bulbs so that their points are covered with half an inch of soil. Plunge in a frame, covering with coco-nut fibre, and leave undisturbed until October. There will probably even then be little sign of growth above the soil, but the pots should be placed on a shelf as near the glass as possible in a temperature of 45 to 50 degrees. Be very sparing with water until growth becomes active, and throughout there is need of caution in this respect, saturated soil being intensely disliked by these natives of the Cape, although at the period of full growth and development of flower spikes they will absorb a considerable quantity of moisture. Feeding should not commence until the flower-spikes can be seen at the base of the

foliage, when liquid manure may be given at intervals until flowers are well expanded, after which no further stimulant will be required. Plain water must, of course, be supplied all through the flowering period, which by the way is of long duration, for the plants begin to bloom quite early in the New Year, and will with care retain their beauty until the end of May. When the flowers wither watering should be gradually reduced, until the leaves also wither ; then water should be withheld entirely and the pots exposed to full sunshine to thoroughly ripen the bulbs. By August they may be shaken out and repotted. Lachenalias are capable of making extremely decorative subjects in broad pans, and also in hanging baskets. In the former they may be planted evenly over the entire area of the pan exactly as in pots, but in hanging baskets of open-meshed wirework, bulbs may be planted sideways with their points toward the openings in the wirework, finishing off with a few planted upright in the top of the basket. The basket must be well lined with sphagnum moss, to hold the compost secure, placing the moss in position layer by layer, and adding the compost and the bulbs as the building up of the moss-wall proceeds.

For the first eight or ten weeks the baskets should hang in a cool, shaded house, keeping the moss fresh by syringing. As soon as the points of Lachenalia growths become visible through the moss suspend the baskets in a tank of water, leaving them immersed until air-bubbles cease to rise to the surface of the water. They should then be hung in a position where some sunlight reaches them, but not the full glare of mid-day sun. Basket plants will require soaking more frequently

than pots because of the greater exposure on all sides to air. Immersion is the best method of watering until development of flower spikes involves risk of damage. After flowering gradually dry off as in the case of pots, and when thoroughly ripened the bulbs may be shaken out and stored in trays of dry sand until repotting time. Trade catalogues offer various species, and a considerable number of beautiful hybrid varieties which may be selected by the aid of their colour descriptions.

Nerine

Many will include Nerines among bulbs which may be grown in unheated structures, and justification exists in the fact that in some well-protected southern gardens Nerines can be grown with no more protection than that afforded by a cold frame. It would, however, be imprudent for dwellers in cold, bleak districts, or in damp fog-frequented localities to risk the choicer Nerines in unheated houses or frames, and they are so charmingly beautiful that they certainly deserve the benefits of a house which is just sufficiently heated to exclude frost and maintain a buoyant atmosphere. These remarks are not intended to dissuade those whose only available accommodation is a cold greenhouse from trying their hand with Nerines, for few flowers are more worthy of special effort, and with a certain amount of care and attention, such as plunging the pots in a bed of fibre, and covering during keen frosts with paper awnings over a wire or string framework to hold the paper just off the plants may be quite satisfactorily grown without heat; but the beauties of Nerines are such that they deserve to be held in such esteem that

the best possible accommodation is not considered too good for them, and there is ground for the contention that they have not been accorded the wide popularity their merits entitle them to enjoy. So long as the impression remains that Nerines are just oddments to be relegated to any structure that is not sufficiently comfortable for tender subjects it will also be supposed that no particular cultural skill is required to grow them. This can only result in poor growth, weak, indifferent flowers, and perpetuation of the idea that Nerines are of no great importance. The common name of "Guernsey Lily" originally applied to Nerine sarniensis has been loosely applied to the whole genus, and the idea has gained common ground that Nerines are wild in Guernsey as the Blue Bell of English woodlands. This is an example of how perniciously misleading the foolish use of common names may become. Nerines are South African bulbs, and are among the choicest of an immensely valuable range of bulbous plants of the same nativity; and whilst we have no lack of really hardy bulbs both for outdoor and cold house culture we have no genus which so well duplicates the beautiful characteristics of choice, well-grown Nerines that we can afford to treat them with slighting disregard.

We have, happily, a few far-seeing hybridists and plant breeders who are working steadily and perseveringly upon Nerines raising beautiful varieties and hybrids, firm in their conviction that their great day will come. Among these productions may appear some which are hardy enough to be successfully treated as really hardy bulbs; let us sincerely hope this may be so, but if it should be that in consequence of improvement

in the quality, extension in the range of colours and lengthening of their period of production they are rendered even more reliant upon regular greenhouse treatment, the achievement will still be great, and likely enough the acceptance of the necessity to treat Nerines with a care akin to that which is accorded the Persian Cyclamen may mean the fuller appreciation of their sterling worth.

Cultural requirements of Nerines are by no means complicated. Potting should be done between the end of July and the middle of August. The convenient pot which formerly was known as "The Sankey 54," a rimmed pot midway between a large 60 and a 48, measuring $4\frac{1}{2}$ inches in diameter, is just correct for a single well-developed bulb, or they may be potted in groups of three, five, or seven, in appropriately larger pots. Good drainage is essential, and a compost of good substantial turfy loam, some leaf-mould (about half the bulk of the loam) and plenty of sharp sand. The top of the bulb should rise slightly above the soil, and firm potting is essential. Do not saturate the soil until new growth appears, then water may be given with a liberal hand until the latter end of the following May, after which the bulbs should be dried off, and thoroughly ripened by exposure to full sun.

Repotting is unnecessary until the third or fourth year, but about August examine the drainage, re-arranging crocks if sediment has clogged the water passages, and scrape away the surface soil, re-topping with fresh sandy mixture. Soak thoroughly and carry on the same cultural routine until the following May.

There are a few species which throw up their flower

spikes in autumn, before new leaves appear. Others produce foliage during autumn and winter and flower in spring. In either case growth must be encouraged right through until May, after which the drying off process must be repeated. Newly potted Nerines should require no feeding, but after the first year dilute liquid manure from September to March will be beneficial.

N. curvifolia and its fine variety Fothergillii are good scarlets; Moorei is also scarlet; Appendiculata is pink; elegans, pink; elegans carminata, cerise; and sarniensis, rose. There are many varieties and bybrids of great charm. The flowers are tubular with reflexing top petals and protruding anthers; they are fixed in a circular umbel, the blossoms standing out more or less horizontally at the summit of straight, stiff stalks.

Sprekelia Formosissima

A century ago this gorgeously rich velvety crimson flower was held in very high esteem, and it is difficult to understand why it is not at present largely grown. The flower is divided into six long lanceolate segments, three of which grow upward and reflexed, the other three growing straight in a downward direction, the central downward segment forming a background for six stamens on long pendant crimson filaments, the stigma also extending below the tip of the basal segment of the flower. The leaves are long, strap-shaped, bending over toward the end, the whole plant wearing a rich tropical magnificence comparable to the Hippeastrums but of greater elegance. This handsome plant presents no cultural difficulties. Potted singly in 6-inch pots, in

February, using strong loam and sand, with a small addition of peat or leaf-mould, the plants should be kept well watered after growth has started and until summer begins to wane, after which they should be gradually dried off, and allowed to rest until the succeeding February. Repotting is only necessary about once in three years, but liquid manure may be given with advantage during the period of formation of flower spikes. No great amount of heat is desirable at any time.

Tuberose (*Polianthes tuberosa*)

Formerly Tuberoses were held in high esteem and were largely used for making sprays, coat button-hole posies and for wreaths, etc. Their flowers like bells, with their interiors filled with petals, waxy white, and powerfully fragrant, are borne in close spikes on the end of very long upstanding stalks. As a commercial flower it has occupied an important position, but of late years importation of tubers has fallen away. In private gardens a few are sometimes grown for the sake of the sweet perfume which permeates the whole atmosphere of a conservatory.

Imported tubers should be potted singly in early autumn, using strong soil, and 5-inch pots. Ram the soil very firmly, and leave a third of the tuber exposed above the soil.

Place in a cold frame in a shaded position. Water will not be required until green growth appears. The most forward plants may be removed in successive batches to a very cool house, and any forcing must be very gradually effected, for sudden increase in temperature

will send the flower spikes " blind." Supplies of water must be steadily increased as growth advances, and liquid manure should be given as soon as flower spikes begin to rise. Tubers are useless after one year.

Vallota

Vallota purpurea is an evergreen bulbous plant which may be called an old-fashioned favourite flower, for not only has it occupied a recognized position among collections of conservatory plants, in association with Clivias, Agapanthus, Amaryllis, etc., but has been counted among the treasured possessions of countless plant-loving cottagers whose best accommodation is the window-shelf, and in either situation the sturdy plants maintain health and produce their " Scarborough Lilies " year in year out, even though repotted only when the mass of roots literally bursts the old pot which has at length yielded to the increasing pressure of years. Although the specific name is purpurea the colours of Vallota tend more to orange, ochre, and flame red, whilst V. purpurea eximea is white and crimson, and hybrida is vermilion. If a plant requiring repotting can be obtained about May, the old soil should be carefully worked away from the roots with the aid of a pointed stick, the roots unravelled, without breakage, and the bulbs drawn apart. The compost should be the usual mixture of good loam, leaf-mould and sand, and it should be worked gradually among the roots so that these are neither cramped together in a crowded mass nor left with vacant spaces between them. Vallotas flower during July and August, and it is after flowering that new growth is made. Water is therefore required

throughout the autumn and winter, the period for minimum supplies being from late May until the expansion of flowers, but even during July and August they must not be allowed to become really dry. When once potted singly it is unwise to disturb the roots for several years, but a plant may, whenever required, be transferred to a larger pot without breaking the ball; always, however, ram the soil firmly in the space between the ball and the pot.

CHAPTER XI

BULBS, CORMS AND TUBERS FOR THE COLD HOUSE AND FRAME.

MANY amateur gardeners may be keen enough to possess a small greenhouse, but cannot, either on account of expense or through uncertainty of being able at critical times to be on the spot to attend to stoking fires, entertain the idea of growing plants which must have artificial heat throughout winter and spring. To such, a wide range of bulbs is available, some of which are just too delicate for general outdoor culture, whilst others, although perfectly hardy, lend themselves admirably to pot culture, and will flower considerably earlier and better under protection of glass than in the average garden. Many bulbs which are associated with rock plants make beautiful little pans or pots, of early spring or even winter flowering plants under the protection of an ordinary garden frame, and exhibitors at early spring flower shows ought to make great use of frames and cold houses for such subjects as Erythroniums, Uvularia grandiflora, Cyclamen of sorts, Ornithogalums, the miniature Daffodils, choice Crocus and Tulip species, and various other dainty little bulbs, whilst there are Ixias, Calochortus, Amaryllis, Crinums, Tigridias and Liliums which may be grown to perfec-

tion and preserved from damage by rough winds and inclement weather when protected by a glass roof, whereas in the open they are prone to suffer much from wind and rain if not from frost. In main essentials such as preparation of a good compost, potting early, starting under ashes or fibre, except in the case of a few corms and tubers, gradual increase in water supply as growth advances, and gradual diminution as the plants approach the dormant state the requirements of cold house and frame bulbs correspond with the details given concerning tender and half-hardy bulbs. There are some which are better adapted for pans than ordinary plant pots, and for the very small kinds pans are procurable which are of about 4 to 6 inches in diameter and about half the depth of pots.

A good general rule is to start the bulbs in a frame placed with a northern exposure, then transfer for the winter to shelves near the glass where they may get the benefit of all the sun that shines, and either by another change of position or by providing light shading of some kind ensure that expanded flowers are not too hastily withered by the full glare of increasingly powerful sunshine as spring advances. Let the true purpose of the unheated greenhouse or the garden frame be recognized to be simply to protect the plants and their blossoms from inclement weather, and do not attempt to produce a forcing temperature by keeping ventilators closed, and above all do not dabble in compromises between heated and unheated houses by trying to warm the house or keep out frost by the aid of oil lamps or other improvised heating apparatus which

cannot be properly regulated, and usually fail at the most critical moment.

