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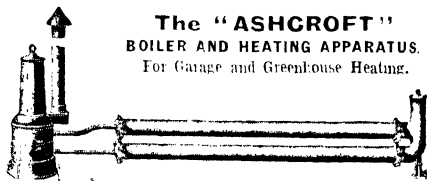
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# ALL ABOUT GARDENING







SWEET PEAS.

*Frontispiece* ]

# ALL ABOUT GARDENING

BY

HARRY ROBERTS

AUTHOR OF

THE BOOK OF OLD-FASHIONED FLOWERS, THE BEGINNER'S BOOK OF  
GARDENING, ETC., AND EDITOR OF "HANDBOOKS OF  
PRACTICAL GARDENING."

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## PREFACE.

It is claimed for this volume that it is a complete and comprehensive work on the Theory and Practice of Gardening in all its branches, containing full and detailed information on every subject that is directly or indirectly connected with the art, leading up from the preparation of any description of ground to render it suitable for horticultural and floricultural purposes to the mode of culture that must be followed with regard to every kind of flower, fruit, vegetable, herb, etc., that is or can be grown in it.

Whether taken from a professional or a popular point of view—whether followed as a calling from which daily bread must be won, or as a recreative employment that affords amusement and relief from everyday work—there is nothing that is fraught with greater interest, or yields such true and tranquil enjoyment, as gardening, in each and all its branches and aspects.

Almost all who like gardening and the pleasures it brings, and who wish to be successful gardeners, naturally use books for direction and instruction in the art, and, indeed, for intuition into some, if not all, of the mysteries of the craft; for although the best knowledge of gardening is to be obtained by watching

and reading Nature, yet it is not every one who can readily understand Nature's teaching, and so books on the subject, written by those who are well skilled in it, will always serve as intelligible and welcome interpreters.

It is, indeed, with such a view as this that this book has been compiled. Much new and important matter not to be found in ordinary works on gardening has been introduced whenever there was an opportunity of doing so with good effect, and a most useful feature of the book is the fine series of plates, many of them depicting actual gardening operations, methods of planting, etc.

The book will be found useful in all climes, but readers south of the Equator should remember the difference in the seasons when using the book. For example, January in England is somewhat equivalent, as regards gardening operations, to July in Australia.

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DAHLIAS.

## CHAPTER I.

### HOW TO PLAN AND MAKE A GARDEN.

**General Principles.**—Gardening, broadly speaking, is one of the oldest of the civilised arts. Its origin is lost in the mists of antiquity. So soon as man awoke to reason and left the woods and caves, he built himself a hut and tilled the soil about it and made a garden. That earliest of practical gardens would seem to have little enough in common with the gardens of to-day, since it was cultivated for the simplest of purposes on the simplest of simple plans.

The passing of the supreme and urgent necessity which once forced all men to till the soil, has broken, to a great extent, the common tradition into which men were born, the tradition which informed them, as a matter of course, of the ways and means by which the earth could be made to bring forth its fruits for their sustenance, and upon whose understanding their life depended. Few of us are born in that tradition to-day. The crops which provide us with bread, our fruits and vegetables, are grown for us wholesale, and often enough our first sight of them is in the shop windows where they are exposed for sale.

Even town life, which has deprived us of easy and regular opportunities to garden, has succeeded neither in killing the impulse to do so nor in thwarting us from gratifying that impulse in spite of the most adverse conditions. The old gods of the arcadian past are still revered in the most unlikely places. Evidence of their worship may be found in the meanest of congested tenements, where the window-box or the tiny back garden cherishes green life; and the innumerable and beautiful examples of town and suburban gardens, which every year are being made, bear eloquent witness to the fact that if the pastoral age is gone, its spirit is still with us.

Gardens have ever held a high place in man's esteem and played an important part in his history. Romance had its birth in a garden, that earliest of gardens, the Paradise of Eden, whose beauties are so wonderfully related by Milton; and

every age has its examples to add to the record so sublimely begun. We read of the hanging gardens of Babylon, of the imperial retreats built by the great Roman emperors whose taste in such matters was magnificent; of the important part played by gardens in the monastic civilisation of the middle ages. Indeed, the praise of gardens has been sung by the poets of all time, and the choice of Boccaccio, who set the scene of his "Decameron" in a garden remote from the stresses and vulgarities of the town, has been ever a favourite with all writers of romance.

The man who sets out to make a garden for himself is on the way to experience, at their fullest, many joys: that of creation, of exciting discovery, and of self-expression which, we are assured, is the true end of life. If he has unlimited scope from the beginning; if he takes over from nature, so to speak, the cultivation of his particular patch and has, moreover, a free hand in the selection of that patch, he is as much to be envied as the adventurer who sets out upon a voyage of discovery. Many of the elements which go to the make-up of such an enterprise have their parallel in the making of a garden. Once it is established, his garden will afford him an absorbing interest which will last him through life and increase proportionately with the devotion he gives it.

To many people who approach the subject from an unprejudiced point of view, a garden signifies that spare patch of the building site left over from the house. How well one knows that garden! It is usually a narrow, rectangular strip divided into two unequal oblongs; one, a grass plot whose bleakness is occasionally mitigated by lozenge-shaped scars for flowers, the other a raw and even less attractive patch where the native soil, cherishing brickbats and builder's *débris*, shows naked and unashamed, awaiting the pick and the spade which precede the immigration of vegetables. Surrounding it are those inevitable trimmings, thinly veneered with gravel or cinders, known as paths. This is the average builder's idea of a garden, and although it has no more in common with Nature's than a piece of ugly linoleum has, many people are content to regard it as not only a possible but the proper conception. At its best it is a discouraging proposition which can only be solved successfully by enterprise, enthusiasm, and a deliberate plan. With the help of these three qualities such a garden can indeed be made to yield as much personal pleasure and profit as one whose construction has engaged the talents of a whole army of landscape gardeners.

Most people, at some time or other in their lives, are taken by the desire to have a garden. Such a desire may originate in many ways. It may be envy of a neighbour's successful enterprise, a sudden access of wealth or opportunity, the instinct which impels men to ride a hobby, or relaxation from the routine of business. Whatever the motive may be, it is safe to assert that the best result will be obtained if the gardener follows his own instincts in the matter, provided they in their turn are backed by certain helpful and essential safeguards.

The wise gardener will stand out against the seductions of any prevailing fashion, and will refuse to follow it merely because it is the fashion. In his selection of a site for the garden, and in his adaptation of that site, he may follow certain authentic rules; but in the actual designing and stocking of that site he must take into account all kinds of eventualities that no formal prescription can possibly provide for. Ask one man to design a garden, and he will draw up a plan on paper, or dogmatically expound his principles, with little or no regard for the situation in which the garden is to be made. He will treat the problem as though site and soil and atmosphere and situation were of so little account that their consideration would be superfluous. One might just as well expect to design a successful costume without knowing the sex, age, proportions, or type of the wearer.

The actual design and embellishment of a garden must of necessity be governed by the character and formation of the ground at the gardener's disposal. This is by no means the trite observation it may appear, as so many of even our most historic gardens bear witness.

Who has not, at some time or other, been struck by the blatant incongruity of those trees, which we know as monkey-puzzles, set in startling isolation before some typically English homestead, an outrage both to the eye and to the shady elm or graceful ash which they have most probably supplanted? Who has not shivered in the mazes of some formal garden set in an utterly incongenial situation, its mildewed stucco ornaments and fountains filling the soul with unspeakable depression? Who has not instinctively rebelled against the insistence of some ugly tropical plantation, all spikes and arid harshness, which jars with every recognised canon of beauty and defrauds every pleasurable anticipation? The reason for such folly in gardening is not far to seek. It is born of a slavish and unintelligent devotion to some prevailing fashion. Someone, in some particular part of the world, has planned a garden which, by reason of the peculiar nature of its situation, is different from other



gardens. It abounds in terraces which are a primal necessity to any scheme which makes the most of the site; in a formal disposal of shrubs; in statuary and architectural features whose presence has been dictated purely by local considerations. Such a garden sets a fashion, and for a while after its completion, every large garden that succeeds it is modelled on its pattern regardless of convenience, expediency, or beauty. Flat country is scooped up and mounded to make those desirable terraces; the natural lie of the land is outraged, and its properties ignored to make those formal walks and shrubberies; the house itself, which in the original instance was planned coincidentally with the garden to suit the surrounding landscape, is treated as a separate and altogether unrelated problem; and the result, from every point of view, is deplorable. Sometimes a single feature is taken, or the particular treatment of some remote corner of the parent scheme is reproduced in lavish multiplicity and expanded to a degree out of all proportion to its original significance. One might just as well transport to a land where perennial rain was the rule, a roofless palace whose architecture was dictated solely by climatic beneficence, or insist that the tiling of a bathroom or the paving of a kitchen be made to constitute the sole decoration and flooring of a whole house.

Such lavish imitators are never perturbed by the waning of the fashion which brought their own garden into being. Some altogether different style of gardening becomes the fashion, and all those features which were typical of the old are scrapped to make way for the new. Such people treat the ground in their control with as little regard for common sense or beauty as so many would-be fashionable women do their bodies. The formal garden, it may be, becomes at a stroke the tropical garden in which cactus and palm take the place of the grass-bordered fountain, and the stucco gods or the "natural" garden in which the features of some remote landscape are presented in absurd miniature. The soil itself is hacked about to make such mimicry possible and every canon of good taste is outraged in the process. Other gardeners go even further along the road which leads to artistic damnation, and include in their garden specimens of a dozen or so of warring styles. The sunk garden is sandwiched in between a tropical and a natural garden; Renaissance fountains peep over a hedge into an old-fashioned orchard; one emerges from a rose-covered arbour at the end of a typically English walk, blazing with familiar blooms, and one's vision is assaulted by the gaunt silhouettes of monkey-puzzles, or the intricate carpeting of the bedded-out.

Few people have an unlimited choice in the matter of locality in which to build their house and garden, but even though that scope be somewhat circumspect, there are many things still to be taken into account. It is obvious, for example, that the various suburbs of even a small town differ very much in climate, in density of atmosphere, and in convenience, so that in choosing a site for a garden each of these factors should be duly considered. One side of a town is likely to present more advantageous features from the gardener's point of view than another, apart from the nature of its soil. The direction of the prevailing wind, to take only one example, dictates not only the steps he must take to shelter his crops, but also the presence or otherwise of smoke and fogs. It is clear that if the prevailing winter wind be a south-westerly one, then the garden situated in a north-easterly suburb will be more liable to smoke and fog than one which stands to windward of the town. It is wisest to select a site upon slightly rising ground which is not so high as to be difficult of access or to suffer from exposure. Fogs are more prevalent in valleys and low-lying hollows; and in valleys, too, owing to the slower evaporation, spring frosts persist until later into the year than they do on rising ground, and autumn frosts begin much earlier.

With the actual neighbourhood fixed upon, consideration should be given to the nature of the soil which covers it. For both building and horticultural purposes such soil should be light and rather spongy in texture. Heavy, sluggish, and impervious soils make gardening a very unprofitable business. They are not only difficult to work, but in wet weather become cold and greasy, hold the water, and promote the ill-health and decay of plant and vegetable alike; while in hot, dry weather, evaporation from them takes place so speedily that the surface cakes together and cracks, and the tender roots in consequence are starved. The atmosphere about such land remains cold and moist all the winter, making the house built upon it damp and unhealthy, while the labour involved to produce even the smallest satisfactory results in the garden is out of all proportion to that which would produce the same or indeed infinitely greater results from a garden whose surface and subsoil are lighter and more pervious.

The most desirable kind of land, then, for gardening purposes, is that which is light in substance and fairly loose in texture. Such soil does not become waterlogged, and so the necessity for extensive artificial drainage is obviated. It is, moreover, easily worked in every kind of weather.

In examining the nature of the soil, due regard must be given to the subsoil. This should consist either of chalk, loose gravel, or coarse sand. If the surface soil be shallow, a substratum of clay or close, unyielding gravel soon has its blighting effect upon the larger growing plants. It dwarfs their roots so soon as they grow down to contact with it, and produces feebleness, disease, and a general lack of stamina in the plants themselves. The roots of plants are extremely sensitive to changes of temperature, liking coolness in summer and warmth in winter; hence it is easy to perceive how in heavy, impervious soil which, in hot, dry weather, becomes parched and crumbly, and in cold, wet weather sodden and close, such changes affect them.

Given, then, these good qualities of surface and subsoil, the garden should have, if possible, a gentle slope to the south-east which is by far the best possible aspect; and that form should be followed which gives the widest and longest access to the sun. Its outline should be as simple as circumstances permit. A tortuous boundary is both uneconomical and much more expensive to fence than a simple one; though a certain laxity of line may be permitted, provided it does not run to extravagance in angles and irregularities. A very narrow plot is on many counts undesirable, and should be avoided by the gardener who would make the most of his garden whether from the picturesque or the purely utilitarian point of view. For all general purposes, a rough oblong, whose narrowest sides are about a third shorter than its longest, is good; though a triangular plot with a blunt apex and its base to the south is perhaps the best of all, provided the view from the chief windows of the house—which should be situated at the narrow end—gives on to it.

A plentiful supply of pure water is, of course, an essential consideration. If there should be no permanent supply, then, in addition to the rain water from the roofs of buildings, either a well should be sunk or some provision made for the ensuring a constant supply.

The site agreed upon and its disposition determined, there comes the question of its laying-out. This dictum of William Morris will serve admirably as a general guiding principle:—"Large or small," he says, "the garden should look orderly and rich. It should by no means imitate the wilfulness or the wildness of nature, but should look like a thing never seen except near the house."