Allium. There are quite a number of Alliums which in point of interest and beauty of flower are worthy of pot culture, but there is the one objection that they emit rather a disagreeable odour, and are on that account not very serviceable for indoor decoration. However, their culture is simple, and in the frame or greenhouse they make quite an attractive feature during a lengthy flowering season. A. neapolitanum and A. zebdanense are both white. A. cæruleum is a tall growing blue, and A. cyaneum is also blue, but only about 6 inches high, making a neat little pan when several bulbs are placed at about 2 inches apart. A. moly, and A. pulchellum flavum are yellows, both near about a foot in height, and A. roseum, A. ostrowskianum and A. acuminiatum are rose-pink.

Pot as early as possible in autumn, using sand liberally in the compost.

Amaryllis belladonna. This may be described as one of the most desirable of all bulbs for the unheated greenhouse. It is lily-like in form, with large trumpet flowers of a pale china pink. It flowers about midsummer under cold house conditions, but not until late summer or early autumn when grown out of doors, as it may be down south, or in warm borders alongside greenhouses even in Midland gardens. The soil should be good strong loam, with some leaf-mould and plenty of sand. Pot early as possible, August not being at all too early, but October too late for good first-year results. The crown of the bulb should be just visible above the soil. Place in a frame, and as soon as growth appears

water liberally. The plant will complete growth and take a rest before sending up flower-spikes, therefore when foliage withers it must be taken as a signal to withhold water for awhile. As soon as flower spikes appear resume watering, and again diminish supplies for a brief spell when the flowers have faded. Amaryllis do not require repotting for at least three years, but after the first season liberal feeding will be necessary.

Anemone. Good plants of Anemones such as A. coronaria, A. fulgens, and a few varieties and hybrids are very bright and effective, and that they are not invariably successful is due to quite simple causes. Cheap, immature roots is a frequent initial step to failure ; poor soil, defective drainage, irregular watering, and impatience to hurry the plants in their growth are the usual sequence of contributory causes of failure.

If the best results are to be obtained, the soil should be good, well-matured loam that was stacked with manure, leaf-mould, and sand both clean and fresh, and some small charcoal. Deep pans should be carefully crocked, with a layer of hop manure over the crocks. The tubers should be laid flat, nearly touching each other, and at a depth which enables them to be covered with 2 inches of soil, leaving half an inch of space for water. Tubers should be of good size, thick, firm and unbroken. Small bits, although low priced, are not cheap, for they have not strength and substance to produce good blooms. To obtain flowers in February and early March tubers should be planted during October and November ; later batches may be put into their pans at intervals until the end of February, but

ANEMONE ST. BRIGID

(By courtesy of Messrs. Reamsbottom & Co.)

the tubers in the meantime should not be exposed to fire heat, sun, drying draughts, etc. ; they are better covered with dry sand or fibre.

The pans in the first instance should be placed in a cool, shady situation to allow good roots to form before foliage rises above the soil.

When growing freely water abundantly, and feed with liquid manure, but keep the pans in a cool position, near the glass, freely ventilated whenever weather is reasonably good even in mid-winter. The slower the progress the stronger and larger the flowers are likely to be. The best method of dealing with Anemones after flowering is to plant carefully, without disturbing the roots, choosing a shady situation, and continuing to supply water until growth ripens off. Fresh tubers should be used in pans or pots each season.

Babiana. Summer-flowering when growing on the rockery, but usually in bloom by May when under glass, the Babianas are comparatively small but gay little flowers, and are refreshingly fragrant. There are several distinct colours in the Babianas, B. disticha, blue, B. ringens, scarlet, and B. macrantha, yellow and purple, being the more distinct and effective. The last named is slightly stronger in growth, attaining a height of 8 or 9 inches, whilst the others usually keep within about 6 inches unless unduly drawn by over-hanging shade. Good potting soil with a liberal proportion of sand, well-drained pots ; 5-inch size will take about half a dozen bulbs, and a bed of ashes or fibre in a frame will give Babianas a good start. Pot in October if possible, although even earlier is by no means a disadvantage. The bulbs should be placed about

half-way down the pot, and from time to time during November and December the pots should be examined to see if there is any sign of growth above the soil. As soon as the points of shoots appear remove to the cold greenhouse and place on a shelf in good light. Water freely during growth, and even after flowering continue until the foliage shows signs of ripening. Transfer the resting bulbs to a cold frame, but in a sunny position, to ensure thorough ripening. Under such treatment the bulbs should be capable of flowering again in pots if repotted and similarly treated the following season.

Brevoortia. There is an uncommon and somewhat rich appearance about Brevoortia ida-maia, a Californian bulbous flower which many people still call Brodiæa coccinea. The flower stems are usually over a foot long, and the blossoms are rich red, rendered the more striking by clear green markings. They are early summer flowering bulbs, but in a greenhouse with the benefit of some sunshine may easily be brought along a month earlier. To secure early flowers the bulbs should be potted early, about the end of August or beginning of September being a reasonable time. The customary mixture of loam, leaf-mould and sand will be suitable, and four or five good bulbs will well fill a 5-inch pot. Let the bulbs be about half-way down the pot, well surrounded by clean sand. Plunge in fibre in a frame, which should be in quite a cool, shaded place, but open to a good light, the latter point being of importance when first the pots are removed from their fibre covering. When growth gains a little pace a position in a light sunny greenhouse should be chosen,

keeping near the glass, otherwise growth will draw up weakly, and when flower stems rise they may be 28 or 30 inches long instead of 12 or 14 inches, and too weak to hold themselves up. These bulbs are not great lovers of moisture ; until growth is well through the soil they will require no watering, but even while in full growth care must be exercised never to water until the soil is tolerably dry, and the proportion of sand and arrangement of crocks should ensure free passage of all surplus moisture. Very little feeding should be indulged in, and after flowering the soil should be gradually dried and the bulbs thoroughly ripened by full exposure to sun.

The same bulbs may be repotted as soon as possible after ripening is completed, but when offsets are formed they should be carefully removed and grown on in pans.

Brodiæa. The treatment advised for Brevoortia ida maia applies in the main to the Brodiæs, of which there are several species which produce umbels of delightful flowers. The bulbs should be given about an inch of space between them and should be well surrounded with sand, but need not be deeply buried in the pots.

B. grandiflora, dwarf, blue, B. laxa maxima, purple, and the white forms of B.B. capitata and congesta are the best of the tribe.

Bulbocodium vernum. This is a real little gem for the Alpine house, the cold bulb-house, or for frame culture. It is dwarf, not more than 6 inches, and frequently only 3 or 4 inches high ; flowers quite early in spring, the blossoms consisting of half a dozen long tongue-shaped petals with a cluster of stamens on short filaments. The colour of the petals is rosy-purple of a bright, cheer-

ful shade. Small pans are the most suitable receptacles, pots being rather heavy in appearance for so dwarf a plant. An 8-inch pan will accommodate a dozen bulbs, which should be inserted an inch deep. Early September is a good time for planting, and after a gentle start in a cold frame the pans may be removed to a sunny stage in the greenhouse, or propped on an inverted pot in the frame, watered freely, and treated to just one or two applications of liquid manure during development of flower buds. After flowering gradually dry off for a complete rest and transplant in fresh soil in September.

Calochortus. This genus richly deserves to occupy front rank among the choicest of bulbs for unheated greenhouses. They are flowers of quite exceptional charm, and have an air of aristocratic refinement and luxuriant beauty, the strangely uncommon arrangement and markings of rich contrasting colours always claiming marked attention and unstinted admiration. In favoured southern gardens Calochortus will succeed quite well out of doors, but in windy or otherwise unfavourable localities it is a pity to allow the beauty of the flowers to be marred by bad weather if any covering of glass is available to keep them clean and unbruised. In Messrs. Barr & Sons' remarkably thorough bulb catalogue Calochorti are arranged in three distinct groups, the first of which embraces the large open-flowered kinds known as Mariposa Tulips or Butterfly Tulips. Some of these are of quite large size, those of the Venusta type ranging from 1½ feet up to 2½ feet in height.

The second section is small in number of varieties, and is known by the common names of Globe Tulips

and Fairy Bells. Unlike the rest of the tribe these smaller kinds which produce drooping globular blossoms prefer shade, or at any rate partial shade, but the other sections cannot have too much sun. The third group is known as Star Tulips, and are the smallest and daintiest members of the family, but are first to bloom.

Reverting to the Mariposa Tulips, it is here we find the most remarkable colour combinations, and the strongest growers. C. Catalinae grows from 1½ feet to 2 feet high. Its stems are gracefully slender, its flowers large, like broad, shallow cups. The colour begins with a delicate shade of lilac merging into a rich deep tone of lilac, and at the base of the cup is a distinctly drawn circle of rich maroon.

C. macrocarpus, a late flowering kind, has petals of a lovely shade of lavender, with a dark centre and a band of vivid green. C. Plummeræ is also lavender, and the petals are partially covered with long hairs, like fine strands of golden silk. In the Venusta type some extraordinary colours are found. C. Venusta El Dorado varying widely from white to lilac, purple, red, and salmon. The centres of the flowers are fantastically speckled with chocolate brown, coppery bronze, and golden yellow, some being studded with gold on each petal. C. V. citrinus has lemon-coloured petals, each being blotched with vivid maroon, the centre of the flower being both speckled with maroon and lit up with slender golden hairs. Two other varieties of venusta, named oculatus and vesta, both have rosy purple exteriors, the inside of the flower having a white ground finely blotched and pencilled with dark velvety maroon and yellow.

In the Star Tulips C. Benthami is bright yellow, C. lilacinus is lilac, and C. Maweanus major white, but each is beautifully marked with other colours.

In the Globe Tulips, which are the shade lovers, C. albus has white flowers several blossoms hanging like silver globes from branching stems. C. amabilis is golden yellow, the petals being margined with a hairy fringe.

Three good bulbs in a 5-inch pot will make a good show. A light, sandy loam, some peat and leaf-mould in equal proportions and a good addition of silver sand will make a suitable compost. Pots should be very well drained, and the bulbs should be potted in October, started in a frame, removed to a sunny position (except the Globe varieties) as soon as growth appears, and thenceforward be kept liberally watered until flowering has finished, when they should be thoroughly ripened and well roasted in the sun. In October shake out, separate the offsets, which should be grown on in pans, and repot the large bulbs as before. Feeding with liquid manure during growth is permissible but must be done with cautious moderation.

Crinum. The hardiest of the Crinums, C. powellii and C.P. album, and also C. longifolium album, are quite suitable for cold-house culture. Treat as advised in the previous chapter.

Crocus. To the average person who knows only the so-called Dutch Crocuses and the usual lines of colour they are made to produce in spring bedding schemes, the real charms of the Crocus family are unrealized, unknown. It is strange, perhaps, that out of a family of wide range and exceptional wealth of beauty of a

particularly dainty character we have chosen just the gaudiest and coarsest to occupy prominent positions in our flower gardens, whilst many lovely little species which are of delicate refinement and surpassing beauty are seldom seen except in the select collections owned by a very small number of connoisseurs.

The real reason for the apparent error of judgment is by no means so foolish as may be imagined, for it is quite essential that flowering plants for what may be termed general purposes shall be not only of robust constitution but prolific in reproduction, so that they may be both plentiful and cheap. These conditions are admirably fulfilled by the varieties and developments of Crocus vernus, which we now familiarly call " Dutch " Crocuses, and the principal characteristics of this group or section are just such as would appeal to the rank and file of garden owners. Their early flowering has a great deal to do with their popularity, for it means much to the townsman especially, to have some bright yellow, rich purple, and shining white blossoms as early as February, to convince him that vegetable life is awakening for another whole season's round of growth and display of colour and elegant form. Cheapness is another strong point in favour of the Dutch Crocus, for to many who love their gardens only the cheapest plants are within reach. It is therefore in no sense due to a desire to disparage the common bedding Crocus that the suggestion is made that whoever possesses an Alpine house, or even a frame, which can be devoted during winter and spring to the cultivation of a few choice bulbs should delve deeper into the tribe for species and varieties which are worthy of special

study and care. The protection referred to is not required by reason of tenderness, for whether spring flowering or mid-winter kinds the plucky little blossoms will emerge from the crowns whatever the weather may be, but it is because so often their dainty petals and stamens become drenched by winter rains, or lacerated by cruel winds that their cultivation under glass is advocated. Most of the prettiest kinds are small, and are well adapted for quite small, shallow bowls or pans, in which they display their dainty charms better than in deep pots, but the pans should be porous and drained, for it is not suggested that the more expensive species should be grown in fibre ; the ordinary bedding kinds are quite well suited for that purpose, which involves the sacrifice of the bulbs after the one season's display.

There are, as already stated, winter-flowering, and early spring-flowering species, and there are also autumn-flowering Crocuses which belong to the real Crocus family and are quite distinct from the Colchicums which so frequently pass as autumn Crocuses. The autumn-flowering Crocuses as exemplified by C. sativus, C. speciosus, and C. zonatus, should, if possible, be put into their pans of soil in July, and certainly not later than the earlier half of August, for if out of the soil longer the flower buds which rise before the foliage will begin to move, and that means serious exhaustion of the bulb, or " corm " as it should of course be correctly called. The early spring-flowering kinds should be planted in September, the earlier the better.

Don't plant Crocus too deeply ; this is a warning that may be uttered regarding outdoor planting as well as potting. The points of the corms need be only

slightly covered with soil in the pans, and even when planted on the rockery, which, of course, is the appropriate spot for the small Crocus species when grown out of doors, they need be but little more than an inch deep. The compost should be porous with sand and grit, but should contain some good fibrous loam and leaf-mould. When planted plunge the pans to the rims in ashes, but do not cover the surface of the pans. The autumn-flowering kinds may be watered once when first planted, and again as soon as flower buds are seen to be pushing their way through. Thenceforward continue to water freely until the foliage stops growing and shows signs of ripening, when water may be gradually reduced, and finally stopped, the bulbs being thoroughly ripened by exposure to sun until the end of June, when they may be shaken out of the soil, cleaned, and replanted during July.

The spring-flowering kinds will scarcely require watering until leaves appear, the programme for these thereafter corresponding to that advised for the autumn bloomers, their rest time extending until the end of August. To name and describe the whole range of Crocus species would be too great a task, but Messrs. Barr & Sons, of King Street, Covent Garden, London, who make a speciality of Crocus and other choice bulbs, issue a comprehensive list which will serve as an excellent guide to any who may undertake the formation of a collection.

Cyclamen. The hardy Cyclamen are not lacking admirers, nor have writers neglected to eulogize their sweet charms, but there are comparatively few gardens where they are either extensively or well

grown, and there is good reason to heed the cautious remark that admiration and praise alone does not constitute clever cultivation. Many disappointments and failures with hardy Cyclamen are traceable to want of precision in brief notes of instruction which appear in the average trade catalogue and gardening handbook, and to the custom of importing corms which have been growing wild in their native haunts, and were uprooted, dried, and tossed about from one dealer to another for an indefinite length of time. "Corms may be planted in August and September," says a paragraph in some book or treatise. That is reasonable in the case of C. coum, C. ibericum, or C. repandum, and the varieties of these species which bear their flowers in spring, complete their growth by midsummer, lie dormant for a brief period and are just in convenient condition for handling at the time mentioned. The trouble is, discretion is frequently not used. There are species of Cyclamen which should be in bloom about August and September, and it is not good for them that they should be lying dry and shrivelled in some warehouse in order that they may be sent to customers who order them at the same time as the others. Cyclamen Europæum should be in bloom in August and September, C. neapolitanum coming in before europæum has tired itself out. Obviously it is wrong to have these lying out of soil until their proper flowering season, but that is frequently done, and it is difficult to avoid such errors if the one aim in view is to secure imported corms for the sake of cheapness, for to have them harvested at the proper time, just after completion of growth, and imported quickly enough to get them

replanted before they should be starting into fresh activity involves special arrangement rather than reliance upon the ordinary routine methods of commercial bulb importers. The really satisfactory method of installing hardy Cyclamen into a garden is to procure stock from a hardy plant specialist who can supply established plants in pots, or where circumstances permit to raise from seed, sown as quickly as possible after ripening, bringing on the seedlings in a frame, and potting as they attain sufficient size, eventually planting out at the very commencement of the growing season, which varies according to species. So also, for culture under glass, the plants should be transferred from small pots to pans, anything from three to half a dozen corms being used according to the size of the pan.

If the pans are well prepared with a good layer of drainage, some old lime rubble and broken oyster shell in the bottom, and a mixture of peat, leaf-mould, loam and sand with a further sprinkling of lime rubble and small charcoal, there will be no need for further disturbance for a period of three or four years at least. With the exception of C. europæum the corms should be level with the surface of the soil, but a thin coating of leaf soil, grit and old, pulverized manure should be spread over the corms after the first season's growth. C. europæum should be planted within an inch of the drainage, and covered with at least two inches of compost. Cyclamen are shade-loving plants, and although during their resting period they do not require much moisture, they should never be "dried off" as many other bulbous and tuberous plants should be.

Erythronium. There are points about Erythroniums

which will remind one of the hardy Cyclamen, the petals of the blossoms being modelled on similar lines, but the Erythroniums break into ranges of colour which are unknown in Cyclamen. The blooms are also not unlike the Dodecatheons, but individually are more widespread, and are borne singly or perhaps two on a stem, standing boldly, for so fragile blossoms, inviting close scrutiny, and certainly capable of surviving the ordeal, for they are extremely chaste and refined. Further interest and charm centres in the foliage which is beautifully tinted and marbled in a picturesque manner. With all their merits Erythroniums are less grown than they deserve to be, and that is somewhat strange, for they are by no means difficult to grow. There must be a reason for this, and probably two reasons have shared the responsibility. First the fleshy and very succulent tubers are too often imported for the sake of cheapness; are kept dry for so long that they become limp and shrivelled, then when they are planted they have so little vitality that they rot in the ground. The second reason is that quite commonly the tubers are planted at a depth suitable for Crocuses, whereas they should be planted quite 6 inches deep, and in very light, loose soil another 2 or 3 inches will not be too much. For outdoor planting British grown roots are much better than imported, and even for potting imported tubers should be first placed in shallow trays of coco-nut fibre and kept slightly moistened until they become plump and firm.

September is the best month for potting Erythroniums, but in the case of the American species and varieties importations seldom arrive before October.

A compost of equal parts loam and leaf-mould, with quite 20 per cent. of clean sand, suits these plants, and the tubers should be buried well down in pots. The large American kinds may be potted singly in 4-inch pots, but the Dens-canis (Dog's Tooth) type produce a better effect when three or four roots are placed in a 5-inch pot, or they may be grown in deep pans, planting closely enough to make a good mass of foliage and bloom. They will bloom very early even in an unheated greenhouse, and do not require plunging if the tubers are buried deeply. After flowering gradually dry off, and rest the tubers out of doors.

Unless closely crowded repotting will be unnecessary for three years or thereabouts. Among the best for pot culture are Erythronium grandiflorum robustum, bright yellow ; Hendersoni, lilac, deepening to purple with a narrow band of yellow ; Revolutum Johnsoni, bright rose with yellow centre ; Revolutum Watsoni, cream, with a golden ring.

The Dens-canis varieties have white, lilac purple, and rosy-pink flowers, either of which is daintily pretty.

Fritillaria. There is something quaintly uncommon about Fritillarias which never fails to attract even the stranger to horticulture, and generally draws questions concerning them, followed by admission that they are extremely pretty. The shape of the blossoms resembles bells with deeply scalloped and sometimes recurved edges. They hang dangling on foot stalks so slender that as they sway in the gentlest breeze one wonders how long the stalk will sustain the bulk and apparent weight of the flower. In shades of colour, and peculiar markings, the Fritillarias are all uncommon, and F.

meleagris, "The Snakeshead Fritillary," is chequered or tessellated with patterns almost unique among flowers. This species is native to Britain, and may be seen in great stretches in certain parts of the country, particularly near pine woods and verging on the bracken peat of moorlands, where, however, the bulbs are so deeply buried that wayfarers seldom succeed in uprooting them. September is a suitable month for potting, and for the majority about five bulbs in a 5-inch pot will produce a pleasing effect. A few kinds are of somewhat small growth, and these are better grown in pans than in pots. F. armena, F. pudica, and F. citrina, all yellows, are only a few inches high, and the Meleagris varieties average about a foot. Some of the most distinct and striking kinds for pot culture are F. coccinea, bright scarlet with recurving petals; F. Elwesii, yellow, with purple pencilling; F. libanotica, lilac and yellow; F. kamschatica, practically black, in pyramidal spikes, and the very refined F. recurva, with drooping bells, recurving at the edges, the colour being clear orange scarlet, with some yellow in the interior of the bloom. For the most part the Fritillarias, and F. recurva in particular require plenty of sunlight, and free ventilation; a few enjoy shade, F. kamschatica preferring peaty bog conditions to those of the ordinary border. With peat in the potting compost and a shady corner in the greenhouse it will be well content, and is of very uncommon appearance. When Fritillarias are carefully potted in good clean compost it is unwise to repot every season. The top soil may be scraped away and replaced with a mixture of leaf-mould, sand, and a good fertilizer, and so long

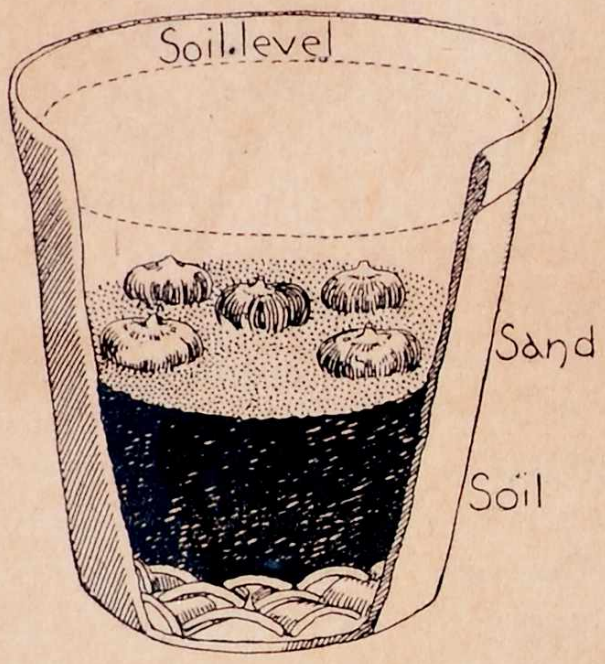
as drainage is not upset all will be well for three or four years.

Gladiolus. The whole family of Gladioli are amenable to pot culture, but the small early flowering kinds have the advantage that they will bloom under the protection of a glass roof during a period of the year when flowers are still comparatively scarce. In the ordinary way there is less reason to grow the large late flowering Gladioli in pots because the effect is simply to bring them into bloom about the period of summer's greatest abundance of flowers, and unless cultivated with considerable skill the flower spikes are likely to be smaller than they would be if grown in the open ground.

The modern race of Primulinus hybrids is much esteemed because of the daintiness and artistic effect of their slender stems and moderate-sized flowers. Six-inch pots containing five corms make really fine plants for pedestal vases, hall corners or verandahs. The orthodox early flowering tribe, among which the Colvillei varieties are the most familiar, may be potted in 5-inch pots, and the earlier the task is accomplished the better. November to January is frequently stated to be the planting season for early flowering Gladioli, and it is quite true corms will live and make some growth even though kept out of the soil until the latter end of January, but the vigour of their growth and the size and substance of their flowers cannot compare with those which were placed in soil quite early in October and brought along very gradually from start to maturity. The greater root development and consequent better absorption of nourishment mean a great deal to the early planted bulbs, and not only do their

blossoms develop earlier and obtain larger size but possess a firm texture and substance which maintains them in first-rate condition for a prolonged time.