There is much sound sense and pregnant suggestion in those simple sentences. The garden, particularly if it be situated in the midst of natural scenery, rather than in a crowded town or

suburb, should form as it were a link between the artificiality of the house and the native wildness of the landscape; and its arrangement should be graduated and composed to that end. The whole art of simple gardening consists really in thoughtful adaptation, in thinking out a scheme which will make the most of the natural facilities of the site and at the same time yield the completest continuity both in the crops themselves and in their disposition. It is really a sublime economy which is as capable of systematisation as any purely scientific faculty. For example, the actual laying-out of the garden determines to a great extent the amount of labour necessary to keep it neat and flourishing. Inaccessibility, distance from the water supply of plants that require much artificial watering, the remoteness of the vegetable garden from the kitchen or of the flower garden from the rooms its blooms are to decorate; all these things militate against that economy which should be the gardener's first care.

In the case of a very small garden it is sometimes a mistaken enterprise to devote much time or space to vegetables. As a rule they can be bought for less than it costs the amateur to grow them, and their presence in such gardens is seldom an attraction from the picturesque or the economical point of view.

The criticism applied earlier in this chapter to too rigid a devotion on the part of gardeners on a large scale to particular fashions in gardening has even greater point in the case of small gardens where faults are less easily disguised and every distinctive feature is obvious from the outset. The common fault of many small gardens lies in an extreme formality of design which not only produces a sense of monotony but decreases the effect of space.

Anything which militates against the unity of the garden should be shunned. Unnecessary divisions, hard dividing lines, many paths which have no practical reason for existence; a hard and fast arrangement of flower-beds and shrubs which seem to have incurred some such penalty as befel Lot's wife; ugly summer-houses, rustic seats, rococo ornaments placed about in incongruous situations with no regard to their immediate surroundings or suitability; artificial mounds and ponds situated in bleak isolation upon a bare lawn; the possibilities of this kind are infinite and offer traps into which none but the thoughtless or haphazard should fall.

A garden can become just as vulgar and unattractive as a drawing-room which is crowded with ill-placed and ugly furniture. That which should be primarily a retreat, restful to be in and

beautiful to look upon, may become a garish and distracting place if discretion and good taste be absent from its planning.

While bareness should be avoided, the other extreme of planting the garden too generously with trees and shrubs is also a great mistake. Such overcrowding, particularly in a small garden, shuts out the light and air so essential to the well being of flowers, spoils the grass, renders the walks damp and mossy, and promotes the growth of weeds. Snugness and seclusion are two very desirable qualities in a garden, but they should be achieved without too dear a sacrifice of air and sunshine. The garden as a whole should seem compact without in any way presenting a cramped appearance; and this desirable effect is most easily obtained by preserving a unity between its successive and varying features. The range of such variety in the different parts of a garden should lie between the definite bounds set by the style of the house itself, on the one hand, and by the paddock or surrounding landscape on the other. That is to say, that the outlying parts of the garden should be wilder and less artificial both in plan and detail than those which more closely approach the house; and the actual transition from formal to free and from free to wild should be gradual, synthetic, and all but imperceptible. All attempts at striking contrasts should be confined to details, leaving the large and comprehensive plan of the garden a complete and harmonious whole.

So many houses are, from an artistic point of view, utterly divorced from their gardens because no care has been taken to graduate their relations one to the other. House and garden are treated as essentially separate and unrelated problems, and an abrupt, unmitigable line shows exactly where the house ends and the garden begins. After all, a garden in most cases is merely a setting for the house, and those parts of it which actually approach the house should be laid out with a certain restraint which may be absent from its more remote situations. Whether one approaches the house from the garden, or the garden from the house, the change should be led up to and not suddenly insisted upon.

Where the commonplace nature of the house or the smallness of the garden renders such a unity of treatment impossible, the poverty of romantic opportunity may to a large extent be assuaged by the judicious erection of evergreen screens and by breaking up the monotony of too rigid an outline by irregular plantations. So many people insist upon revealing the smallness of their gardens by laying out most of it with gravel. Indeed, in many cases, the lawn itself might be but a decorative appendage

to the bare stretches of gravel which circumvent it. While nothing gives a greater sense of space than breadth of lawn, nothing is more cramping in appearance than bare stretches of gravel. Paths are, of course, a necessity, but their extent and number should be restricted purely to necessity. If these be thoughtfully planned and have their edges planted about with shrubs and flowers, their presence in the garden should help to co-ordinate rather than to dissipate the effect of unity, and lend a pleasing variety to what might otherwise be a monotonous and uneventful prospect.

The care spent on a lawn is never thrown away. The lawn should often be the chief feature of the small garden, even at a sacrifice of flowers. It is a permanent beauty, the hardiest of perennials, the most capable of adaptation and, from every point of view, offers the most rewarding prospect. It is both useful and ornamental, far more decorative—if imaginatively treated—than any amount of prim flower-beds, while at the same time lending itself to an infinitude of practical uses.

We have already deprecated the habit of mere paper planning, that is, of drawing up a hard and fast disposition of the garden without practical reference to the site itself, and of forcing extremes of fashion upon an uncongenial locality. From all of which it must not be understood that any particular style of gardening—the formal, the natural, and so on—is condemned as such. Certain situations demand a formal, even as others call for a freer, treatment. The point to be remembered is that the plan of the garden must have more than a purely theoretical warrant. The character of the site and its architectural and rural surroundings should give the general lines upon which the plan should be formed. Many people insist upon making a clean sweep of everything with which nature has already endowed the proposed site. Such drastic treatment is almost always a great mistake. In the case of such natural features as trees, clumps of shrubs, etc., thought should be given to decide how far these original tenants can be utilised in the gardener's scheme. Nature, no doubt, leaves many obstacles in the way of the horticulturist, but, on the other hand, her big effects are seldom without a certain fundamental fitness. She may seem at times to work without a plan, to sow lavishly and to produce extravagant results which, while they may pass unregarded when viewed simply as details in a large tract of country, seem altogether disproportionate and out of place in the scheme of a small garden.

The actual spade work should not be embarked upon until

the plan of the garden is complete in every important detail, its boundaries fenced, and the walks and leading features decided upon. For it is here, in the early stage of carrying out a plan into practice, that proper methods must be understood and followed. The progress of the garden should be an orderly one, beginning with the actual preparation of the soil by drainage and levelling when they are necessary, and ending with the planting of stock; and as much thought should be given to purely utilitarian as to artistic considerations.

If, for example, it is desired to grow vegetables, the kitchen garden must receive as much attention even in this early stage as is given to the flower garden, and due provision must be made also for the housing of implements and the storage of manure, stocks, and other accessories. It is bad policy to regard these things as unimportant and necessary evils, to be hidden away in any chance corner, remote from the garden, perhaps, where their use will involve long and frequent journeys. Without being unduly obtrusive, the garden apparatus should be easily accessible and conveniently housed. For, after all, the tools of a man's trade should be his chief care. What would be thought of a cook, for example, who banished from the kitchen all implements and utensils because their presence was considered unsightly; or of a carpenter whose shop, for the same absurd reason, displayed no tools? Gardening is essentially a practical art, and one that requires, above all, method and common sense to bring it to perfection.

**Soil and Site.**—So far as the site of the garden is concerned, the majority of readers can have little choice, but where the possibility of selection is present, a slight slope towards the south, south-east or south-west is to be preferred. This is especially important where fruit or vegetable gardening is to constitute the principal interest. Where, however, the gardening is to be purely pleasurable, with no so-called utilitarian aims in view, then site matters little. For, after all, the object of the gardener should be to consider the circumstances of his environment and employ means accordingly. To a real gardener a so-called difficult site but makes his problem more interesting. For there is no situation so bad from the gardening point of view but that by proper preparation of the soil and proper selection of plants a beautiful garden can be made of it. Even on bleak hillsides Nature succeeds in growing beautiful flowers, and charming gardens have been created on what originally was but a mountain of sand.

It is, however, in the preparation of the soil that the gardener has the matter in his own hands. To some extent different soils naturally need different treatment if they are to be rendered fertile, but there are certain general principles which are more or less applicable to all. In relation to a plant's life the soil can be considered from various standpoints. In the first place it furnishes root-hold by means of which the plant is able to fix itself in space. Then, again, it acts as a storehouse from which the plant absorbs as required the greater part of the nourishment on which its continued life depends. Clearly, therefore, we must see to it that if our garden soil is to be fertile it must be of such a texture as shall be compatible with the healthy life and development of the roots and rootlets, and shall contain within reach of those rootlets in an assimilable form the necessary food elements for the plant's growth, and a sufficient supply of moisture at all seasons to present those elements in a dissolved form for absorption.

Water-logged soil will not allow the continual life of the majority of plants. Soil so unretentive of moisture as rarely to contain enough water for dissolving plant foods is equally hopeless. What most plants require is a soil which, while efficiently drained and containing within a few feet of the surface no body of stagnant water, shall yet be of such a texture and shall include a sufficient proportion of organic material as to retain for an appreciable time a moderate degree of water. If the soil is naturally very heavy, that is to say, if it consists very largely of clay, and especially if it rests at a comparatively shallow depth below the surface on an almost impervious layer, it is almost certain to be more or less water-logged. And it is necessary in such a case to dig it deeply and to provide adequate drainage, in bad cases by means of pipes, in less bad cases by means of stones and broken bricks, and at the same time to lighten the upper layers of the soil by the addition of sand, leaf-mould, organic manures such as stable manure, and the like. In a similar way very light, sandy soils should be improved by the liberal addition of clay, fibrous loam such as is obtained from the top spit of meadow land, leaf-mould, and farmyard manure. These latter, which, in the case of the heavy soils, serve to keep open the clay which would tend otherwise to form a solid block, serve, in the case of sandy soils, to bind them together, and enable them to retain a greatly increased volume of water. In the case of practically all soils one of the first things to do, over and above such special measures as have been suggested above, is to trench the ground or to dig it deeply. The process



of trenching, though extremely simple, is not always well understood by amateur gardeners. It essentially aims at the breaking-up of the soil to a depth of three spades, and in practice it is performed somewhat as follows: Along one end of the piece of ground to be trenched the top spit of soil to the depth of one spade is thrown out and is wheeled to the opposite end of the piece of ground, where it is to remain in heaps. The top spit of a parallel strip to this first strip is then thrown up and wheeled away in a similar manner. The second spit of the first strip is then thrown up and also wheeled to the opposite end of the patch, where it is to be kept in heaps separate from the top spit. At this stage we have one strip about ten inches or a foot wide which is excavated to a depth of two spades, and adjacent to this a parallel strip which has been excavated to a depth of one spade. The soil or subsoil at the base of the first strip is now to be broken up with a pick, mattock or spade to another spade's depth, but left in place. On this a liberal dressing of farmyard manure should be spread, and on this the second spit of the second strip should be thrown. On this another layer of manure should be placed, and on this should be thrown the top spit of a third spit, adjacent to the second. At this stage we have the end strip completed, consisting of a spade's depth of broken-up soil or subsoil at the bottom, a layer of manure on this, a layer of second spit (derived from the second strip) on this, a layer of manure resting on this second spit, and the whole covered with a layer of top spit derived from the third strip. The second strip is now excavated to the depth of two spades, and its base should in a like manner be broken up to a further spade's depth and should then be covered with manure, with the second spit from the third strip, with another layer of manure and with a layer of top spit from the fourth strip. In like manner the whole plot should be treated, until when we reach the opposite end of the patch the heap of second spit which has been wheeled to that end should form the second spit of the terminal strip, and the heaps of top spit which have been wheeled to that end should form the top spit of the two terminal strips. Ground properly prepared in this manner forms a satisfactory basis for almost every kind of gardening.

Ordinary digging is a somewhat less thorough proceeding than that of trenching. It usually consists in throwing out the top spit along one strip of the patch to be treated, laying manure along the ditch thus created, and covering with the top spit of the next strip, and so on until the whole patch has been treated.

The object of this thorough cultivation is primarily to bring the maximum volume of soil into a useable condition, penetrable by, and accessible to, the roots of the plant. But also a soil thus deeply broken up is rendered much more retentive of moisture, and this retentiveness is materially increased by fairly frequent surface hoeing; that is to say, scruffing up the top inch of soil by means of a hoe, thus breaking the continuity of the fine capillary tubes through which water commonly passes into the air from the deeper layers of the soil.

**Manures.**—Manures, as the term is commonly applied, have two great functions in promoting the life and health of plants. In the first place, they are a source of actual food elements, which they directly contribute to the plants' necessities, and secondly—and this is true particularly of so-called organic manures, such as farmyard manure—by reason of the fermentation which takes place in the manure, chemical changes take place in the surrounding soil which liberate materials required by the plants. It is because it fulfils both these functions that farmyard manure, or its equivalent, is so especially valuable. It is, however, not always convenient to obtain a sufficiency of stable or farmyard manure for the requirements of one's garden. In such cases resort must be had to various so-called artificial manures, most of which provide plant food in a highly concentrated form. These, for the most part, have but little effect—at any rate directly—on the structure or chemical activity of the soil itself. The three elements which it is generally necessary to add to soil in the form of manure if crops, whether vegetable, fruit, or flowers, are to be raised year after year on the same ground, are phosphates, potash, and nitrogen. And it must be remembered that these have not only to be added to the soil, but to be added in such a form that they are or readily become soluble and so capable of being absorbed by the fine rootlets of plants. The most expensive of these elements is nitrogen, that is to say, nitrogen in a form available for plant food. Apart from guano and other mixed-elements manures, the most useful nitrogenous manures are nitrate of soda and sulphate of ammonia. Nitrate of potash is also good, but is much more expensive. In the last few years a remarkable discovery of the utmost importance to agriculture and horticulture has been made. It is, that in well-drained soils certain bacteria exist, especially round the roots of leguminous plants such as peas, beans, and clover, which, by their activity, collect nitrates from the air and add them to the soil. Thus it is often possible to furnish

a soil with both humus and nitrates by growing a crop of clover and lucerne and digging it in. Of potash manures kainit is, on the whole, the cheapest and most useful. On heavy soils, sulphate of potash is also valuable. A simple way of providing potash for a small plot of ground is to add wood ashes and the ashes from burnt weeds in generous quantities.