The soil in the pots should be chopped, turfy loam (not sifted), leaf-mould, and plenty of sand, old lime rubble and wood-ash. The method of crocking and filling pots, depth at which to place the corms, surrounding with clean silver sand, etc., will be more



POTTING GLADIOLI

clearly gathered from a glance at the illustration than from a lengthy written statement, and when potted the best place for Gladioli is a frame in a sheltered, shady spot.

As winter approaches have some loose dry material ready with which to cover the batch of Gladioli should hard frost set in. Let growth be as gradual as possible, and right up to the end of February water must be sparingly given. Don't try to produce a forcing tem-

GLADIOLI

Hooded Gladiolus
(Primrose and Coral)

Early-flowering
'Cardinalis Elegans'
(Scarlet, flaked with white)

July-flowering
'Mrs. G. W. Willock
(Blush, with cerise markings)

perature by keeping the ventilators closed while sun shines; furthermore don't begin to feed at all until flower spikes put in an appearance. A good chemical mixture for top-dressing Gladioli is 60 per cent. superphosphate, 30 per cent. sulphate of potash, 10 per cent. sulphate of ammonia. A small salt spoon filled to the edge should suffice for a 5-inch pot, and is best distributed close inside the rim of the pot. Watering should be liberal from the time the flower buds first become visible, but discretion must, of course, be exercised not to saturate already comfortably moist soil.

It is equally as important for the future welfare of the corms that care shall be exercised after flowering has ceased, and it may be added that failure to realize this has been the cause of much disappointment and loss. Watering must continue as long as the foliage retains its green colour, and should only be gradually diminished as the ripening progresses. When at length the whole of the growth dies down turn the pots on their sides and expose them to all the sunshine possible, and in September shake out the corms and clean them in readiness for repotting. Treated thus there is no reason why corms should not flower well the following season, but if dried off immediately after flowering they will be of little worth the following year.

Faded flower spikes should be cut away as soon as the blooms have withered, for development of seed is detrimental to the corms.

Hyacinth. There is no need to differentiate between the treatment of Hyacinths to be grown and flowered in an unheated house and those to be forced. The only point where a difference arises is that instead of

being subjected to heat the bulbs growing in the cold-house will be allowed to come on gradually, and that is much better for them. Not only with Hyacinths but with most bulbs that may be forced the commonest error, and most frequent cause of failure, is too early a move into heat, or too sudden a jump to a high temperature ; therefore the cold-house relieves one of considerable risk, and that relief is very good compensation for waiting a week or two longer for one's flowers to open.

Hyacinths are immensely popular, and the quantities imported annually reach enormous figures. The fact is the bulbs are among the difficult crops to produce, requiring a particular kind of soil and special methods of cultivation. Holland has the ideal soil for the purpose, and in consequence there has been an inducement to Dutch growers to make a close study of their cultivation, whilst British growers have practically left the whole thing to the Dutch growers, and to the French in so far as the small white " Roman " Hyacinths are concerned.

These remarks, be it understood, apply only to the production of bulbs, for both commercially and privately Hyacinth flowers are grown in vast quantities, and it is strangely true that whilst there is much skill in producing a good bulb the bringing of good bulbs into bloom is simplicity itself.

Ordinarily good potting soil is quite suitable for potting Hyacinths, and the bulbs should be potted with their noses just level with the surface of the soil. The size of the pot should be governed by the size of the bulb, and in like manner also the larger the bulb the

finer the flower will be if ordinary care is bestowed upon its cultivation. A really good bulb will be well accommodated in a 5-inch pot, although some exhibitors use 6-inch pots which are too clumsy in appearance for use in decoration schemes. Smaller bulbs, if plump and well-ripened, will produce useful flowers in 4-inch pots.

Early October is the best time for potting, a week or two in the soil during early autumn revealing a tremendous advantage in the quality of the flowers over those which are kept in store until the middle or latter end of November. Formation of abundance of roots and slow, gradual development of top growth should be the great aim, and even when some degree of forcing is to be indulged in, the heat should not be brought into service until the flower buds begin to rise above the crown of the plant.

Newly potted bulbs should be plunged in a deep bed of ashes, and usually three months may quite well elapse before they are taken out. For a few days the subdued light under the greenhouse stage will best suit the plants, but as soon as the pale yellowish tint of the foliage gives place to a healthy green the stage, or a shelf near the glass, will be their proper position. Water abundantly from this point onward, and at intervals of twelve or fourteen days give weak liquid manure.

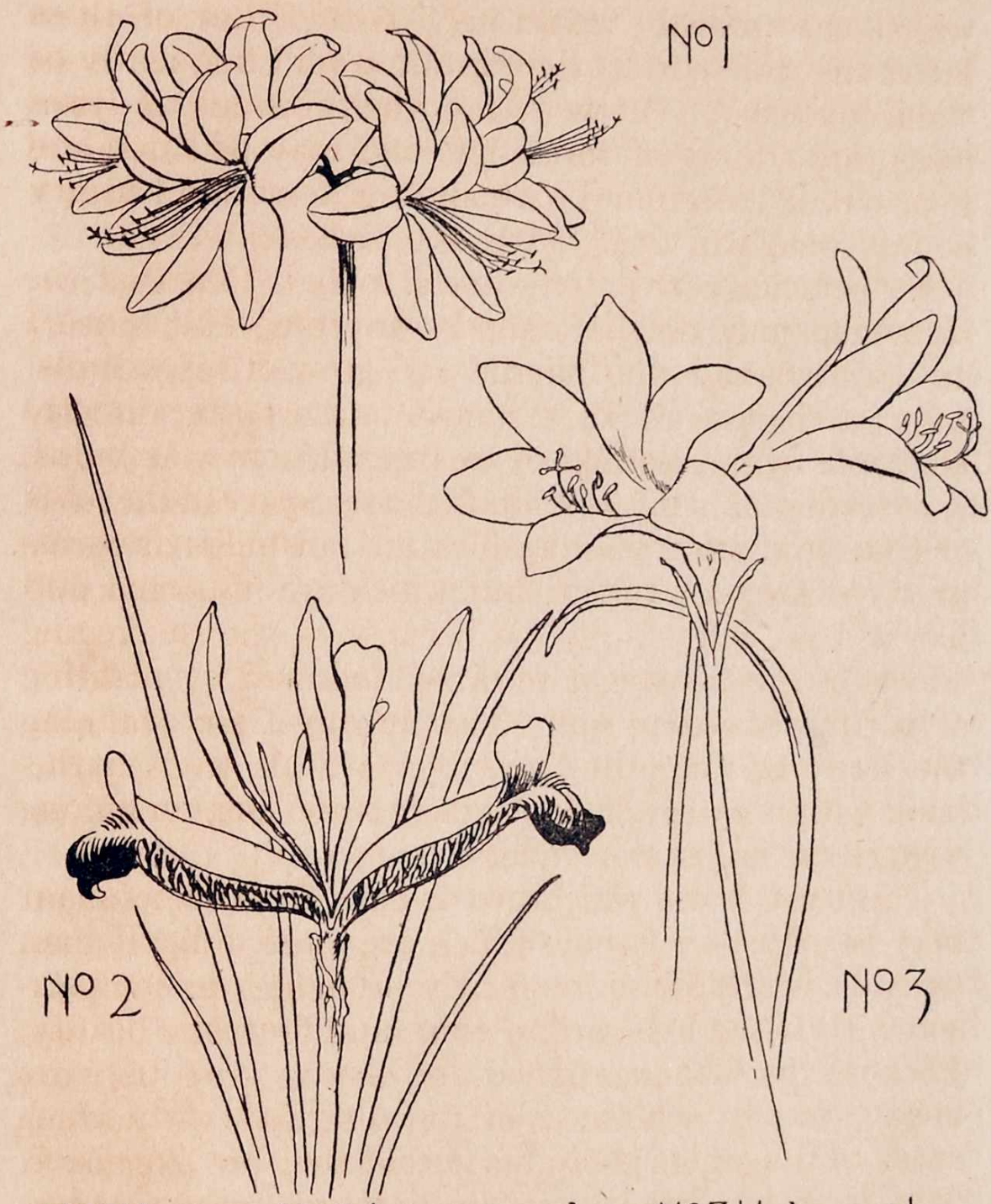
Hyacinths which have been flowered in pots may be planted in the open, but fresh bulbs should be procured annually for pot culture whether forced or grown in cold-houses.

Iris. Within the compass of this extensive and very extraordinary family there are species, and in fact whole

tribes, which are really bulbous in character, and some which are termed "tuberous" rooted, but of these latter the more correct description would frequently be "rhizomatous." A few even of the rhizomatous Irises ripen into a state of dormancy, and may be lifted and kept out of the ground for some weeks without injury or, as some will aver, with actual benefit.

My personal conviction—and I write it thus that the statement may not be taken as anything else, since I am aware many who handle and grow Irises will disagree with me—is that many failures are directly traceable to the method of treating rhizomes as bulbs, and, further, it is my opinion that a majority of the roots of Irises and other plants which are not bulbs or corms or even dormant tubers, but which are imported and handled as such, simply die because of the weakening effects of the treatment received, followed by planting or potting in strong soil. That is why I am confining the scope or range of the subjects dealt with in this book within narrower limits than is the custom among writers on bulbs and tubers.

There are Irises which are as easy to grow as plant may be; there are some which are more difficult than Orchids, which are so frequently brought into comparison with Irises, in regard to grace and fantastic beauty. Because the first-mentioned are easy to grow they are cheap, and it is because of the difficulty with which stock of the others is produced that they are expensive. This is an important point to note, for quite feasibly, the uninitiated are inclined sometimes to think that low price surely means low grade, and that all the really charming Irises are the costly ones. Some of the most



No 1 Nerine · No 2 Iris reticulata · No 3 Habranthus

expensive Irises are extremely beautiful; indeed if it were not so nobody would persist in endeavouring to surmount difficulties of cultivation whilst there is so much beauty among the cheap kinds. I am not here referring to novelties which are expensive while scarce, and will likely enough be cheap in a few years because they increase so readily, but my meaning is that the Iris which consistently remains at a high price, and has done so for many years, only does so because it is difficult to grow, and multiplies at an extremely slow pace. None of these remarks are made with intent to disparage the high prices of Irises, but with the sole object of emphasizing the fact that those who cannot pay guineas per plant may find real quality and superb beauty among those which are procurable for pence and shillings.

The so-called "English" Irises, which are varieties of I. xiphioides, are often recommended for pot culture, and certainly they will grow and flower in pots, but in most warm gardens they will flower in the open in June, and even far North will bloom in July, and as it is easier to get really fine blooms in beds or borders in early summer than to get them a little earlier but not so fine in pots in a cold-house there seems to be no particular reason to urge that they should be grown in the unheated greenhouse, unless, of course, one has the greenhouse and not the convenient or suitable garden space. It is a different matter where, by judicious use of fire heat, these lovely flowers may be produced for Easter or earlier. Where the desire is to produce Irises for cutting just a little earlier than they may be had from the open garden there is certainly an easy means

of gratifying that desire by growing English Irises in the cold-house, either in boxes or in pots, and another equally useful type to which the same remarks apply is the " Spanish " Iris (*I. xiphium*), which indeed may be specially recommended because this section will flower considerably earlier than the " English " type.

The Spanish Iris take first place among the cheapest of bulbs, in fact the mixed, unnamed stocks are so cheap that the price per 100 bulbs is very frequently thought by recipients of catalogues to be a misprint, or to be more correctly interpreted as the price per dozen. For massing outdoors the mixed bulbs are quite good and suitable, but for cultivation in pots (or in boxes for cutting) under glass it is decidedly worth while to grow some of the choicer named varieties, and even these are by no means expensive. The colour combinations in these extremely elegant flowers are of wondrous charm and striking character : Bronze Queen, for instance, has rich bronze-brown standards with orange falls, into the edges of which a flush of bronze creeps. Glory of Overveen has delicate lavender-blue standards, golden yellow falls and a rich orange blotch on the lip ; Thunderbolt has smoke-bronze standards and chestnut-brown falls with a large blotch of orange on the lip. These, however, are but examples of many exquisite blendings and combinations of colour, and there are also pure golden yellows, rich navy and Cambridge blues, lavenders and clean whites. In but few cases is the importance of early potting greater than with the Spanish Irises. Left in the ground they rest for an extremely short period, and begin to send out fresh roots before summer has waned. Naturally the bulbs

which form an extensive root system before top growth begins are able to produce foliage and flower spikes of great vigour, whilst those which remain until autumn is well advanced in their trays or bags will have less nourishment to support growth when it begins. It frequently happens when bulbs remain in a bag, or become very slightly moistened that they will begin to send out roots, and as these roots find no feeding ground the bulb is seriously impoverished by their wasted effort. Quite early in September is a better time for potting Spanish Irises than October, but November potting means sadly weakened flowers.

Use a fairly good soil, but with plenty of sand, and unless manure was stacked with the loam it is advisable to do without it and rely upon a little feeding when buds show. Five bulbs in a 6-inch pot should make a good potful. Bury the bulbs an inch deep in the soil, and plunge the pots to the rims in ashes, in a frame, but do not cover the soil with ashes.

Until summer weather is past the lights may be left off the frame, and even far into autumn abundant ventilation must be given, but with protection from heavy rains, etc. The pots should remain in the frame right through the winter, and in March may be taken into the cold-house, which, however, should be kept well ventilated. Any hasty effort to speed up the development of the flowers will be disastrous, for even the forcers of these flowers have to wait until the buds are fairly well advanced before subjecting them to heat. When flowering is past replace the pots in the frame; continue to water for a week or two, then gradually withhold and allow the bulbs to ripen. It is better to

plant out bulbs of Spanish or English Irises after one year in pots, starting afresh with new bulbs for potting each season.

Iris tingitana, a very beautiful species from Tangiers, may be likened to a Spanish Iris on a large scale. The standards are prettily frilled, and their colour is blue, shading from pale to dark shades; the falls are lilac merging into white, with a broad, frilled lip of bright yellow. I. tingitana is a little more fastidious than the Spanish Iris. It must have very gritty soil through which moisture runs without hesitation. It must also have all the sun possible, and when growth is completed should be well baked in the sun to thoroughly ripen the bulbs. After a season in pots the bulbs should be planted in a border with a southern exposure, and, if possible, a wall behind in order that the warmth may be well held during the sunny months. Although this Iris requires summer heat it is not tender so far as frost endurance is concerned. When planted the bulbs may be left undisturbed for several years.

There is another comparatively modern race of hybrid Irises which are popularly called "Giant Spanish" or sometimes "Dutch" Irises. These are very popular as market cut flowers, their size, length of stem, and beautiful colours making them extremely serviceable to florists. They are also particularly well adapted for pot culture, and have proved capable of responding well to slight artificial heat. Trade catalogues provide descriptive lists of names, and these newer hybrids are worthy of special attention. Their cultural requirements correspond to those of the ordinary Spanish class.

For the connoisseur and the persevering cultivator of what we are prone to call "troublesome" plants, although the term is never used in a complaining spirit by the enthusiast, there are quite a number of bulbous as well as other types of Irises which are well worthy of attention, but in some cases soil, situation, and environment have a greater influence than can be controlled by what we understand as skilful culture.

Iris reticulata is an indispensable gem, and it cannot be charged with any perversity, for it will thrive and bloom on the rockery in February, and flowers as cheerfully in pots as Hyacinth or Tulip. Three bulbs in a 4-inch pot makes a very useful little table plant, or five bulbs may be placed in a 5-inch pot. Plenty of sand in the compost, stout, plump bulbs to start with, early potting, gradual growth in a frame on the shady side of a wall, and removal to the greenhouse when flower buds peep from the sheath of foliage will ensure perfect flowers which are of rich violet, with a golden lip, which is finely pencilled with purple. The flowers are delicately fragrant. Much depends upon the after culture of the bulbs. If the pots are simply set aside after flowering and left to chance the bulbs will lose vitality. As long as foliage continues to grow watering must be regularly attended to and even a dose of weak liquid manure supplied. Then when growth has ceased allow the pots to become well baked in the sun for a week or two. After a brief spell of sun-baking shake out the bulbs; be careful not to tear away the netted skin, and spread the bulbs thinly on a shallow tray of dried sand. Store in a cool dry place until planting or potting time again comes round.

Iris histrio, and Iris histrioides major are on similar lines to I. reticulata, but have broader flowers and bloom earlier, but I. alata, the "Scorpion" Iris, is a real winter-blooming bulb varying in colour from lavender to purple-blue with some gold on the prettily frilled falls. Although flowering in winter it will tolerate no heat, simply requiring the glass roof to shield the fragile flowers from wintry storms.

There are still other quaint and beautiful little bulbous Irises, but for the average small greenhouse or frame these will make a very good beginning.

Ixia. For brilliance, variety of colours, and sparkling gaiety Ixias are supreme. Not only do we find vivid scarlet, cerise, carmine, golden yellow, purple, blue, and all manner of striking tones daringly combined and painted in sharply defined blotches, but even vivid green, velvety black, and the metallic lustre of burnished copper and bronze may all be included in the gorgeous range of Ixia colours. The flowers are borne on slender, wiry stems, in racemes, which vary from about 15 inches to 20 inches in height, the foliage being sharp, narrow blades somewhat similar to that of Freesias.

Pot the bulbs five or six in a 5-inch pot; October being the best month for potting. Plunge to the rim in a frame, but only put the lights on in bad weather. February is soon enough to house the plants, and after flowering treat as advised for Iris reticulata.

Lilium. The whole family of Liliums is so grand, so varied, and so important that chapters might be devoted to some kinds in every section of this work. The general principles of cultivation in pots are the same

whether they be grown with or without the aid of artificial heat, and for the comfort of those who have only a cold-house at disposal it may be remarked that the texture of petals, richness and clarity of colour, markings and the lasting power of the blooms really attain greater perfection when the plants develop slowly without any fire heat, the only advantage this latter can bestow being to bring the flowers along in advance of their natural period. There are certainly some Liliums which are better adapted than others for cold-house culture in pots, and happily the noble golden-rayed Lily of Japan (*L. auratum*) is one of these. Liliums chalcedonicum, elegans, Hansoni, Henryi, Krameri, longiflorum, rubellum, speciosum, testaceum, and umbellatum all come well within the group, and our old favourite the Madonna Lily (*L. candidum*) also makes a very successful pot plant.

It would be superfluous to write at length upon the splendours of Liliums, the wide range of their variations in character, form, and colours, and their irresistible appeal to all who are appreciative of beauty which is superb, for all this is familiar knowledge, and has been eloquently expressed times out of number. There is nevertheless the very strange fact that throughout the country a multitude of greenhouses exists which might be growing Liliums whilst thousands of more or less pretentious gardens contain not so much as one bulb of either the choicest or the commonest of Lilies. What can be the reason or combination of reasons which account for this fact ? We cannot attribute it to lack of appreciation, nor can the reason be cost of bulbs, for many more expensive plants abound in the gardens and

LILIUM REGALE

A hardy variety that may be raised from Seed

greenhouses which never possess a Lilium. It would seem that the real reason must be either that the majority of amateur gardeners entertain the idea that Liliums are beyond their cultural ability or that vast numbers have tried, failed, and fear to try again. Whichever of these may be the responsible reason should not be allowed to deprive the gardens and greenhouses of Britain of the glories of a host of the grandest bulbous plants within our reach. Those who are afraid they cannot grow Liliums may be assured that their fears are unwarranted ; those who have tried and failed may learn the cause or causes of failure, and by cautious avoidance of former errors may make further attempt successful.

The bulk of Liliums obtainable through ordinary trade channels are imported, many coming from far distant lands. They are of necessity shipped in a very dry state, packed in soft, dry material in order to prevent bruising and breaking of the fleshy scales of the bulbs when cases are overturned and heavily jarred during the many shifts they undergo. During the whole time the bulbs are thus packed the dry packing material absorbs what moisture can be extracted from the flesh of the bulbs, and after months of alienation from soil and moisture they pass into the hands of the purchaser in the form of limp, withered, famished bodies half or less than half their normal size and in a state of emaciation and exhaustion.

It is a common occurrence for bulbs in this condition to be immediately potted in soil or planted in the garden and soaked with water, and that is all too often tantamount to an act of execution, for bulbs in that

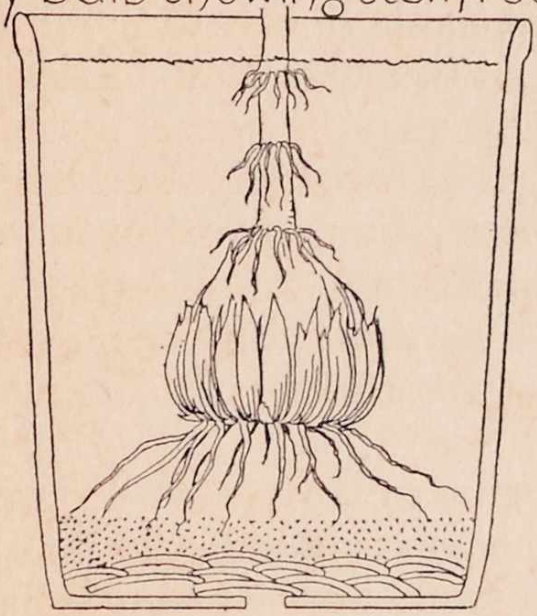
condition cannot grow and will most likely expire.

The proper method of treatment is to place the dry, limp bulbs in trays and cover with a mixture of coco-nut fibre and sand, or, if more conveniently obtainable, finely sifted leaf-mould may be substituted for the fibre. In either case the material should be slightly damp, but not really wet, the reason being that too sudden contact with much moisture will cause the bulbs to absorb it too eagerly and hurriedly, with the result that the cells will swell before the skin of the scales has regained elasticity, and cracking of the skin will mark the commencement of a series of troubles. After a few days the surface of the fibre may be lightly syringed, and from time to time may be moved just sufficiently to allow the outer scales of the Liliums to be examined. A touch with the finger and thumb will tell when the limpness is giving place to a natural crisp firmness, and when the dry hard skin of the scales is becoming softened and healthy.

It is only as this improvement progresses that the moistening of the covering material may be increased, and when, after several weeks the bulbs have swollen up to normal size and all the scales are well developed, thick, firm, and velvety to the touch, the first good soaking with water may be given. Very shortly after this the bulbs may be carefully removed from the trays for potting, or for planting in the garden as the case may be, but extreme care must be exercised that no brittle young roots that may have started into the fibre shall be broken or bruised, nor should the bulbs be taken from the trays and left to dry before being potted. Methods of potting differ somewhat from ordinary

rules, indeed accuracy demands that different kinds of Liliums shall be potted in different ways, for several of the species issue two distinct sets of roots, one set emanating from the base of the bulb and the other from the stem, in successive whorls or rings, the first of which appears immediately above the points of the bulb scales. Both sets of roots have their particular functions to perform, but a common error in potting is that the

Lily bulb showing stem roots



bulbs are placed so near the top of the pot that the stem roots are hoisted in the air, and being unable to touch the soil cannot develop or serve their legitimate purpose. Cases are not infrequent where these stem roots are actually rubbed off as being useless appendages which ought not to appear. To deprive the plant of the nourishment these stem roots should absorb from the soil is to destroy its chances of development to anything like full extent, and it may be added that not only

does the current season's growth suffer, but the vitality of the bulb is impaired for the following season. The correct method of potting for these stem-rooting Liliums is to place the bulb low down in the pot, leaving room for soil to cover the stems as far as the top ring of roots. It is not, however, advisable to fill the pots at once, the better plan being to cover the crocks with not more than 1½ inches depth of compost, spread over this ¼ inch of sharp sand ; place the bulb upon this, sprinkle some more sand between the scales of the bulb and surround it with compost only to the crown of the bulb. Apply water, and then plunge the pots to the rims in a bed of ashes.