The three commonest forms of phosphatic manure are superphosphate of lime, dissolved bones, and basic slag. Superphosphate is the quickest acting, whilst basic slag is the cheapest, slowest acting, and therefore most enduring.

The requirements of each soil can only be ascertained after individual consideration, experiment, and possibly analysis. But there are certain rough rules. Farmyard manure in reasonable quantities, improves almost all soils, heavy or light. It is usually unnecessary to add potash to clay soils, and usually necessary to add it to sandy soils. At the same time it may be necessary in order to liberate the potash in the clay soil, to add lime. Gravelly and sandy soils are nearly always deficient in nitrogen, and are much less retentive of manures generally. Soils that are peaty, or that have become sour from excessive humus from constant year-by-year manuring with organic manure, are much improved by the addition of quicklime applied frequently in small doses and dug in at once.

Stable manure and, indeed, all animal manures, should not be left exposed to rain and air. They are best mixed with a little soil, and covered with about another six inches of soil until they are required for use. As some guide to the amount of various artificial manures to apply in average cases, we may say that it is safe, as a rule, to add to a square rod of ground needing that particular manure, two pounds of kainit or sulphate of potash, three pounds of superphosphate, four pounds of dissolved bones, seven pounds of basic slag, three bushels of lime, two pounds of guano, quarter of a load of stable manure, a hundredweight of fowl manure, two pounds of nitrate of soda, one pound of sulphate of ammonia. The nitrogenous manures are usually best applied in spring, the stable and fowl manures in the autumn and winter, the lime about February, the kainit in the winter, the sulphate of potash in the spring, and in the spring also the dissolved bones. Basic slag is best applied in the autumn.

**The Flower Garden.**—It may be convenient to deal here with some of the more important considerations which should guide the gardener in his arrangement of the flower garden, for that, in

the case of most small gardens, will be his chief concern. The flower garden is usually situated within close range of the house, so that its beauties may be seen from the windows. On this account its plan should be formal and not present too startling or scattered effect. We are only beginning to break away from the cast-iron method of planning, a method which has survived the primness of outlook in which it originated, whose every line and form are severely geometrical and every colour crude and definite. The formalities of the Georgian age were tightened and cramped into the carpet and other artificial forms of bedding of the Victorian. The most intricate patterns were produced in flowers whose natural forms were clipped and stunted in the services of this most inartistic fashion, and their individual beauties ignored. A comparison has only to be made between, say, one of the simple cottage gardens of Devonshire aglow with flowers and the most ambitious example of carpet bedding, for the utter inferiority of the latter to become apparent. We are beginning to tire of these wasteful and ugly extravagances, and to seek inspiration from more natural sources where pleasant and harmonious comparison prevails between colour and colour, and where beauty results from freedom rather than restriction of form.

The flower garden is of necessity more obviously artificial than those parts of the garden where lawn and shrub and tree hold natural sway. For this reason its planning is more liable to be attended by mistakes from the artistic standpoint. The gardener cannot go far wrong in the arrangement of bush and lawn, but the management of large masses of bright colour is an altogether more difficult proposition and one which requires skill and a sense of beauty to produce a successful result. The beauties of a landscape view may be utterly spoilt by the sudden intrusion into its foreground of a profusion of bright flowers, and where no other position is possible for the flower garden than that which directly intervenes between such a view and the spectator, some arrangement should be made for screening the too obtrusive colour. Such a difficulty is not likely to occur in a town garden when the only view is usually restricted to the bricks and mortar of other houses.

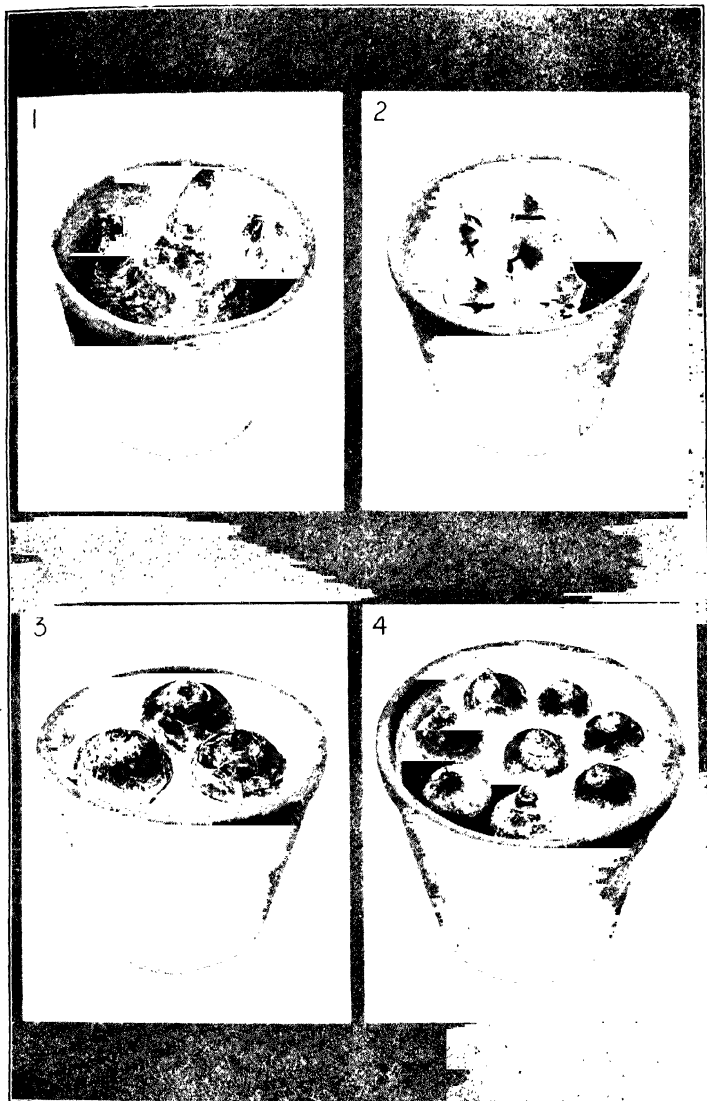
Wherever it is possible the flower garden should have a southern or western aspect, which is sheltered from cold winds. Such shelter, whether natural or artificial, should be sufficient to protect quite tall growing shrubs without excluding light and air. It is an almost hopeless enterprise to attempt very much in the way of flower culture in a soil that is heavy and

impervious, or in an exposed situation, unless shrubs can be grown to afford shelter, and the impervious soil either replaced by one of light texture or so improved by the addition of some element such as sand, leaf-mould, lime, chalk, or charred garden *débris* that the tender roots may be able to penetrate it easily. Drainage, too, is a very important consideration, and one which such a treatment of heavy soil as is recommended above makes doubly necessary. It will be obvious that if certain portions of the soil be broken up and lightened, they become automatically drains for the heavier surrounding land, and all the surface water which such land is unable to absorb, will just drain down into the beds that have been rendered pervious, turning them into a sort of natural reservoir. The foundation of such beds must, therefore, be constructed of such loose yet durable ingredients as will permit the accumulation of water to drain through. For this purpose nothing is better than broken brick or flints, but even this precaution needs support from a drain which will collect and convey the surface water away. It will be seen, therefore, how essential it is that the land to be used for a flower garden should be properly prepared before anything very elaborate in the way of cultivation be begun.

With the garden planned, drained, and prepared, there still remains several important considerations to be taken into account. The stocks of plants, for example, should be selected for various qualities such as their size, their time and term of blooming, their suitability to the garden itself, their fragrance, form, colour, and hardiness. These qualities, which are obviously desirable in themselves, do not always receive due consideration.\* It should be noted, too, that that plan of the flower garden is best which will not necessitate frequent and laborious re-arrangement. The same piece of ground should not require an annual overhauling and replenishing, but once stocked and started, its condition should be permanent and progressive. All garden plants need to be looked to from time to time, but the successful flower garden should require casual and detailed rather than annual and fundamental attention. In the present state of horticulture, so generous and varied are the available stocks of hardy plants, such a plan is by no means difficult to achieve.

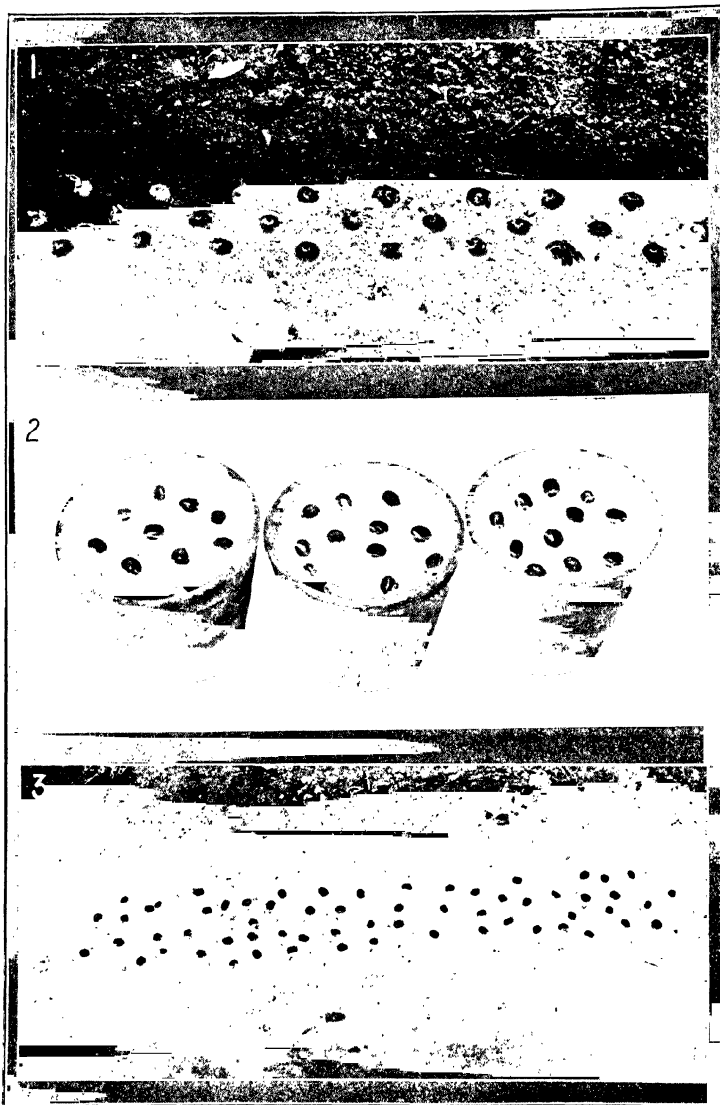
If care is exercised in the selection and planting of its stock the flower garden can be kept, if not generously blooming, at least verdant through practically the whole year. How much more satisfactory is it when the flowers of each season appear in their ordered turn, and in passing give place automatically

No. 1. BULBS



4. Amaryllis, tulip, and hyacinth bulbs, ready for covering.

## No. 2. CROCUS CORMS AND PEAS



1. Planting crocus corms, showing bulbs in position, before covering. 2. Early garden peas for raising, showing seeds in pots, before covering. 3. Section of a row of garden peas, showing the seed in place, before covering.

to a fresh crop, than when the efforts of the gardener are devoted to a fierce display of blooms, which, though they may make a wonderful show during the actual period of their blossoming, perish with the first frosts in autumn, leaving no successors to grace the bare and unlovely soil! The garden in winter need by no means present the barren and disagreeable appearance it too often does in England, nor need the gardener depend entirely upon the products of a greenhouse for his sources of winter display. Reference will be made in detail later on to the types and characteristics of such hardy plants as are adapted to this form of permanent gardening. Here we are mainly concerned with the considerations which should help the gardener in his first planning.

Colour, again, is one of the chief considerations which should control the arrangement of the flower garden; and its study should be one of the first cares of the true garden-lover. Many people are without an artistic colour sense, and when the result of their particular arrangements of colour is criticised by others, retort that, in the matter of colour, Nature cannot offend. That may be so, but we must remember that the garden is essentially an instance where Nature is assisted by art, and such co-operation, as we all know, does not invariably make for beauty. But apart from the mere placing of flowers so as to produce harmonious results, blooms raised under artificial conditions are by no means always perfect from the standpoint of either colour or form. Nature, left to herself, may produce immaculate results, but when she is assisted by art, blemishes are only too apt to occur.

Foliage, too, plays a very important part in perfecting the colour scheme of the garden. It mitigates the clash of warring shades, assists the gradation of tint into tint, and provides by far the most effective background for the display of the garden's colour beauties. A much freer arrangement of colour may be followed, for instance, against a close background of shrubs than if the flowers are grouped together without such help. The most thoughtful planting may give utterly unsatisfactory results if the colour grouping of the flowers be ignored. It is always best to avoid too close and sharp contrasts of colour. Gradation and harmony are the effects to aim at, and the groups of each individual colour should be important enough to look well from all points of view, but not so extensive as to become tedious. The sudden and frequent intrusion of bleak whites in an otherwise richly coloured scheme will do more to destroy the effect of beauty than any amount of ill-assorted colour.



Their sparing and deliberate use, however, is often of the greatest assistance in co-ordinating and setting a scheme of colour. Observe, for example, how, even in the arrangement of cut flowers in a vase, a small but well-grouped bunch of quite simple blossoms will satisfy the eye where a larger and more pretentious bunch merely distracts and displeases. The hues of the rainbow may be taken as a guide in the happy relation of colour to colour. There we find violet shading to indigo, indigo to blue, blue to green, green to yellow, yellow to orange, and orange to red, each of the colours borrowing something from its immediate neighbour and harmonising perfectly. Where the flower garden is open in design; the highest colours should be placed in those beds which are nearest to the boundary, since they will always attract the eye and in consequence give a greater suggestion of space than if they were more centrally disposed.

Fragrance, again, is a quality that needs no recommendation, since so many of our most beautiful flowers and shrubs have also the sweetest scents. Roses, lilies, stocks, and wall-flowers, jasmine, honeysuckle, and sweet verbena, to mention but a few, are all flowers beautiful in themselves and in their odour, while rosemary, sweet briar, southernwood, laurel, bay, and myrtle combine equally charming qualities of scent and form.

The same rules should be followed in designing the detail of the garden as governed the planning of the garden as a whole. Simplicity rather than an intricate complexity, ease of access, suitability of the beds to the ground they cover, are the things to bear in mind when the flower garden is being made. Anything that savours of the bizarre or fantastic should be avoided, and the grouping of each set of plants should allow freedom for growth and access.

Another and equally important consideration in the arrangement of the garden is that of form, the selection of plants beautiful in themselves, and their arrangement singly or in groups, as backgrounds for smaller flowers, as screens, boundaries, and hedges. When one speaks of form in the matter of plants, one's mind turns instinctively to such outstanding examples as the cypress whose telling silhouette is so beautiful a feature of the Italian landscape, to the tropical palm, to the poplar groves of France, and last but not least to the many beautiful varieties of English trees which at any season of the year present such lovely appearances. So far as the garden is concerned, it is best to select for this quality such plants as flourish in this climate and that once placed in the garden do not require continual nursing and attention. It is a purblind spirit which affects to

see beauty only in exotic forms, which when transplanted to an English garden and deprived of their natural setting, not only lose their own beauty but detract rather than add to the charm of the garden as a whole. There would, perhaps, be more excuse for the presence of these exotic aliens in the English garden if they flourished there and suited their surroundings, or if we had no alternative choice among native plants. But the range of hardy shrubs and trees, beautiful in themselves and harmonious in their setting, is very wide. The true lover of gardens will grow plants for their beauty rather than for their rarity; and in a small garden, at any rate, no individual specimen should be allowed to monopolise either the gardener's attention or the spectator's interest. Each should be part of an harmonious whole and such as do not contribute to the harmony should be rigidly excluded.

Among the plants whose foliage is beautiful and whose presence in the garden is of the utmost value from the point of view of backgrounds are the willow, the acacia, the asparagus, various specimens of bamboo, reeds, pampas grass, the cypress, cedar, yew, and fir, and a host of hardy evergreens and flowering shrubs. Such plants, indeed, lend themselves to a variety of decoration and practical purposes. The larger of them can be used as screens for unsightly corners, and to afford shelter to more delicate specimens; others to break up the monotony of a lawn and to maintain the beauty of the garden through even the most trying winters. Others again require no such practical warrant. Their mere beauty is sufficient reason in itself for their inclusion. The azalea, magnolia, rhododendron (in moderation), broom, pyrus japonica, to mention but a few, whose flowering periods but crown their common life as elegant shrubs, should need no recommendation. In the use of evergreens discretion should be exercised, and their hardy and enduring qualities must not be favoured to the detriment of more vulnerable plants. In moderation their usefulness cannot be too highly praised; but it must be remembered that most evergreens are greedy feeders; their roots are voracious and spread very widely; and when, as is often the case, they are used to border flower beds, if planted there too generously or allowed to multiply unchecked, they impoverish the soil and weaken the chances of the flowers.

The many varieties of beautiful flowering shrubs which grow well in this climate should appeal to the gardener for more than their purely outdoor qualities. Most people who have gardens like also to decorate their houses with flowers, and, in this

connection, nothing lends itself more charmingly to indoor use than single sprays of some small flowering shrub placed in the right kind of vase. The Japanese, whose good taste in such matters is universally admired, have made long study of this form of decoration, and their artists have recorded its success in a wealth of beautiful prints. These prints should be studied in order to see how simplicity and real beauty are often synonymous terms. In the winter, too, when the garden is practically devoid of flowers, the foliage of many of these hardy shrubs presents a very beautiful and satisfactory substitute, which is equally pleasing as a decoration for rooms when used in the manner described above.

As an immediate setting for the house, also, no form of planting is more satisfactory than groups of flowering evergreens. Here, above all other places in the garden, permanence is a quality to aim at, for this is the view which is most constantly in evidence. In winter weather it may, perhaps, be regretted but not deplored that the remoter places of the garden are not bright with flowers, but if the immediate view from the windows be equally barren then the dreariness of the whole garden will weigh more heavily. For this reason, then, the use of flowering evergreens near the house is to be recommended.

The amateur will find frequent visits to public gardens, or any of the big country houses, of the greatest educational value. In such natural gardens as that of Kew the flowers of every season can be seen in perfection as well as the numerous styles of gardening. Tropical cultures, too, can be closely studied in greenhouses of immense size and variety, to say nothing of the charming formal gardens whose popularity was once so universal in this country. The shrubberies, road and water gardens of Kew, the architectural fantasies which delighted a former age, little temples and arbours and summer-houses, orangeries, pergolas, and mazes, all exist in perfection in these gardens, and should inspire the visitor with a desire to practise in his own fashion and with his limited personal opportunities some of the lessons he will find here so admirably set out.

**The Kitchen Garden.**—The planning of the kitchen garden must be carried out upon severely practical lines. A simple rectangular form is the most suitable and economical to adopt, since it lends itself to the straightforward methods of vegetable culture. All paths and borders and divisions should follow straight lines and form right angles with each other. The paths should be strong and solid, and built high enough to allow for

a certain amount of subsidence owing to the constant wheeling of heavy substances over them. The garden should be well drained and sheltered. For the latter purpose trees, though perhaps the most obvious and convenient form of natural shelter, are on many counts the least satisfactory. Their roots impoverish the soil, to say nothing of the fact that in winter and early spring their leafless boughs afford little protection against the chill winds of these seasons. By far the most satisfactory form of shelter is that of brick walls, since the primitive service they render is added to by the protection they afford to the more delicate kinds of fruit trees. That side of the wall which protects the garden from the north should be built higher than the others, and the height of them all should be gauged by the size of the garden itself. Their purpose is to shield the garden without excluding the sun. The shadier parts of the garden should be the home of vegetables that do not primarily require warmth, such as rhubarb, sea kale, Scotch kale, and the many varieties of salad. The pulses, potatoes and cabbages require more sun, and it is a safe rule to follow that where the cabbage will grow to perfection almost any vegetable will do well. The sides of the wall which face east and south and west should have borders at their base in which fruit or rose trees may be placed, and here also, owing to their more genial situation, early crops of all kinds may be nursed. The width of such borders depends upon the amount of sunlight that visits them, and while they should in no case be so wide as to render cultivation difficult, those which get most sun may be wider than those whose aspect is less sunny.

The size and arrangement of the kitchen garden should be as compact and systematic as possible. Waste of air or a disorderly disposal of crops are fatal to its proper working. Although the purposes of such a garden are so definitely utilitarian, there is no reason why flowers should be altogether excluded, so long as they do not interfere with its legitimate purpose. Such flowers may be grown in narrow borders which fringe and define but never encroach upon the various vegetable sections. Divisions between the beds are necessary, and the presence in them of flowers will not detract from their utility. A bed or border should be given up to herbs, and since so many of these are beautiful in form and sweet smelling, the strip they occupy may be placed as near the house as is convenient. The system of cultivation in the kitchen garden should be that followed by the farmer, who keeps all his fields annually fertile by changing the nature of the successive crops. The same

piece of ground, if made to produce, say, a crop of peas for season after season will become impoverished for that particular crop, but a vegetable of a different nature will find still in the soil all the ingredients necessary to its healthy growth. For this reason the arrangement of crops should follow an orderly system of change.

Water is, of course, a primary necessity in the kitchen garden, and wherever it is possible, arrangements should be made for a good and constant supply of rain water. Failing this, some large open receptacle which will allow the water to lie exposed to the air should be built close to hand. The action of air upon the water used for garden purposes is of the utmost value, and the difference to the crops between water that has been so aerated and that which is discharged straight from a pipe is incalculable.

**The Reserve Garden.**—In addition to the kitchen garden and adjoining it, a small plot should be set apart as a reserve or nursery garden. Its purpose is indicated by its name. Without being too shut in by tall trees or buildings, it should still be sheltered, and its soil while rich, not so much so as to make the plants delicate or insular, nor so dense that their removal cannot be easily effected. The more easily transplantation is carried out the greater will be the chance of the plants in their new home and the sooner will they establish themselves there. The arrangement of the reserve garden permits of no display in the artistic sense. Its purpose is strictly utilitarian, and order and convenience are the things to aim at since its contents will be constantly changing. There choice flowers can be nursed and grown and special crops raised for cutting purposes without interfering with the regular order of the flower garden proper. Perennials can be raised from seed, cuttings struck, and a reserve supply of plants kept in readiness to fill up gaps in the beds and borders or to replace old plants that have outlived their time. Where forcing is done, the reserve garden is most handy as a store place, and it may be used, too, as the home of plants whose short period of blooming, while it does not warrant their permanent inclusion in the flower garden, yet is of sufficient beauty to recommend their temporary migration there.

Hardy annuals should be sown in the reserve garden in September and October, so as to be ready for the flower garden in the spring. This frequent transplanting is beneficial in the long run both to their health and blooming qualities. When spring-sown hardy annuals are not grown in the garden itself,

they should be raised in the reserve garden, which is also the proper nursery for the whole species of half-hardy annuals. The disposition of the reserve garden should allow of such plants being raised on a slight hot bed, gradually hardened off, and then planted in rich soil in a sheltered corner until the time comes for their removal to their place of blooming. Hardy biennials should be sown in the reserve garden in May or June and receive attention there throughout the summer. There is no end, indeed, to the uses to which such a garden can be put. It is the place where new experiments can be tried, where the stock of bedding plants may be hardened, choice collections of show flowers grown, special cultures carried out, and the winter stock of shrubs, etc., stored during the summer.

The soil of the reserve garden should vary with the special uses to which it is put. A heavy loam which is treated with sand, leaf-mould, lime, etc., as occasion may require, will be found on the whole to be most satisfactory. Its size will depend upon the purposes it is to serve, and may range from a few square yards to half an acre according to the size of the garden itself. It is an all but indispensable adjunct to the flower garden, containing not only the tender seedlings, but a ready supply of plants whenever the garden needs them.

**The Town Garden.**—Many people despair of making anything of the tiny plot which backs and sometimes fronts as well the average London house. If they do attempt anything in the way of gardening there they follow the worst traditions of the geometrical system. Crude gravel, and a little stunted grass kept severely in place by red tile edgings are all that hundreds of such little gardens have to show. That arrangement, their owners argue, is all that is possible in London; it is only thus that they can be kept tidy. How untrue such an assumption is becomes patent once one has seen a successful alternative, in which, without sacrificing anything of the neatness and order, the gravel has been replaced either by plain, red tiles closely set together, or by ordinary flag-stones whose divisions are wide enough to shelter a charming variety of tiny rock plants, such as thyme, fairy mint, little harebell, stone-crops, rock-foils, and other dwarf Alpines. Such a garden cannot be too formal in design, since landscape considerations are necessarily non-existent, and its surroundings are purely architectural. The beds should carry on the precise character of the walks, and be filled with hardy plants which require but little attention. The edge of the beds may be defined with rough natural stones

## 40 HOW TO PLAN AND MAKE A GARDEN.

of uneven sizes which only require to be sunk firmly in the earth, and not fixed into any rigid setting. Such an edging very quickly acquires a pleasing colour and also affords shelter to the roots of the rock plants mentioned above. Borders may also be made with low hedges of lavender cotton, box, and the whole garden screened and enclosed in with some beautiful leaved evergreen.

Such a garden as this is infinitely more practical from the utilitarian point of view than the scrappy and sordid makeshift which debases the approach to so many London houses. It is a thing beautiful in itself, and affords much real scope to its cultivator. The Dutch have brought this style of gardening to a fine art. Nothing is so characteristic of that people's domestic enterprise as order and economy of material. There is scope, too, for the display of much ingenuity in the mere setting out of such a garden. The prim formality of design, the selection and arrangement of its dwarf inhabitants, the making of its borders, the hundred and one little economies of space, to say nothing of the possible floral results, all unite to prove how far from hopeless is the problem of the small London garden, and how much worth while are the time and enthusiasm spent on its solution.

A garden of this type may not produce any unusual show of flowers, but, as we have pointed out, that does not mean that ugliness and negligence are the only alternatives. The kind of treatment which is not only possible but the proper one for such a garden is an art in itself, and not less desirable or rewarding than the more showy kinds because its principles are those of severity and restraint. A real enthusiasm will triumph over almost every difficulty, and if the problem to be solved be only tackled in the right way, few London gardens of the type referred to need be abandoned as altogether hopeless. It will be seen that the construction of such a garden must be founded on principles quite different from those which dictate the planning of a country garden whose space is not restricted and where flowers are its chief concern.