The protection of a frame will be necessary, for it is not well that heavy rains shall saturate the soil in the pots before the bulbs are well rooted.

The compost for this potting should consist of very fibrous turf loam, leaf mould of the best quality, or peat as an alternative, sharp sand and some small charcoal. Some recommend that both peat and leaf-mould should be used, but this is scarcely necessary, for if the loam contains plenty of fibre leaf-mould is ample accompaniment, whilst if the loam is close and heavy peat will be better than leaf-mould for admixture. When growth has sufficiently advanced for the first ring of stem roots to appear another layer of compost containing rather more leaf-mould, and still plenty of sand, may be added, just deep enough to cover the roots, and these layers will follow in succession as growth advances until a level is reached which allows reasonable depth from the rim of the pot for watering.

The kinds of Lilies which require this method of

potting are auratum, Batemanii, Brownii, concolor, croceum, elegans, henryi, longiflorum, Maximowrezii, regale, rubellum, speciosum the new and lovely Sulphur-gale hybrids, tenuifolium, umbellatum, and Willmottæ. There are still a few more, but for the most part more adaptable for garden planting than for pots.

The kinds which do not make stem roots may be potted in the ordinary way, with the crown of the bulb near the surface of the soil.

The season for potting Liliums is rather difficult to accurately define. To say that early in the new year is the best time is wrong, for the majority of species will, if in the soil, make considerable root growth before Christmas, and the early roots thus formed make a vast difference to the maintenance of an adequate flow of nourishment to the bulbs. Nevertheless it would be folly to urge that all Liliums must be in the soil by October or even November, for a very large proportion of importations do not reach these shores before January, and it would be far from accurate to say that none of these do well. The best advice is, when purchasing imported bulbs order early, asking that they shall be delivered as soon as supplies are available; place in the fibre trays immediately upon receipt, and when potted let the plants come along as steadily as possible in a frame, making no effort whatever to hasten flowering. Wherever home-grown bulbs can be handled get them potted in autumn. If severe frost sets in during winter it is a good plan to fill the frame from the level of the pots right to the lights with loose hay, but this should be removed when the frost breaks

up. Liliums, almost without exception, like their roots to have a cool moist bed, but, with only a limited number of exceptions, they like their stems, foliage and flowers to bask in the sunshine ; not, of course, to the extent of sweltering under clear glass in the noon-day heat of June and July. The shading of pots can frequently be arranged by standing the Liliums between other plants of medium height but spreading foliage, whilst the flower stems rise above to full daylight.

Free ventilation is essential from start to finish of the growing season, and it is prudent, during warm weather, until the flowers begin to open, to syringe the foliage in the afternoon or early evening, not with freshly drawn tap water but from a tank where the water has been exposed to sun and air for several days.

Liquid manure, preferably from cows' manure, and quite weak, may be given from the time the flower buds just begin to show themselves, until the first flower opens. So long as the blossoms are in good form water must be unstinted, but when the flowers begin to fade the reduction of water may begin, gradually and progressively, until the complete withering of the stems just coincides with arrival at the lowest point of watering, which will mean that water is only given often enough to avoid complete drying out of the soil. Do not mistake this to mean that only driblets of water should latterly be given, for thus only the top soil will be moistened whilst the bottom of the pot would remain bone dry. That will not do at all, for the basal roots would thus all be killed, and the aim should be to retain life in as many as possible of these, for with the help

of a few persistent roots the strength and vigour of the bulb and of the succeeding year's growth and flowers will be greatly enhanced. One sometimes sees a Lilium auratum, for instance, with several strong stems carrying two or three scores of massive and glorious blooms. That is evidence of skilful culture which contrives to give the bulbs an annual rest without ever completely losing all the roots.

At repotting time the soil should be carefully removed from the sides of the bulb, the crocks taken from the base ; the soil which has roots in it should so far as possible be left intact, and if the bulb is particularly strong and healthy a larger pot should be used. This work may be done in autumn, so that the bulbs again make an early start to develop a strong root system.

Perfect drainage is most essential, the crocks being carefully placed and covered with moss, semi-rotten leaves or fibre from peat. For new bulbs of average size 6-inch pots are of suitable size, but large bulbs of L. auratum and other very strong growers may require 7-inch or 8-inch pots. Sometimes large massive specimens are required, and for this purpose several bulbs are potted in one large pot or tub. This may be quite satisfactory, but requires care, especially when top dressing the stem-rooting kinds. Finer flowers are usually obtainable when each bulb grows in a separate pot.

Narcissus (or Daffodil). The whole extensive family of Daffodils, of which the correct botanical name is Narcissus, offers an abundance of excellent material for pot culture, and once again cold-house treatment is far more successful than forcing, except when the latter

task is undertaken by experienced and skilful hands.

The small amateur whose sole aim is to provide useful spring flowers either to use in the home as pot plants or in the greenhouse, or for cutting, and who must keep within limits of strict economy, may quite safely rely upon the popular favourites among cheap Dutch stock, such as Golden Spur, Empress, Emperor and Princeps among the trumpet flowers, and Poeticus ornatus, White Lady, Barri conspicuua, etc., among the small crowned tribe, but practically all sections, types and varieties will grow well in pots in the cold-house, and the exhibitor may take his choice from the ever-growing list of high-class named varieties and unique hybrids, the very cream of which are, happily, of British origin. A thousand pounds may very quickly be spent upon a nice little collection of the newer gems among these highly bred Daffodils, and with the very choicest the grower may still rest content they are safer in the cold-house than in artificial heat. For the Alpine house or frame there is quite another class, the miniature Daffodils, Hoop-Petticoat Narcissus, Jonquils and another race of hybrids between these tiny but sweetly pretty little flowers.

Most of the latter are best grown in pans, and if well planted in the first place they may be kept two or three years in the same pans, shaking out and sorting the bulbs only when they begin to show signs of overcrowding. The great thing is to keep the foliage growing and green as long as possible after flowering, then thoroughly ripen the bulbs, rest for a reasonable time ; top dress with a well-mixed fresh compost, and restart into growth before September is out.

For the larger tribe compost, potting and treatment is simple work; 5-inch pots take five average bulbs, Emperor, being extra large, requiring larger pots. Plunge and cover with a good depth of ashes until well rooted and starting to grow, then transfer to a frame; water freely, and place in the greenhouse when buds are well advanced.

Having enjoyed the floral display, the best plan is to plant out in a prepared bed without disturbing the root ball; water freely, and allow the foliage to ripen in a normal manner. The only difference between cold-house culture and forcing is that heat is applied during the last few weeks of bud development, but this must not commence until the stems are several inches high, then only very gradually, a high temperature only being permissible when the buds begin to show colour. The usual custom when forcing for cut flowers is to plant in boxes instead of pots. Four inches depth is suitable, and 2 inches space between bulbs sufficient.

Puschkinia scilloides. Among small bulbs for culture in the Alpine house or in a frame this is a real gem, and associates well with the Erythroniums, the Muscaris, Scillas and other early flowering bulbs of small proportions. The flowers of Puschkinia are blue and white, arranged in a short close-set spike on a stalk only a few inches long. April is its normal flowering month, but under glass it will open considerably earlier.

There is no difficulty in cultivating this dainty little flower, which simply requires potting or putting into small pans of what may be termed general bulb compost, in September or early October, starting slowly in a

frame, and removing to the greenhouse when flowers are showing.

Sparaxis. The common name of Harlequin flower applied to these African bulbs is not inappropriate, for their gay colours are arranged in vivid blotches and splashes, producing quite a dazzling effect. They are suitable companions for the Ixias, and should receive similar treatment. Very sandy soil suits Sparaxis best, and at no time should they be heavily saturated with water. They will flower without forcing in May, and after flowering should be gradually dried off and thoroughly ripened by exposure to sun, but covered to prevent their being soaked by thunderstorms. Sparaxis pulcherrima, otherwise named Dierama pulcherrima, is a flower of quite different character from the Harlequin Flower.

This is a bulb for early spring potting and autumn flowering. Sparaxis pulcherrima grows 3 or 4 feet high, the long slender flower spikes arching over in a very graceful manner, and the bell-shaped, drooping flowers of a satiny rosy purple shade issue from semi-transparent scaly sheaths or bracts which glisten with a peculiar metallic lustre as though dusted with a mixture of glittering powders. Of recent years a few specialists have been working on the improvement of this plant and have raised varieties of deeper and richer shades of red and purple, and also pale pinks and whites. There is every probability that ere long quite a colour range will be secured, and the extreme elegance of the arching racemes will ensure a widespread welcome for any fine forms and distinct colours that may be produced.

Tigridia. Gay colours and weird markings are the

outstanding features of the "Tiger Flower." Three broad, flat, round-edged petals are united to a shallow cup, which is spotted, freckled, marbled or mottled with brilliant colours of dense, velvety appearance. In some the expanded petals are white, but there are also lilac, yellow, red and pink shades, the cups in all cases being painted in far more brilliant hues. They are summer flowering bulbs, and in warm sunny gardens may be flowered in the open, but the roots will not endure frost, and the unusual character of their bright flowers fully justifies their being afforded greenhouse culture. As soon as the bulbs can be obtained in spring they should be potted and plunged in a frame. Give no water until growth commences, and throughout they require a cautious hand with the waterpot. After flowering ripen off, and store the bulbs for winter in a frost-proof place.

Tulips. The whole extensive family of Tulips, like the Daffodils, will admirably adapt itself to pot culture in unheated greenhouses or frames.

The ordinary bedding Tulips, especially of the Duc Van Thol class, will provide pots of gay flowers for brightening the greenhouse or the rooms of the house during early spring, larger, and somewhat later varieties following close upon their heels and bridging the gap between the earliest and the Darwins, the Cottage, and other May-flowering groups, which are extremely popular by reason of their large size, fine long stalks, and rich, striking colours.

In addition to all these, however, there are the choice old English or Florists' Tulips which were in former years the special pets of Tulip fanciers, who grew and

exhibited them with untiring care and unbounded pride, and yet again there are many beautiful and interesting species which are certainly worthy of pot culture under the best available conditions, for their varying forms and colours are quite above ordinary character.

Tulips are not difficult to grow, but two or three common errors should be avoided. Unnecessary delay in potting the bulbs is responsible for much loss of quality in Tulip blooms. Mixing manure and fertilizer with potting compost is not clever cultivation, unless the compost is stacked after the addition of manure, a year being allowed for mellowing down before use. Impatience to hurry growth by bringing the pots too soon from the plunge-bed, and sometimes into too warm a temperature often causes blindness or misshapen blossoms, and erratic watering is likewise responsible for many defective flowers. Pot bulbs as early as possible ; plunge in ashes and cover with a good depth of fibre in a position where a cool, steady atmosphere will prevail. When growth of tops indicates that removal from the fibre is advisable transfer to a frame, water sparingly, and do nothing to hasten growth. Feeding should commence only when buds are well developed, and from that time the soil should never be allowed to become really dry. Free ventilation, good light, but not much sun should be the conditions under which Tulips are grown, and when the blooms are well opened they should be placed out of reach of direct sun-rays. Tulip bulbs are best planted out after flowering, and if the ground is dry continue to water until foliage loses colour.

Some of the earlies of the bedding or Dutch Tulips are Brilliant Star, scarlet, with yellow centre; Chrysolora, clear yellow; Golden Queen; Keizerskroon, scarlet with yellow edge; Proserpine, carmine rose; and Pottebakker, white. Followers of above may be Cramoise Brilliant, rich scarlet; Drana, pure white; Koh-i-Noor, rich maroon; Prince of Austria, terra-cotta, shaded orange; Rose Grisdelin, rose pink with glistening sheen; White Swan, a beautiful pure white. Among the many delightful species the following may very well be made the beginning of a collection, being all beautiful and interesting but reasonable in price and of easy culture: Clusiana, Greigii, Hageri, Kaufmanniana, Persica, Primulina, Sylvestris major, and Turkestanica.