**Garden Furniture.**—The vexed question of garden furniture is one that is not altogether confined to gardens of immense size and magnificence. The most modest plot is usually considered incomplete without some sort of furniture—a seat, a summer-house, a fountain, perhaps a vase or a piece of statuary—and nowhere is it so easy to go wrong as in the choice of these artificial accessories. If such things are beautiful in



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CHRYSANTHEMUMS.





themselves and really improve their situation, nothing can be said against them, but such success is by no means common. Too often an otherwise inoffensive scheme is utterly spoilt by the introduction of an ugly or pretentious seat or summer-house ; by rustic work which fulfils no useful purpose and clashes with every other neighbouring feature. An inappropriate fashion is largely responsible for most of such outrages upon the dignity of the garden. Beautiful as is so much of the architecture of Italian gardens, the fountains, the little temples, the urns and statuary, their use in most English gardens has only to be seen in winter to be condemned, and the same may be said of most of the more ordinary furniture with which our gardens are embellished.

Ugly iron trellises and arbours, cast-iron seats and tables, are made and sold wholesale for use in English gardens. To their design, one knows, none but the most sordid commercial instincts have contributed, while their use is due not so much to necessity as to a bad tradition. The only warrant such things have, in such gardens, at any rate, is whether they are beautiful in themselves as well as useful. In this country the climate does not permit of very much sitting about in the open air, and the provision of elaborate and permanent seats is, therefore, a mistake, to say nothing of the fact that such materials as iron or wood, which are usually employed for this purpose, soon perish and become ugly. The use of stone, on the other hand, is rarely convenient, on account of the coldness of the climate and the difficulty attendant upon its working. If stone seats are made they must be placed in situations where they will not seem isolated and incongruous, and for mere comfort, a lattice seat should be provided which can be moved when necessary and stored during the winter months. Such seats should be plain in design, and built of a stone that is quickly coloured by the weather, and a position should be chosen which, while it gives a good view of the garden, is not in itself a view. The bastard rustic affair, often ingenious to a degree in character and material, should be shunned by all who have any respect for the garden as a whole. The same criticism applies to summer-houses and any sort of shelter erected in the garden.

The archway or trellis is a much simpler problem, since its presence in the garden is warranted by its use in the culture of such plants as require support, and by the fact that even such gardens may be improved and beautified by its help. Simplicity of design, together with a due regard to the kind of plants the arch or trellis is to support, are the things to bear in mind when

planning this kind of garden accessory. They must be solid enough to support the sometimes heavy foliage of the climbing rose, and wide enough to allow the main shoots to spread. Wood is a much better material than iron, since many plants do not thrive in close conjunction with the latter, and screws should be used in the construction of the arch rather than nails, because they offer a stronger resistance to the strain imposed by warping, and are on the whole easier to manipulate. An arch should only be placed where it can be walked under and at the same time display its floral burden to good effect.

Of all the many varieties of purely decorative, as opposed to useful, garden furniture, the sundial comes easily first in favour. Over nothing else of its kind does sentiment so willingly and agreeably linger, and it may be conceded that, on the whole, the sundial is the least objectionable form of purely artificial decoration a garden can have. Though even with such an amiable subject care must be exercised over its design and situation. The simplest design is often the most effective, and quite beautiful specimens can be made by the gardener himself from such materials as are most easily obtainable. A simple base of plain, straightforward brickwork surmounted by a square flagstone to hold the dial itself, will often more than hold its own against the most ambitious example of the sculptor's art. Set in some congenial situation, on a small circular lawn, for example, or the rectangular crossing of four paths, such an object will do much to co-ordinate the scheme of the garden as well as to form a most charming and picturesque feature. But no matter how desirable the sundial may be in itself, unless its inclusion in the garden seems inevitable from the designer's point of view it must be ruthlessly excluded.

Statuary in the garden is a far less favourable proposition in England, though in some kinds of garden, when economy of space is not a supreme consideration, and when suitable surroundings may be given it, most romantic effects may result from its use. It is advisable to make use of lead and bronze rather than stone statues, since on many counts the former materials lend themselves more satisfactorily to garden situations in the country. A single well-executed figure, such as a small lead Cupid, may be used in much the same way recommended for the sundial. At the end of a formal garden, where nothing of a purely botanical nature can be placed to emphasise the situation, and placed against a background of close-growing evergreen or a stone wall, such an object will serve a very useful and decorative purpose. A due regard must be paid to congruity

in the situation of statuary in the garden, and the choice of subject should be limited, as a rule, to such characters as have pastoral associations. The habit of planting at regular intervals busts, modern in character, is obviously a bad one, though it is more likely to occur in public rather than in private gardens, and is mentioned here as an illustration of the kind of thing to avoid. Heraldic devices should be confined to architectural ornament, and not allowed to trespass beyond that subordinate place. The statue itself is a formal convention and as such demands a formal setting. Its use in the garden is purely that of a decorative accessory, and must never be allowed to usurp the place of principals, or presented in aggressive isolation. Kept within these bounds and sparingly used, they are often of value; if made anything of a feature they are almost invariably out of place from the gardener's point of view. These same rules apply to almost every other form of purely architectural forms, and where any doubt exists in the mind of the gardener as to their suitability the safe line to take is to shun them.

**The Water Garden.**—By the water garden we mean a garden of plants growing in water or in the saturated soil adjacent to water, the which soil is periodically submerged for varying spaces of time. Few features in a garden are more attractive and interesting than this, where means for its provision exists. It is useless to attempt water gardening unless a continuous supply of water, the year through, is available. A very small supply will suffice, providing it is continuous, but a water garden which is liable to dry up in the summer is a source of disappointment. Where a stream exists the difficulty of creating a pond is a small one. In any event, whether the water is derived from a stream or is brought to the pond by means of pipes, a low-lying piece of land should be selected, preferably one where a natural depression already exists. One should look down on the plants, not have to look up at them, as sometimes occurs in the case of water-gardening in artificial tanks. The pond—assuming that one does not already naturally occur—should be made about two feet in depth at the deepest point, and the bottom should gradually slope up to the edges. The bottom of the pond should be covered with a layer of soil in which plants may root. The plants which may suitably be grown in and around such a pond naturally vary with its size. If the pond be large such water-lilies as *Nymphæa Marliacea*, *N. Gladstoniana*, and *N. candidissima*; *Nuphar advena*, *Phragmites communis*, *Stratiotes aloides*, and *Sagittaria* may be grown. Intermixed

with these may be grouped such vigorous plants as *Alisma*, *Hottonia Palustris*, *Aponogeton distachyon*, *Cyperus longus*, and *C. vegetus*. The giant Mace reed (*Typha latifolia*) should be included wherever space permits. Where the pond is a small one there are still water-lilies which occupy comparatively little space, among the most beautiful being *Nymphæa odorata* minor, *N. pygmæa*, and *N. Laydekeri rosea*. These last have the further advantage of growing freely and well in a foot of water. These *Nymphæas* cannot feed on water alone, and the soil of their pond or the water around their roots must be enriched if they are to do really well. This is best done by means of small balls of cow manure mixed with straw or litter to bind it, made firm and thrown into the water round the roots of the plants just as the young growth is starting.

The best method of planting water plants in a pond or lake is in pans or flat baskets, in which the plants are placed in suitable soil, the whole thing then being gently lowered into the water in the desired situation. A layer of enriched mud should cover the bottom of the pond, the baskets resting in this so that the roots of the plants can get out and ramble at will. So well do many plants thrive in this situation that where the space is limited care is needed for the protection of the more delicate species grown. Such plants as the *Nuphars*, pretty as they are, are great offenders in this direction, spreading their strong rhizomes and roots all over the bottom and strangling weaker things. The reed grass, *Phragmites*, is another of these greedy plants, and its runners should be fished for occasionally with a strong rake and cut off to keep it within bounds.

The borders of the pond should be hidden with such plants as spread out on the surface of the water, while rooting in the firm soil at the margin. Amongst these are the water forget-me-not, *Mysotis palustris*, *Comarum palustre*, *Calla palustris*, and *Veronica Beccabunga*. These, prettily grouped, will clothe the actual margin, while beyond them the taller growing plants, such as the irises, spiræas, marsh marigolds, with the sedges, grasses, and rushes, thrive on the slightly swampy banks. Many of the ferns love such a situation as this, among them the beautiful *Osmunda Regalis*, and the bamboos (which are also at home in these conditions) make effective clumps as a background for smaller plants.

Many of the ordinary garden plants which prefer a moist soil will, if planted on such a swampy border and well nourished, grow in an amazing luxuriance. *Spiræa Kamtschatica* will make a plant from eight to ten feet high, while several of the *lobelias*,

notably *L. fulgens*, *L. cardinalis*, and *L. splendens*, will often grow from four to five feet. *Iris lævigata* should certainly be included and *I. orientalis* and *I. aurea* will sometimes make clumps seven feet high.

**The Rock Garden.**—There are few features in the garden which provide such a variety of interests in so little space as a well-planned, well-planted, rock garden. The smallest plot will contain a rock garden which will house a good and charming collection of Alpine and native plants; but, on the other hand, there are few features in the ordinary garden which are so neglected and so ill understood. The horrible mass of shiny, glazed lumps of brickwork, in the cracks of which half-starved ferns and plants struggle for existence is nothing but a disfigurement. The chief uses of the rocks and stones in a rock garden are the provision of coolness for the roots and the storing of moisture in crevices for the use of the plants. But the idea that rock plants grow best in practically nothing but rock is a mistaken one. A generous allowance of good soil between, amongst, and beneath the stones is essential for the healthy growth of the plants. It is necessary, if a successful rock garden is to be constructed, that the principles which govern it be understood. As the function of the rocks is to provide shelter for roots, it is clearly useless to plant slabs of rock or stone perpendicularly in the soil. No protection is afforded in this way: the roots cannot get beneath them, and they do not preserve any moisture. Large masses of stone should be used, where possible, and should be sunk in the earth in a slanting direction or even laid flat in it. Although the visible portions of rocks in the garden should be as pleasing as may be to the eye, it should never be forgotten that they are not there for the sake of picturesque effect, but to protect the roots of the plants growing among them.

The great mass of rock plants, particularly the Alpines, like a rich soil, even where they need little of it. A soil full of leaf-mould and other decayed vegetable matter, mixed in some cases with old spent manure from a hotbed, is excellent for rock gardening. Alpine plants in their native habitat receive a yearly top dressing of vegetable matter from the material carried down by the melting snows, and Alpines in a rock garden are all the better for a top dressing artificially applied in imitation of this natural process.

Where rock plants are studied in their natural conditions it will be found that in most cases the soil around the roots is completely covered by the stalks and leaves, each plant touching

its neighbours, and that practically no soil is left exposed. This arrangement is of the greatest use to the plants, as by preventing the exposure of the soil to the action of sun and wind, its natural moisture is preserved, so that so far as we can we should provide this protection. This is, however, rather difficult to do at first, as while the plants are still small and most need protection they are unable to cover the surface of the ground, and to plant them closer together would merely mean starving and overcrowding them. In such a case the best thing to do is to cover the intermediate surface of soil with chips of stone, small enough to be easily pushed aside by a shoot, but sufficient to prevent over-drying of the earth. In a suitable rich soil the plants should soon spread well and clothe the surface with leaves and flowers.

As regards the situation of the rock garden, it should, where possible, have an open, sunny position, away from walls and trees. The latter will soon find their way into the soil provided for the Alpine plants, and rob it of its nourishment. The rock garden always looks best where it has not to bear contrast with any formal arrangement of garden or shrubbery; a wild and "natural-looking" site, and, where possible, one where the natural rock of the district crops up here and there, is the most favourable, where there is choice. In making the garden the stone of the district should always be used if it can, but any stone will do well enough, except, perhaps, the very crumbling slates or magnesian limestone. Any natural rock formation should be used as a basis, the garden being composed round and among it, any mound or banks required being built up, not of heaps of stones, but of good soil, with big stones set in it here and there, the surface being set fairly thickly with stones of varying sizes. It is essential that there be no spaces and hollows under and around the stones, and that the earth be well bedded round them, or the air within the hollow spaces will dry up the soil and drain the moisture from the roots of the plants. The paths through and near the rock garden should not be too formal, and their edges should blend softly into the surrounding vegetation. This may be done by making the path of flat rocks or broken paving stones, set in good soil, with small plants at the edges planted actually between the stones, and encouraged to spread everywhere that is not habitually walked upon. Even upon the edges of gravel walks this softening process may be very well carried out, if suitable plants are chosen. The Alpine toadflax will do well in such a position, on gravel, as will most of the dwarfer stonecrops. The great thing to aim at in the rock

garden is the complete covering of the space with plant life—if not flowering plants, then ferns and mosses—the only bare spots being a few actual rock projections.

Where the garden provides an opportunity for a "wall garden," many things will thrive in it which do poorly or not at all in earth on the flat. Of these plants the Cheddar pink is an instance, as it does far better in a crevice of a loosely-built wall, or in the chink of an old and ruinous one, than it does in any form of rock garden. Such loosely-built walls are often used in garden making for the support of a small terrace or bank, and they may be made a most interesting feature of the garden if properly treated. If the wall is purposely built it should have a slight slope, the base being thicker than the top, and a "dry" wall, that is to say, one which is laid without mortar, is most suitable. The plants should be planted in the crevice, as each stone is laid, with a little sprinkling of fine earth or sand over them to give the roots a hold until they can spread through the wall to the bank of earth at the back. Almost all rock and Alpine plants do well in this kind of wall, among them being the Iberis, Arabis, and Aubretia, Alpine and other Toad-flaxes, various wallflowers, and many harebells. Many kinds of thyme, and some of the dwarf phloxes, with, of course, the stonecrop and houseleeks, are also suitable.