CHAPTER XII

BULB CULTURE IN BOWLS OF FIBRE

CONTRARY to the general rule of plant-life, bulbs may be grown in bowls and vessels of glazed, non-porous ware without drainage holes for escape of superfluous moisture. This has proved of great convenience to plant-lovers who live in flats and town houses, enabling them to enjoy the pleasure of growing flowers in rooms without the annoyance of marking and staining polished furniture, table-cloths, etc. A properly prepared fibre compost is essential, ordinary potting soil being quite unsuitable for the purpose.

Bulb culture in fibre has become so much a vogue that various potteries make bowls and pots of ornamental design and artistic colours expressly for the purpose. One may therefore give full play to personal tastes in the selection of receptacles as well as flowers, but it is well to bear in mind that a bowl which is of broader surface than depth is better for the bulbs than a deep, comparatively narrow topped vase. The necessity for careful choice of colours that will not clash with the tints of the flowers will be too obvious to require emphasis, but it is rather strange that manufacturers produce a large proportion of bulb bowls in a shade of pink which never seems to tone with either flowers or

surroundings. Black, white, primrose yellow, lavender, apple green, are safer colours.

Of the immense number of bowls which are annually filled with bulbs it is very doubtful whether the half are even moderately successful, and this notwithstanding the simplicity of the few rules which make for complete success.

Quite a wide range of bulbs may be grown in this manner, but the inexperienced will be well advised to commence with either Hyacinths, Tulips, or Narcissi, and of the last named the Tazetta, or cluster-flowered Narcissi, are the easiest ; the doubles and the Poeticus varieties requiring more skilful handling. Only firm, well-developed bulbs are capable of yielding good results in bowls, and it is imperative that they shall be started quite early in autumn.

Bulb fibre consists of clean, fresh coco-nut fibre refuse, or of sifted peat, finely broken oyster-shell, and small charcoal. Some brands contain a small percentage of chemical fertilizer. Bulb merchants stock and retail properly prepared compost so reasonably that there is little or no advantage in procuring the ingredients to mix at home. It is well, however, in addition to the fibre, to procure a small quantity of charcoal in pieces approximately the size of lump sugar, a few of which should be placed in the bottom of each bowl before filling. The purpose of the charcoal is to prevent the compost becoming soured by stagnant moisture. Fibre is generally received in a dust-dry condition, and the first task should be to thoroughly soak it with water, and turn the mass into a conical heap to drain sufficiently to assume a nice crumbly state. Half fill the

bowl and press the bulbs well in, almost close enough to touch each other. Add more fibre until about ½ inch of space is left for water. Soak well, and an hour afterwards very gently tilt the bowl to enable any surplus water to escape. If outdoor accommodation is available, it is desirable to plunge the bowls, allowing a covering of coco-nut fibre 3 or 4 inches deep. Here they may remain undisturbed for at any rate the first month, at the end of which time it may be prudent to lift out and examine the bowls to ascertain that all is well, that no mice, beetles or pests of any kind have taken up their abode in the plunge-bed. After an hour or two in the air the bowls should be replunged, and left another fortnight, and thenceforward weekly examination will be necessary, because some bulbs make growth sooner than others, and it should be a rule to remove the bowls from the plunge-bed when growth has well started, and not to leave all plunged for a definite period. Early Roman Hyacinths may be ready for removal in six or seven weeks, whilst some Narcissi and Tulips will be better under their covering for ten or even twelve weeks.

Failing outdoor accommodation—and it is those who have no gardens to whom fibre culture should specially appeal—the best place for the bowls will be a shelf in a darkened store-room, where the temperature is cool and not subject to violent fluctuations. A close, unventilated cupboard is not good, neither should the bulbs be placed near hot-water tanks or any heating apparatus.

In due course green shoots will appear, and when these are nearly an inch high the bowls may be removed

from darkness, but must still be given cool conditions. Soak the fibre, and henceforth never allow it to become dry. Always after watering repeat the process of tilting the bowl to get rid of surplus moisture.

Three distinct causes of failure with bulbs in bowls are singly or in unison capable of utterly spoiling the best of them. First of the three is to let the roots become dry ; second, to allow the fibre to become soured by stagnant moisture ; and third, but of no less gravity, endeavouring to hasten flowering by keeping the plants in a warm, fire-heated room. Simpler cultural instructions it would surely be difficult to devise, but it is strange indeed how frequently all three of the mistakes indicated are made. First watering is forgotten ; then to make amends the bowl is flooded until the fibre is converted into a puddle, then when the foliage begins to look sickly the bowls are transferred to a position near the kitchen range in order that the warmth of the fire may help them along. That move provides the final blow and makes failure doubly sure.

When bulbs have been grown in fibre they are best planted in the garden, for the vitality will be somewhat impaired and they cannot successfully bloom a second time under similar conditions.

In addition to the three principal kinds already named it is possible, with care, and the use of strong sound bulbs, to flower Crocuses, Irises, Lachenalias, Muscari, Snowdrops and various other bulbs in fibre, the smaller subjects requiring only quite small receptacles and about 2 inches depth of fibre. The range of subjects may be extended season by season as experience is increased.

One tolerates bulbs in fibre not because it is to be considered clever to induce plants to bloom out of their natural rooting medium but because bowl culture renders many flowers admissible to rooms where pot plants in soil would be inconvenient, and moreover many invalids, cripples, and children can indulge in this method of culture of a few bulbs who could not as conveniently handle pots, soil, etc., nor find suitable accommodation for potted bulbs during the earlier stages of growth.

The fibre treatment is, moreover, infinitely better than the older freak-method of growing Hyacinths and the Polyanthus Narcissus in water, a custom which we have happily almost outgrown. There are still a few books, it is true, which describe Hyacinths perched on the top of blue, pink or green bottles of water as being objects of interest and beauty, capable of educating the young in Nature's wonderful methods of producing roots and foliage and flowers. As well might one urge that watching a goldfish in a pickle jar will teach the observer something about the life and habits of fish. Let us not be content with freak-gardening; but even if the only available accommodation be a shelf at the scullery window let us at least endeavour to provide a few bulbs with good potting soil in which to root, or as the only alternative adopt the fibre method of culture.

CHAPTER XIII

BULBS IN WINDOW BOXES

WINDOW-BOX gardening is often conducted in a manner that results in one month's bright display of newly purchased plants, two months of gradual decline of those plants toward sickly shabbiness, and nine months of painted woodwork, glazed tiles or virgin cork.

The question is often asked: "Are window-boxes worth while?" Perhaps for those who have country gardens of sufficient scope to satisfy their craving for flowers, and to occupy their leisure one may say "No"; but when a lover of flowers dwells in a town, and is penned up, so to speak, amid the drab monotony of bare-fronted villas or flats, window-box gardening is not only worth while but deserves all the encouragement it can receive, and if made the subject of careful effort and close study is capable of producing real enjoyment which the owner of the window-boxes will share with all who behold his handiwork. Bulbs and tubers may and should play a large and important part in the programme of window-box gardening, especially for the spring display, for at no time are bright flowers more welcome, and nowhere are they so greatly needed as in the streets of the city and the industrial town where

the only gardens possible are window-boxes. The first essential is that the boxes shall be as broad as the position they are to occupy will permit, for very narrow boxes involve crowding of the plants and greater tendency to souring of the soil through lack of proper aeration.

Let drainage holes in the bottom be of good size, and numerous. The rounded side of an oyster shell is the best thing to place over each drainage hole (of course, convex side uppermost), filling in the spaces between the shells with broken lime rubble and pieces of fresh charcoal. Cover the layer of drainage with a thin layer of hop manure, and fill the boxes with a good compost such as is used for potting, but not finely sifted. Insert the bulbs as though potting, just covering their crowns with soil, but taking care to leave reasonable space for water. When the bulbs have been once watered in they should be left without further watering until signs of growth appear ; except in cases where exposure to wind thoroughly dries the soil, when, naturally, it will be necessary to re-moisten. It will be an advantage to mulch the tops of the boxes with coconut fibre at the start, the fibre being carefully removed as soon as the tips of the young growths peep through. The fibre need not be more than 2 inches deep in the centre ; sloping to the edges of the boxes.

From the time growth is fairly started water supplies must be gradually increased. Do not, however, keep the soil in a perpetually muddy condition. Allow it to become tolerably dry before re-watering, and then soak thoroughly. The roots must, of course, never be so dry that foliage droops. When flower buds

appear, a light sprinkling of a good fertilizer will be of benefit, and this is cleaner and less objectionable than liquid manure, especially for boxes at the windows of dwellings.

One drawback in regard to bulbs for window-boxes is that the proper planting time is early autumn, and usually the Ivy-leaved Pelargoniums, the Tropæolums, Petunias, etc., are at their best—if they have been properly treated—just when the suggestion is made that the boxes should be cleared for bulbs. Some enthusiasts surmount the difficulty by running two sets of boxes, but where that cannot be done there is a good deal to say in favour of potting the bulbs, starting them in a cellar or outhouse, and transferring to the boxes when at length the autumn show of bloom is cut short by frost. It must at any rate be reiterated that the fullness of success is only possible when the bulbs are in the soil by middle autumn.

Likewise in spring, after the bulbs have finished flowering, the necessity generally arises for an immediate clearance that summer plants may be introduced. That, of course, means entire sacrifice of the bulbs, or transferring them to the open ground, where they may complete growth and ripen off. Even in the latter case it will be inadvisable to use the same bulbs in boxes for the second year in succession, so perhaps it is unnecessary to deal with after-treatment beyond saying that it should correspond with that advised for bulbs grown in pots and pans.

The kinds of bulbs which are suitable for window-boxes are many. Hyacinths, of course, are quite appropriate, and the early Dutch Tulips are also very service-

able, more so for this purpose than the Darwins and Cottage Tulips, which are prone to draw up too tall when grown in close proximity to a window, and especially when the position is under projecting eaves.

Of Daffodils the best are the bold-flowered Trumpet varieties, the Star Narcissi being somewhat thin and ineffective when seen against a glass background, and especially if the window is at a high level. The Jonquils, however, are effective because their golden yellow is so bright, and their stems do not attain the height of the Poeticus and Barrii varieties. Other very suitable bulbs and tubers are Scillas, Ornithogalums, Chionodoxas, Muscari, Erythroniums and the Crocuses and Snowdrops.

For large boxes it is quite reasonable to plant both Spanish and English Irises, and also early-flowering Gladioli, but they must be allowed full time, and that means the boxes will not be available for other subjects before midsummer. Neither Irises nor Gladioli are suitable for small narrow boxes for the few bulbs they will accommodate will appear thin and lanky. Nothing so tall should be used where the situation is exposed to much wind, and even in favourable situations it is usually necessary to provide neat, inconspicuous but strong stakes, wire being useful, and if painted green will be neat.

For a summer display Tuberous Begonias make excellent window-box plants, the two requisite conditions being shelter from wind, and just sufficient shade to preserve the plants from scorching in summer's strongest sunshine. A good deal of benefit will accrue from an inch-thick layer of hop manure over the drainage, and

an inch mulch of coco-nut fibre over the surface. The former will soak up and hold plenty of moisture for the roots and the fibre mulch will to a considerable extent check evaporation and keep the soil cool. It is an advantage if the tubers of Begonias can be started in pots under glass about February, and are then planted in the boxes about the end of May, or as soon after as weather conditions permit. The large-flowered singles generally make a better colour display in boxes than the doubles, but if the latter are preferred strong two-year-old tubers will produce quite good results. Begonias must be lifted at the first appearance of frost, and if carefully stored in winter and re-started in spring the same tubers will be serviceable in the window-boxes for three or four years.

One occasionally sees a window-box planted with a miscellaneous collection of small rock-plants, with fragments of porous stone wedged between them. It is possible to grow quite choice little subjects in this manner, and the Crocus species, the miniature Daffodils, hardy Cyclamen, the lovely little Iris reticulata, and the choicer kinds of Snowdrops may be drawn into service. It will generally be found desirable that other small plants shall be intermingled with such bulbs to extend the season of attractiveness, for a miniature Alpine garden requires to be established on more or less permanent lines rather than for one brief season.