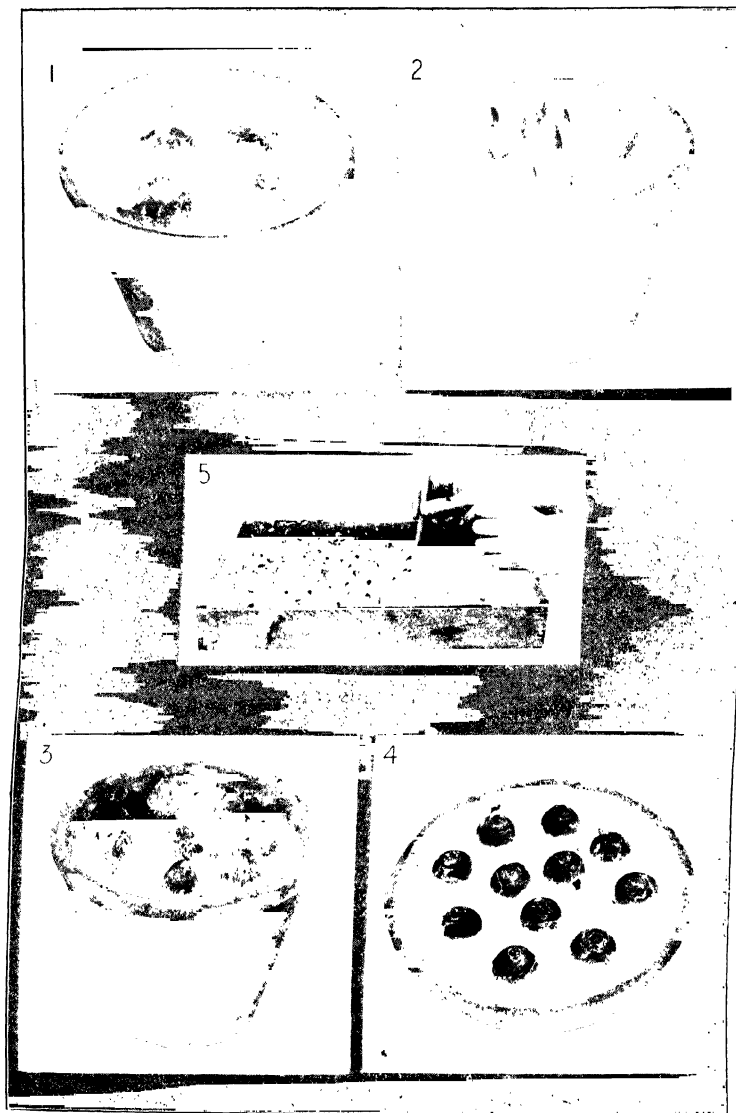
## CHAPTER II.

### PLANT LIFE AND VARIOUS GROUPS OF FLOWERS

**How Plants Live.**—Plants, like animals, require for their continued existence, air, food, and water. Deprived of any of these elements the plant ceases to grow. Water is mainly derived from the soil by the roots, being absorbed much in the same way as that in which animals absorb water from the stomach and intestines. Generally containing more or less food substances in solution it passes from cell to cell, and so is distributed throughout the plant, ultimately to be given out or transpired into the air from the surface of the leaves. Thus the inner surface of a glass bell placed over a plant in a pot soon becomes dimmed by the drops of moisture given off in this way. Water is not only important to the plant in itself, but also as a carrier of the various gases and foods absorbed by the roots and leaves for use throughout the plant, and of those waste products which are given off also by the roots and leaves. The food of the plant, apart from water, is taken in partly in a gaseous form through the leaves, partly in a state of solution through the roots. Nor is this absorption of food an entirely simple matter. It is selective. The rootlets of the plant seem to select from the available food stuffs in their neighbourhood just those substances which the plant requires, and in proportion to its requirements. In order that they may be absorbed these food substances must first of all be dissolved. This process of solution is facilitated by the fact that the roots are not only organs of absorption, but organs of excretion, and are generally furnished with a supply of acid sap, which possesses considerable dissolving power on rocks and mineral substances generally. In this connection it may be pointed out that a good deal of the value of partly decomposed organic manures consists in their rendering available, that is to say, soluble, much of the food already contained in the surrounding soil, through the action of the acids produced by their continued fermentation and decomposition.

Most of the carbon which makes up so large a part of the solid constituents of every plant is obtained by means of the leaves from the air. The gas, carbon dioxide, is absorbed by

### No. 3. BULBS



1. A pot of hyacinth bulbs, before covering. 2. Lily of the valley crowns potted up. 3. A pot of fresh bulbs, before covering. 4. A pan of Roman hyacinths before covering. 5. Correct method of picking out seedlings.

**No. 4. LILY OF THE VALLEY**

1. Lily of the valley: crowns divided before potting up.

the leaves, and in the plant is split up into its component parts, the carbon being retained, and the oxygen again discharged into the atmosphere. This process only takes place to any extent in the presence of sunlight. Side by side with this taking in of carbon dioxide and giving out of oxygen, the leaves are always performing ordinary acts of respiration parallel with those of animals, that is to say, taking in oxygen and exhaling carbon dioxide gas. In the absence of sunlight this latter process continues, whilst the other process is discontinued, so that, to a small extent, plants tend at night time to use up air, much as we do ourselves. One order of plants, that known as the leguminous order, to which the peas and beans belong, has the further property of obtaining through its leaves nitrogen from the air, and consequent on this fact leguminous plants are now known to play quite a considerable part in promoting soil fertility. This whole matter, however, is discussed elsewhere in this book.

The surfaces of leaves through which these elaborate physiological processes take place are themselves by no means the simple and homogeneous things which they appear to be. They are furnished with little mouths or stomata, often to the number of hundreds of thousands to the square inch, and it is through these that water, vapour, and gases pass into and out of the plant. How important it is that the roots and the leaves of plants shall be in no way injured should be now apparent. They are, as it were, the lungs and the stomach of the plant, and every leaf that is wantonly removed, and every rootlet that is wantonly damaged, lowers to that extent the strength and growing power of the plant.

The importance, indeed the absolute necessity, of every plant being provided with an adequate supply of water at its roots will, in the light of what has just been said, be obvious. Not only does water constitute the greater part of the bulk of every plant—so much as ninety per cent. in the case of the turnip, and fifty per cent. even in the case of timber—but it also has to act as the blood of the plant, that is to say, as the carrying medium for all the food and air which the several parts of the plant require. Air and food and water and light are thus the bare necessities of plant life, but a certain degree of heat is essential for any active process to take place. Unless that degree of heat is attained no food is absorbed, no chemical changes take place, no growth results. The plant simply becomes numb and stagnates, and should the cold reach a certain level of intensity the plant dies.

The stomata play so important a part in the routine of the plant's existence, that the keeping of them clean and open,

unclogged by soot or dust, is vital to the health of the plant. It is for this reason that plants grown indoors or in greenhouse require frequent sponging or syringing of their leaves if they are to flourish, and why so many plants are unable to grow within the reach of the smoky atmosphere of towns.

Nor must the plant's roots be looked upon as a mere instrument for fixing it in space. Their physiological function, that of obtaining food from the soil, is clearly even more important than their mechanical one. It is the little root fibres, with their *fine hairs, that are mainly concerned in the absorption of food and the elimination of waste products.* Through the thin walls of their cells liquid is able slowly to filter; consequently in any act of planting or transplanting the less these fine rootlets are damaged the more quickly will the plant be able to resume its active life.

Besides the two functions just mentioned, roots also often perform another function. They serve as reservoirs or storehouses of food. The carrot, the turnip, the beet, and the parsnip, all afford marked examples of this use. In this way a plant is often able to drop its leaves and its stem, to cease from all activity for a season, and yet to have stored up in its root a sufficient supply of food and energy to enable it in the spring to put forth fresh rootlets and a fresh stem, and to produce fresh leaves.

But not roots alone are used by plants for the storage of nutriment. In the case of many plants which last more than a single season the stems often perform this function. Many forms such as tubers, and rhizomes, and rootstocks, which are popularly supposed to be forms of root, are really creeping or underground varieties of stem, modified so as to act as food granaries for the plant's future use. Examples of such tubers are afforded by the potato and the Jerusalem artichoke, whilst common examples of the rhizome or rootstock are shown by the primrose, the couch-grass, and the mint. Leaves again are often thickened and otherwise modified so as to serve as storehouses of nourishment. The ordinary bulb of hyacinth or lily consists essentially of numerous fleshy leaves closely laid one over another. As has been pointed out above, during the winter the activity of almost all plants is very much diminished, and in most cases comes practically to a standstill. To such plants the value of a stored-up hoard of food and solar energy is clear enough. It enables them to make an early start in the spring; it provides the wherewithal of the production of leaves and rootlets to carry on the necessary work. In other words, it enables such plants to lead a perennial life.

What, then, about plants for whom nature has made no such

thrifty provision? These plants, as individuals, die down when winter comes, and have no means to make a fresh start when the spring comes round again. This great group of plants is known as that of the Annuals.

For the perpetuation of their kind nature has arranged that before the individual plant dies the germ of a new plant shall have been created, and with that germ a sufficient supply of nourishment will have been stored to enable it to make some small start in life. This is true also of perennial plants, but in their case the creation of seeds is not generally so lavish, seeing that the plant's own life will not disappear with the end of the season. In all the higher or flowering plants—which class includes almost all those with which the gardener has to deal—the steps taken by nature to produce the seed by which the continuity of the species is accomplished are of a highly complex kind. Sexual organs are produced, in some of which are developed little ovules or unfertilised eggs or seeds, in others of which—the stamens—are developed grains of fertilising powder, called pollen. And in order that insects may be attracted to visit these organs, and in so doing convey the pollen from one to the ovules of another, nectar is produced and bright-coloured petals are flown to act as flags or signs. This is the accepted explanation of the brilliance of colour and attractive fragrance which so many of our wild flowers possess. By artificial selection gardeners have been enabled to create races of plants yielding flowers of increased brilliance and stronger perfume.

But the primary and sole natural function of the flower is the production of a fertilised seed, consisting of the nucleus of a new plant, more or less resembling its parents, and of a certain store of food and energy to enable it to produce its first roots and leaves, which in turn will absorb fresh supplies of nourishment from air and soil.

Normally the seed, having been fertilised and ripened, falls to the ground at the death of the plant, and lies dormant until the advent of spring, warmth, and sunshine. Then, in the presence of moisture, it germinates, and out of the seed proceeds an ascending axis and a descending axis, the former tending, no matter in what position the seed lies, to grow toward the light, the other tending to grow away from it. On the ascending axis soon appear one or more fleshy leaves, the so-called seed-leaves or cotyledons, and gradually are developed from this small beginning, stem and root and leaves and flowers, resembling those of last year's plant, of which the seed formed so small a part.

**Classes of Flowering Plants.**—For gardening purposes flowering plants are divided according to the length of their life into annuals, which live their entire life from seed to flower and subsequent fruit in a single year; biennials, which occupy two years in these processes, and perennials, which go on bearing flowers year after year. According to their ability to bear our climate, plants are classified again as hardy, half-hardy, and tender, needing respectively no protection throughout the year, or some protection during the winter, or to be grown under glass the year through. Perennial plants, again, are subdivided into herbaceous plants, which die down to the ground every autumn, shooting up fresh from the roots each spring, and shrubby plants, which may or may not drop their leaves, but in any event retain their stems year after year.

**Hardy Perennial Plants.**—Of all sections of garden plants that of Hardy Perennials is on the whole the most satisfying and the most interesting. Each individual plant comes to possess a certain character and certain associations of its own, which no annual and no tender transplanted flower of a season can ever own. Hardy perennial plants are those which possess a herbaceous character, for the most part dying down in the autumn and springing up fresh from the base in the spring. But many of them are evergreen or evergrey plants, furnishing beauty in winter as well as in summer time.

Hardy perennials have always been characteristic features of English gardens, and the majority of our old-fashioned flowers belong to this group. Moreover, they are the simplest of all to grow, and most of them yield beauty of form as well as of colour, whilst the greater number of fragrant flowers and fragrant leaves are yielded by them. At the same time, hardy perennials are by no means universally properly grown. Because they will grow almost anyhow, and almost anywhere, it is often thought sufficient to dig holes in the ground and put their roots therein. But in order that these plants may give their full measure of grace and beauty considerable care and preparation is necessary, and much judgment is called for in the spacing and arrangement of the plants. At the same time, the rules which must be observed are of the simplest, and the situation must be indeed unfavourable where the true flower-lover may not by the exercise of reasonable labour and patience grow some or other of the most beautiful of our hardy perennials.

In general we may say that the less obvious formality the better. We do not want our flower borders to be imitations of our carpets;

or, on the other hand, mere museum collections of specimens. Not that we can leave the matter to nature any more than we can the building of our houses. The planning of a hardy flower border calls for all our knowledge, our taste and our ingenuity. We wish to produce a so-called natural effect, but we wish each individual plant to have scope for the full and free development of its own individual beauty. There are many ways in which hardy plants may be grown: in beds cut out of lawns, in borders edging shrubberies, in rock gardens, or in borders against walls or fringing paths. These latter ways are for the great majority of hardy plants the most satisfactory of all; for they need, at no season of the year, be other than full of interest and surprise. There are some plants, it is true, which are better grown in beds, such as carnations, stocks, ranunculuses, and some of the anemones. Many of the so-called Hardy Florist's flowers are best grown by themselves. This is true of pansies, picotees and some others. But in no other way can so satisfactory a result be obtained as by growing these hardy plants in wide, well-arranged borders.