Arenarias, Acænas, etc., may carpet the surface over the bulbs, and small Sempervivums, encrusted Saxifrages, Lewisias, and small Primulas will associate well with the small bulbs.

CHAPTER XIV

A CHAPTER OF MISCELLANIES

Pests and Diseases of Bulbs

IT would be strange, indeed, if the fleshy succulent scales of bulbs and the soft, sweet easily gnawed substance of tubers and corms provided no special attraction for the multitude of insect pests which commonly infest garden soils, and torment the gardener.

Bulbs and tubers are, as a matter of fact, particularly susceptible to attacks of such ground pests as wireworm, leather-jacket grubs, certain weevils, slugs, woodlice, etc., but good cultivation, frequent hoeing, dressing with lime, and exposure of rough surface on every possible occasion will tend to discourage their development, and an occasional dressing of a good soil fumigant will destroy many and drive others away.

There is no lack of proprietary compounds for this purpose, Apterite, Vaporite, Kilogrub, Gasonite, etc., being effective and easy of application. The old-fashioned method of trapping with slices of beet root, carrot, etc., may also be pressed into service in small gardens, for it is not desirable to overcharge soil with constantly repeated doses of gas-producing chemicals. Seldom, however, will the ordinary pests such as those

named long maintain vigorous opposition to persevering efforts to annihilate them.

More serious are attacks of fungoid diseases, for these, when once established, not only destroy whatever bulbs may be attacked, but contaminate the soil and make it an unhealthy home for any fresh bulbs that may be planted within a few years. The best advice that can be given is, be most careful to plant only sound, healthy bulbs. To this end purchase only from really well-known sources of supply, avoiding ultra-cheap bargain lots, and uncertain goods of foreign dumpers. If a bulb has lost its skin, and its flesh is discoloured with sore-like patches and blisters, be wary. It may be only a superficial bruise, but even that is undesirable; and on the other hand, it may be a virulent disease in its quiescent state, and if the bulb feels soft, instead of hard and firm, and shows the least sign of oozing moisture at its base discard it. When lifting one's own bulbs watch for any which may show signs of decay, and segregate them at the outset together with old withering bulbs which should on no account be left in the ground to rot. Old stems and foliage should not be buried, but picked up and burned. By such methods of careful cleanliness trouble may be avoided, and that is far better than having to resort to cures.

It is very doubtful whether written descriptions of the fungoid and parasitical diseases that may affect bulbs, and formulæ for their treatment, will prove of really practical worth. The apparent differences between one disease and another are frequently slight, but the correct antidotes may differ very widely.

For instance, formalin, in a very weak solution (1 in

300) has been successfully used against the black scab which attacks some bulbous Irises, but a disease of similar outward appearance on various other bulbs yields more readily to a fairly strong solution of Permanganate of Potash.

Ordinary moulds, of mildewy character, will usually succumb to sulphide of potassium (1 oz. to 20 pints of hot water), and Lilium bulbs which show orange brown blotches on their scales may be cured by immersion in a 1 per cent. solution of salicylic acid.

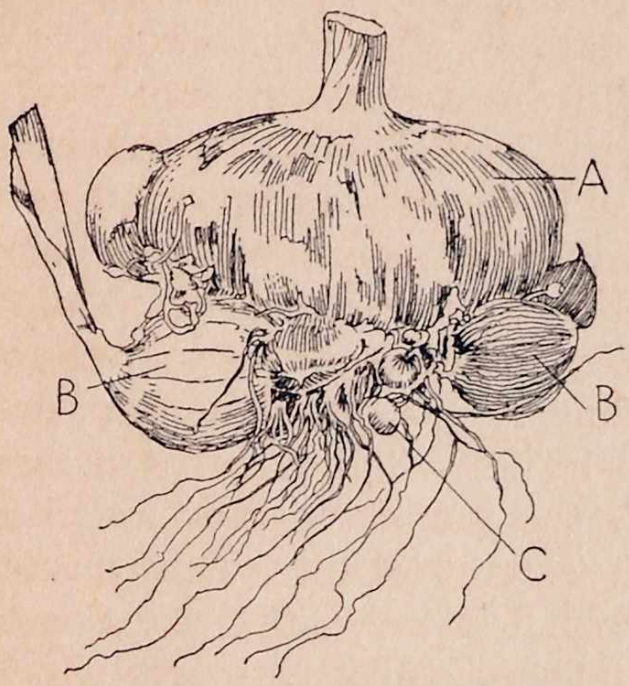
The much dreaded eelworm disease of daffodils has been conquered by hot-water treatment, but to carry this out properly a special apparatus is necessary or the bulbs may suffer by being scalded or partially cooked. Dusting bulbs with ordinary flour of sulphur is a good deterrent to some fungoid diseases. All together, without being able to go minutely into detail, showing coloured illustrations of all diseases in various stages of development the soundest advice is, burn all badly diseased bulbs, and treat any which appear to have some slight superficial discoloration to a spray of either permanganate of potash of a strength which gives a clear bright pink colour, or of sulphide of potassium as already described. Let the bulbs dry before planting, and when placed in position in the ground surround each with sand in which a good peppering of flour of sulphur has been mixed.

The Propagation of Bulbs.

To undertake propagation of bulbs in a systematic manner is a task outside the scope of what may reasonably be termed " Home Gardening," and to provide full

instructions upon the methods practised by bulb-farmers is unnecessary to the purpose of this book.

Almost all bulbs and corms throw what are termed off-sets, which are first attached to the basal ring of the bulb, drawing nourishment from the parent bulb, but later developing an independent root system. Off-sets which have advanced to the point of producing their own roots may be separated from the parent bulb,



GLADIOLUS CORM AND PROGENY

A. Main new corm B.B. Strong young corms C. Spawn

planted separately in a nursery bed, and grown on until they attain flowering size. There is interest in thus producing one's own stock of a favourite Narcissus, Tulip, or Lily, but the process is slow, and is certainly not to be recommended on the score of economy. Those who make a small collection of uncommon bulbs for rock gardens, etc., may in course of time increase their stock in this manner, whilst growers of choice

Gladioli will do well to take care of the best of the young corms that form in the natural course of cultivation, for in a year or two the young corms will attain flowering size. The ordinary Dutch bulbs of Hyacinths, Tulips and Daffodils develop so slowly that their off-sets are of little value to the average amateur.

Bulbous plants can be produced from seeds, but here again the process of development is very slow, and with but few exceptions the results are of insufficient value to be worth the labour room, and four or five years of waiting. The plant-breeder, whose hobby or calling is to raise new varieties of the flowers which are his speciality, carefully hybridizes or cross-fertilizes certain selected varieties which he has reason to believe or hope may produce something good and valuable. The seed is saved, carefully sown, the seedlings cherished and watched over until the time comes for separating, planting out, and nursing along for a few years, and when eventually they bloom the flowers are submitted to close scrutiny and only the very cream of a batch will be retained for further cultivation, a large proportion being discarded and destroyed, as being unworthy of further trouble.

Quite a small proportion of hardy bulbs and tubers are really worth raising from seed. Anemones, such as the St. Brigid type, are sometimes quite successfully raised by amateurs, and the hardy Cyclamen are well worth raising from seed. Many amateur Gladiolus fanciers raise seedlings, and it is a very interesting hobby, careful culture, starting with sowing seed under glass either as soon as ripe or in early spring producing good flowering corms the second year; indeed some raisers manage to flower a proportion of their seedlings

during the autumn following the sowing of the seed.

Lilium regale and the new Sulphur-Gale hybrids attain flowering size very much quicker than most Liliums, the third year from seed generally bringing the majority of seedlings into bloom, a few specially well-grown seedlings even bearing flowers when two years old. The seeds should be sown either in a pan or a frame-bed of rich light compost. Allow the young seedlings to grow the whole of the first season without disturbance, separating and transplanting in a freshly made frame-bed just as new growth starts. Do not allow the young plants to suffer drought so long as their foliage remains green, but take particular care that their root run is thoroughly well drained.

Seeds of Anemones and of hardy Cyclamen should be sown in pans as soon as ripe, and should be kept clear of frost during their first winter, but not in a high temperature.

Raising from seed is quite a serviceable method of producing stock of many greenhouse subjects such as Begonias, Gloxinias, Achimenes, Gesneras, and Freesias, but instructions will be found in the chapters dealing with these plants.

Some "Common" or English Names of Bulbous Plants

WITH THE BOTANICAL NAMES OF THE PLANTS CONCERNED

AMAZON LILY—*Eucharis grandiflora or Amazonica.*

ANGEL'S TEARS DAFFODIL—*Narcissus triandrus albus.*

AUTUMN CROCUS—*Colchicum.*

BELLA DONNA LILY—*Amaryllis belladonna.*

BERMUDA LILY—*Lilium Harrisii.*

BLUE BELL—*Scilla festalis.*

BUTTERFLY TULIP—*Calochortus.*
CALIFORNIAN HYACINTH—*Brodiæa.*
CAMPERNELLE—*Narcissus odorus campernelli.*
CAPE COWSLIP—*Lachenalia.*
CAPE HYACINTH—*Galtonia candicans.*
CHILIAN CROCUS—*Tecophylæa cyanocrocus.*
CODLINS AND CREAM—*Narcissus incomparabilis flore pleno.*
CORN FLAG—*Gladiolus.*
CROWN IMPERIAL—*Fritillaria Imperialis.*
DAFFODIL—*Narcissus.*
DOG'S TOOTH VIOLET—*Erythronium.*
EGGS AND BACON—*Narcissus incomparabilis* ("*Orange Phœnix*").
ENGLISH IRIS—*Iris xiphioides.*
GLORY LILY—*Gloriosa.*
GLORY OF THE SNOW—*Chionodoxa.*
GOLDEN-RAYED LILY OF JAPAN—*Lilium auratum.*
GOLDEN GARLIC—*Allium moly.*
GRAPE HYACINTH—*Muscari.*
GUERNSEY LILY—*Nerine.*
HOOP-PETTICOAT DAFFODIL—*Narcissus bulbocodium.*
JONQUIL—*Narcissus Jonquilla.*
LEBANON SQUILL—*Puschkinia libanotica.*
LENT LILY—*Narcissus* (*Trumpet var.*).
MADONNA LILY—*Lilium candidum.*
MARIPOSA LILY—*Calochortus.*
MARTAGON LILY—*Lilium martagon.*
MEADOW SAFFRON—*Colchicum.*
NANKEEN LILY—*Lilium testaceum excelsum.*
ORANGE LILY—*Lilium croceum.*
PANTHER LILY—*Lilium pardalinum.*
PERSIAN LILY—*Fritillaria persica.*
PHEASANT EYE—*Narcissus poeticus.*
POET'S NARCISSUS—*Narcissus poeticus.*
POLYANTHUS NARCISSUS—*Narcissus tazetta.*
QUAMASH—*Camassia esculenta.*
SCARBOROUGH LILY—*Vallota purpurea.*
SCARLET TURK'S CAP—*Lilium chalcedonicum.*
SCORPION IRIS—*Iris alata.*
SIBERIAN SQUILL—*Scilla sibirica.*
SNOWDROP—*Galanthus.*
SNOWFLAKE—*Leucojum.*
SOWBREAD—*Cyclamen.*
SPANISH IRIS—*Iris xiphion.*
SQUILL—*Scilla.*
STARCH HYACINTH—*Muscari.*
STAR OF BETHLEHEM—*Ornithogalum.*
SWORD LILY—*Gladiolus.*
TIGER FLOWER—*Tigridia.*
TIGER LILY—*Lilium tigrinum.*
TRUMPET LILY—*Lilium longiflorum.*
WINTER ACONITE—*Eranthis hyemalis.*
ZEPHIR FLOWER—*Zephyranthes.*

INDEX

Printed by Butler & Tanner Ltd., Frome and London