The ground intended to be devoted to this purpose should be thoroughly prepared in advance. This is even more important than in the case of beds of annuals or of tender plants, which will occupy the ground but for a single season. For the properly-prepared and properly-planted border should not require thorough remaking or replanting for many years to come; for one of its chief charms consists in the "settled-down" appearance, which is only possible for plants which have occupied the same ground for some time. Some months previous to planting, the ground should be deeply dug to a depth of three feet. The soil occupying the lowest foot should not be brought to the surface, but should be thoroughly broken up, a moderate amount of farmyard manure added to it, and the mixture left in its original place. On this should again be placed a little dressing of manure, and on this the second or middle foot of soil. On this should be placed another liberal dressing of manure, and a moderate dressing should also be incorporated with the top foot of soil. All this should take place, as I have said, some time before planting, so that the manure may become well rotted down, and more or less incorporated with the soil. Should the soil be very heavy it may be well to place at the bottom of the dug or trenched ground several inches of large stones or broken brick to provide drainage, and to add to the soil sand and leaf-mould. On the other hand, should the soil be naturally very light, the dressings of stable manure may be more liberal, and a certain amount of clay may be added with advantage. The actual planting is



best performed either in the autumn or very early spring, though where care is taken in transplanting to leave a liberal amount of soil round the roots, the process is possible at almost any season of the year. Generous watering must then be given twice daily if the process takes place during the summer months.

Where space permits it is usually desirable to plant several specimens of a plant together, so as to form a group, allowing, however, sufficient space between each individual for its satisfactory development. On the whole, of course, the taller growing plants should be arranged at the back of the border, and the smaller and dwarf growing ones at the front. But it is important to avoid any appearance of stiffness and formality. Groups of moderate-sized plants should here and there abut almost on to the front margin, whilst small growing and creeping plants should seem to find their way right to the back, at the base of the taller ones. So far as space provision is concerned, the aim should be to show practically no bare earth during the periods of active growth, and at the same time to avoid any overcrowding which interferes with individual development. There is thus great scope for observation and knowledge of the habits of plants, as well as for taste in the harmonious arrangement of colours and forms.

Gardeners who have any other aims than the mere production of specimen plants for exhibition would do well to study much more than they commonly do, not only their neighbours' gardens, but hedgerows and railway embankments and wayside waste spaces. They will thus learn how the more beautiful effects are produced in nature, why such and such a grouping is effective and pleasing, while another arrangement presents an appearance either of artifice on the one hand, or a mere disorder on the other. They will learn, among other things, that much of the natural beauty of plants is bound up with their adaptation of structure to natural environment; in other words, much of their beauty is essentially parallel to the beauty of all articles really adapted to the function they have to perform. In a well-constructed herbaceous border no plant would look out of place. The aim should be to give it the appearance of naturally occurring in the situation in which it is seen, of having made its home and settled down there. Nothing is so fatal to beauty and repose in the flower garden as the look of unsettledness and constant removal, which is as unbeautiful and uninteresting as are the corresponding phenomena in a new suburb. To some extent, also, plants in a hardy herbaceous border should be permitted to develop and spread according to their own natural

habits and tendencies. But that does not mean that the border once planted, should be left to chance. The watchful eyes of the gardener must be ever on the alert, lest the more rampant and more vigorous plants overgrow and throttle their more modest and unpushful neighbours. Plants like the perennial sun-flowers, for instance, beautiful though they are, should not form too frequent a feature in a mixed border, but should rather be kept to themselves in bold groups, where their rapidly spreading and voracious roots can do little harm to neighbouring plants. Plants with creeping stems or stolons need especial watching in this matter, or soon they will usurp all the ground about them, destroying the inhabitants as they spread. Clumps of plants which have become over-dense and consequently have exhausted the soil in their immediate neighbourhood with a resulting lack of vigour, will require dividing, and some or the whole of the divisions replanting in a fresh situation. Other plants will require a little surface mulching, and so on

Few herbaceous borders should remain without replanting for more than three or four years, and it will generally be found the most convenient, and in every way the most satisfactory plan, to deal with a quarter or a third of a border each year, entirely remaking the soil, digging it deeply, giving it fresh manure, and replanting it. In this way the work is kept within moderate bounds, that total appearance of newness which a freshly-made border inevitably has for a time is avoided, and the maximum of fresh interests and old associations is afforded.

It is round the herbaceous border that gardening associations grow. Here those plants that come year by year in the one accustomed spot are found. Here most of those plants whose fragrance remains in the memory find a place. Here most of those old-fashioned plants around which a thousand literary and poetic associations have been built by English writers, make their home. It is in the mixed border again, that the new plants obtained from some collector or florist are afforded sanctuary. Here a spot is found for the plant or offset of some admired flower given us by a friend, or treasured from some holiday. Moreover, in no other way can the majority of hardy plants be so healthily grown, and yield such natural grace. For, by careful planting, just that right amount of shade and protection can be afforded by one plant to another without that airlessness and sunlessness which more artificial forms of protection are so apt to produce.

So far as possible care should be taken that the roots of trees do not trespass on the hardy border, and rob its occupants of nourishment. Not that hardy borders fringing shrubberies are

impossible or undesirable. On the contrary, such borders afford the very best situation for growing many of our most beautiful plants, such as lilies, Solomon's seal, dornicums, Michaelmas daisies, and ferns. But constant surface mulching will be required, and some of the more sensitive of our hardy plants are likely to be starved by the roots of the shrubs. But the herbaceous border proper may be backed by a wall or a trellis work, covered with clematis and rose, or dwarf cordon fruit trees, or it may be bordered on either side by wide grass walks. The width of the border must naturally vary according to the size of the garden and many other considerations. But where possible it should be not less than four feet wide, and where there is plenty of space it should be at least double that width. In planning be careful not to repeat the same plant at regular intervals in the border, or an appearance of artifice will inevitably result, which is fatal to the real charm of the mixed border. Nor should the flowering seasons of the plants employed be forgotten. In almost every month of the year each yard of border should include some plant then at its moment of supreme interest. Thus the whole border will, almost throughout the year, show in every part not only the beauty of plants growing and plants mature, but also of plants at the zenith of their glory.

Where a border is fringed on either side by grass walks the centre of the border should be slightly raised, and should slope down towards either edge; but where the background is a wall or trellis, then the border should slope slightly from back to front. The sort of effect to aim at in constructing a hardy mixed border is well conveyed by an account given by the late Frank Miles of his own aims and results.

For all practical intents and purposes every six inches of ground could contain its plant, so that no six inches of bare ground need obtrude on the eye. Supposing the back of the border filled with delphiniums, phloxes and roses, pegged down, and other summer and autumn blooming plants, the ground at the back might be carpeted with spring blooming flowers, so that when the roses are bare and the delphiniums and phloxes have not yet pushed above ground, the border should even then be a blaze of beauty. Crocuses, snowdrops, aconites, and primroses are quite enough for that purpose. The whole space under the roses might be covered with common wood anemone, golden wood anemone, early cyclamens and dwarf daffodils. Among the roses and pæonies and other medium-sized shrubs would be put all the taller lilies, such as require continual shade on their roots, and such as pardalium and the Californian lilies

generally, the Japanese, Chinese, and finer American lilies. In the front of the border there would be such combinations as the great St. Bruno's Lily and the delicate hardy columbines, primroses planted over hardy autumn gladioli, so that when the primroses are at rest the gladioli might catch the eye; carnations and daffodils, so planted that the carnations form a maze of blue-green for the delicate creams and oranges of the daffodils. When the daffodils are gone there are the carnations in autumn. A mass of *Iberis correaefolia* is the very best thing possible for some *lilium Browni* to grow through, for the *Iberis*, flowering early, first makes a protection for the young growth of the *Browni*, and then a lovely dark green setting for the infinite beauty of the lily flowers. If you once get it into your head that no bit of ground ought ever to be seen without flowers or immediate prospect of flowers, heaps of combinations will immediately occur to those conversant with plants, and the deep rooting habits of most bulbs, and the surface rooting of many herbaceous plants—for instance, colchicums and daffodils, with a surface of *Campanula pusilla alba*. The big leaves of the colchicum grow in spring, and there would be nothing but leaves if it were not for the masses of daffodils. By and by the leaves of the colchicums and daffodils are dry enough to pull away, and then the *campanula*, be it *pusilla*, *pusilla alba* or *turbinata alba*, comes into a sheet of bloom. Before the blooms have passed away the colchicum blooms begin to push up.

The daffodils and colchicums root deeply, and grow mostly in winter, requiring water then and not in summer, when the *campanula* carpet is taking it all. There are some, however, which one must be careful about—the common White Lily, for instance, which wants exposure to the sun in autumn. The exquisite French poppies are excellent among these candidum lilies, because the poppies die about August, and then the lilies get their baking, and refuse to show the bare earth, soon covering it all with their leaves. For the extreme front of the border hundreds of combinations will occur—pansies over daffodils, *Portaculas* over Central Asian bulbs, Christmas roses and *Heldebores* over the taller daffodils, with *Gladioli*, *Tritomas* and giant daffodils, *Hepaticas*, and autumn-blooming and spring-blooming cyclamens, with *Scillas* and snowdrops. When *Anemone Japonica* is low, up come the taller Tulips, *Sylvestris*, for instance; and higher still out of the dark green leaves come the jewelled Crown Imperials.

The following list is a good one from which to choose in planting a permanent mixed herbaceous border, for it does not include any

plants which are not perfectly hardy in our English climate. This quality is essential in forming such a border, as the removal for winter housing of tender or half-hardy plants would leave ugly gaps, upsetting all the balance and harmony of the planning. The selection is Mr. Robinson's.

Acanthus, Achillea, Acis, Aconitum, Adonis, Agapanthus, Agrostemma, Allium, Allysum, Alstroemeria, Amaryllis, Ambergboa, Anemone, Anthericum, Antirrhinum, Arabis, Arenaria, Argemone, Armeria, Arnebia, Arum, Aster, Aubrietia, Bartonia, Bellis, Bocconia, Brachycome, Brodiaea, Calendula, Calliopis, Calochortus, Caltha, Campanula, Carnations, Catananche, Centaurea, Cerastium, Cheiranthus, Chelone, Chionodoxa, Chrysanthemum, Colchicum, Convallaria, Convolvulus, Coreopsis, Corydalis, Crocus, Cyclamen, Cypripedium, Delphinium, Dianthus, Dielytra, Digitalis, Dodecatheon, Doronicum, Dryas, Echinops, Epilobium, Epimedium, Eremurus, Erigeron, Erodium, Eryngium, Erythronium, Eschscholtzia, Eutoca, Fritillaria, Fuschia, Funkia, Gaillardia, Galanthus, Galtonia, Gentiana, Geranium, Geum, Gladiolus, Godetia, Gypsophila, Helenium, Helianthemum, Helianthus, Helichrysum, Helleborus, Hepatica, Hesperis, Heuchera, Hieracium, Hollyhock, Hyacinthus, Iberis, Iris, Ixiolirion, Kniphofia, Lathyrus, Lavatera, Lavendula, Leucojum, Lilium, Linaria, Linum, Lobelia, Lupinus, Lychnis, Lythospermum, Lythrum, Malope, Malva, Meconopsis, Megasea, Michauxia, Mimulus, Mirabilis, Monardia, Montbretia, Muscari, Myosotis, Narcissus, Oenothera, Onosma, Orchis, Ornithogalum, Orobus, Omphalodes, Oxalis, Papaver, Pæonia, Pancratium, Pansy, Pentstemon, Phlomis, Phlox, Physalis, Portulaca, Polemonium, Potentilla, Plumbago, Primula, Puschkinia, Pyrethrum, Ramondia, Rhodanthe, Rockets, Rudbeckia, Ranunculus, Salpiglossis, Salvia, Saponaria, Saxifrage, Scabiosa, Schizostylis, Scilla, Sedum, Sempervivum, Senecio, Sidalcea, Sparaxis, Spiraea, Statice, Sternbergia, Stocks, Sweet Pea, Sweet William, Symphytum, Thymus, Tiarella, Tigridia, Tradescantia, Trillium, Tritelia, Tritonia, Trollius, Tropæolum, Tulipa, Veratrum, Verbascum, Veronica, Viola, Waldsteinia, Wallflower, Zephyranthes, Zinnia.

**Annuals.**—The class of plants which flower and fruit in the same year as that in which its seeds are sown, or, at any rate, complete the series of those processes within twelve months of the time of sowing, is known as that of Annuals. In the flower garden it includes some of the most beautiful, as well as undoubtedly the most easily grown of all those things which make up a typical English garden. It is only necessary to name

a few of the commoner annual garden flowers to realise how large a part they play. Sweet peas, and mignonette and poppies and nasturtiums and marigolds and cornflowers, the number is legion. No other class of plants enables us at so small an expense and in so short a time to produce a show of colour and a wealth of beautiful vegetation.

If the ground has been thoroughly dug, thoroughly enriched and properly prepared, a few shillingsworth of seed, with possibly a glass frame or two for raising some of the more delicate seeds, will make quite a large garden gay and splendid for a considerable part of the year. In every garden Annuals have an important part to play, but they have special qualities which peculiarly fit them for certain purposes. Thus in starting a new garden, even though ultimately its principal tenants are to be fruit trees and shrubs and perennial plants, yet during that first year or two, while the more permanent features are getting established, themselves producing as yet a comparatively small effect, the garden may be kept interesting and full of flowers by means of annuals. Then, again, as often happens in these days, when one's tenure is likely to be of the briefest, and one feels accordingly loth to spend money and time in permanent plantations, of which, likely enough, one will be unable to reap the harvest, Annuals offer a means for the quick, easy, and economical furnishing of any plot of ground.

For bedding purposes, again, that is to say, for the provision of splashes of bright colour in prominent positions, which, though perhaps the least interesting of all branches of flower gardening, yet has its uses and even its necessity, Annuals often have many advantages over the so-called conventional bedding plants. Many of them have long periods of flowering, which can be considerably increased by picking off the flowers as soon as they have passed their best, and their hardiness often enables them to continue in blossom long after frost has nipped and disfigured such tender subjects as geraniums. Moreover, in beds annual plants seem altogether more natural and in place than do many of those more delicate plants so often used. These plants being, as they are, great seed producers, and themselves running their course and dying in a single season, naturally occur in nature as masses rather than as individuals, through the seed from the parent being generously scattered in the neighbourhood of the plant of the previous year, and those who have seen only beds of so-called bedding-out plants can have little conception of the gay and glorious effect of beds of candytufts, forget-me-nots, dwarf nasturtiums, and Chinese asters.

In growing annuals it is important that the ground shall be well prepared, and that it shall have been well enriched some months previously. It is, however, possible for the ground to be too rich, where flowers are the product desired. In such soil certain plants tend to run to the production of leaf and stem rather than flower, and of this there is a physiological explanation. There seems to be a kind of instinct in plants to produce flowers, and consequently seed, so as to secure the continuity of the species, most pronounced when the food supply is limited, and the life of the individual consequently threatened. Still, for the production of good flowers a condition of health in the plants is necessary, so that a happy medium should be struck in this matter of enrichment of the soil. In almost all cases, however, it is wise to incorporate with the natural earth a very generous allowance of humus or of leaves or other decomposing vegetable matter which will help to create humus. In the process of decomposition of leaves or other organic matter, various acids and other products are created, which tend to liberate from the mineral elements in the soil certain foods essential to the life of plants. Gases also are generated, which help to keep the soil in a porous, spongy condition, which is agreeable to the roots, and which assists in the maintenance of that moist condition so essential to healthy growth.

There is one great fault, which is all too common among amateurs who raise annual or other plants from seed. It is the fault of overcrowding. It seems to be thought that if one seed produces so much beauty, ten seeds sown on the same area will produce ten times as much. Nothing could be further from the truth. The right thickness or density for plants where several of a kind are grown together, whether they be annual or perennial, is that which allows the full-grown plants just to touch one another without interfering with their natural shape. It is usually undesirable that bare earth should to any appreciable extent remain uncovered, but the way to provide for this is to arrange for the maximum development of each individual plant, rather than to aim at the production of a mass of stunted specimens.

Annual plants may often with advantage be sown on the site which it is intended that they shall occupy during their flowering period. In such cases the soil, having been prepared as already suggested, the surface should be carefully freed from stones and sods and finely raked. The seed should then be thinly sown, either in shallow drills or broadcast, the earth being subsequently raked over them, so that in either case they are buried to a little more than their own depth. They should be

sown thinly, though three or four times as thickly as it is intended for the plants ultimately to remain. This is necessary in the first place, because some of the seeds will probably fail to germinate, and in the second place because the sowing will not be quite regular and even. After their appearance the seedlings should be further thinned, especially where little clumps of two or three plants come up together. After the seed has been sown the surface of the ground should be made moderately firm by pressing it with the rake or some other means. If the ground is inclined to be dry it should be carefully watered from a watering pot through a fine rose. Seeds of hardy annuals may be sown at intervals on dry days throughout March and April, and also at the end of August for early spring flowering. Very fine seeds may best be covered by sifting over them a very little finely sifted leaf-mould, mixed with light soil. The seed having been sown, it is well, in dry weather, to check evaporation by covering the surface of the ground with boughs or other screens. When it is intended to transplant the seedlings seed is best sown on soil the top four inches of which is half leaf-mould, or partly decomposed horse droppings. In this way fibrous roots are encouraged near the surface, and the young plants can be easily transplanted together with the fibrous mass adhering to their roots.

A few of the more useful hardy annuals for bedding purposes are *convolvulus minor*, dwarf nasturtium, *saponaria calabrica*, *Linum grandiflorum*, candytufts, forget-me-not, sweet alyssum, *silene pendula*, *nemophila*, *limnanthes Douglasi*, and *lupinus nana*.

Half-hardy annuals can mostly be raised by sowing in the open early in May, but success is more likely to be obtained if the seed be sown in April, on a very gentle hot-bed, consisting of a heap of leaves firmly packed together, with four inches of soil on top, the soil being not more than five or six inches from the glass. The soil should be well watered, and the glass should be covered with mats or boughs until the seedlings are well up. The seedlings can be transferred to the open about the middle of May. Among the more useful half-hardy annuals may be mentioned stocks, asters, petunias, lobelias, Indian pinks, scabiouses, gaillardias, and *salpiglossis*.

**Biennials.**—Biennials are a useful class of garden plant, coming between the annuals and the perennials. They flower in their second year, and should be sown in the late summer for flowering the following season but one. When sown early the young plants have a better chance of making good growth for the winter. They should be planted out for flowering the second summer,



the time varying with the kind of plant, but roughly between March and September. They will flower the following summer or spring. The seeds of most biennials should be sown in drills in well-dug, moderately rich garden soil, the situation being preferably not too sunny. The seeds should be well watered, and, should the weather be dry, windy or sunny, the bed should be shaded to prevent the surface of the soil from drying too quickly. The shading must be removed as soon as the young plants show above the ground. The young plants will be twice transplanted: once when they have made growth enough to be handled and before they have become crowded, and again when they are moved into their flowering position. The first time the seedlings should be planted out in rows with a few inches between each plant. Room should be allowed for free growth, and for the removal of a good ball of soil with the roots at the second move. The biennials are largely used as "bedding-out plants."

**Bedding Plants.**—Almost all flowers can be used to furnish beds, and it is now a common practice to use for this purpose such beautiful annuals as *Saponaria*, *Forget-me-not*, or such hardy plants as pansies and violas. Still, the old term of "bedding plants" is commonly used to refer to certain half-hardy or tender flowering plants which are grown under glass during the winter and spring, and are merely planted out during the hot months of summer to be again lifted as soon as summer is over. *Pelargoniums* or geraniums, as they are commonly called, and *begonias* are the two plants perhaps most frequently grown in this way; the latter being commonly prepared by planting the tubers in pots with a rich soil in April, and placing the pots in a cool frame or cool greenhouse until June. Early in that month the plants are commonly placed out in beds, moderately enriched, of finely dug soil.

*Pelargoniums* are plants of much more beautiful habit, and some will consider it somewhat sacrilegious to use so elegant a plant in order merely to produce masses of colour. Whether intended for bedding purposes or for the production of individual specimens, *pelargoniums* are generally propagated by taking, early in August, sturdy cuttings about four to six inches long, cut square with a sharp knife, just below a joint. The plants from which the cuttings are taken are preferably such as have been grown under a full exposure to the sun. These cuttings should at once be planted in clean three-inch pots, which have been soaked for an hour in water. The bottom quarter of the pot should be filled with broken crocks to provide

thorough drainage. On this should be laid the soil, composed of a mixture of turfy loam, sand, and leaf-mould, without any admixture of manure. The top half-inch of the pot should be filled with pure coarse sand. A hole should be made about two inches deep by means of a blunt stick, and in this the cutting should be placed, the soil being pushed firmly up round it by prodding obliquely with the stick. The pots should be stood on a thick layer of ashes in the open air in a shady place, and should be soaked with water from a watering pot through a fine rose. Directly the surface soil becomes dry and crumbly, but not before, water should again be given in the morning, a thorough soaking being given whenever water is necessary, not a mere sprinkling. In about a fortnight all the dead leaves which can be separated without force should be removed. During the winter the pots should be kept in the cool greenhouse, or close to the window in a living room, where they will be protected from frost, but will not be subjected to any degree of heat. During the winter very little water should be given. Early in March the tops should be cut, and growth should be encouraged by a little warmth and more liberal supplies of water. They may be planted out in beds early in May. Instead of taking cuttings in the autumn old plants can be lifted at that season, potted, and placed in the cool greenhouse or cool frost-proof room for the winter. In spring cuttings can be taken from them and placed in heat or in a warm room.

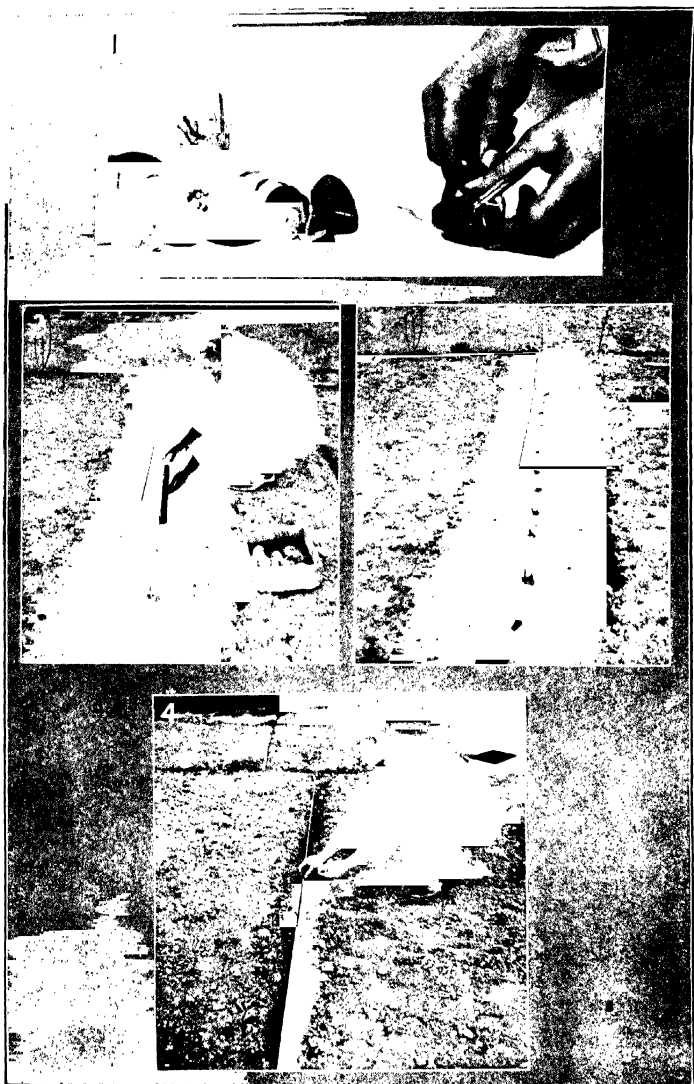
**Carpet Bedding.**—Carpet bedding has largely gone out of fashion, except in the case of a few large and very formal gardens. It consists in arranging masses of low, compact-growing plants, with various coloured leaves in such a manner as to show patterns. It is usual to arrange a background of plants of some one colour, and through this to run plants of other colours in masses, stripes or ribbons, so as to produce the artificial result desired. Among the commoner plants used for this purpose are *Sempervivum* of various colours (grey and green), *Echiverias*, *Sedum Glaucum* (grey), *Cerastium tomentosum* (silver), *Herniaria Glabra* (green) and *Pyrethrum Auream* (yellow).

**Flowering Bulbs.**—For gardening purposes the term “bulbs,” which strictly is applicable only to underground buds surrounded by fleshy scales like the onion, the lily and the hyacinth, may be taken to include corms, which are a kind of dumpy tubers, or underground fleshy stem, with one “eye” only, like the crocus and the cyclamen; and some tubers, such as the anemone.

The one common feature of all these is their possession of a store of nourishment formed by the activity of last year's plant in the presence of last year's sun, enabling them to produce leaves, stems, and flowers before this year's sunlight has been sufficient to enable them to accumulate a fresh supply. Consequently bulbous plants are among the earliest flowering plants of the year, and it is to them that we owe the beauty of the snowdrop, the winter aconite, and the crocus. The generality of bulbs are of the easiest cultivation, needing but to be planted in the early autumn at about two or three times their own depth, in reasonably good and light garden soil, with which a good amount of leaf-mould has been mixed. They should not come into contact with recent manure, and good drainage is essential. Many bulbs such as the crocus and the winter aconite and the scillas and narcissi do well, and look very beautiful when planted in grass on lawn or in orchard. In such situations they often succeed in naturalising themselves, and in flowering year after year for generations.

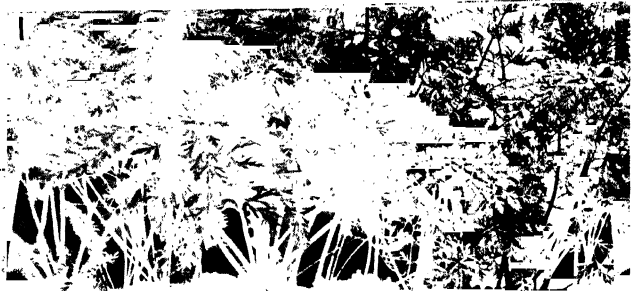
Most bulbs, having been planted in suitable soil at a reasonable distance apart, may be allowed to remain for several years without being taken up, divided and replanted. But there are certain exceptions. Tulips and hyacinths, for example, should be lifted when the leaves die down, carefully dried, stored in a cool dry place, and replanted in September. Ranunculuses and anemones should be planted in fairly rich deep soil early in February, being placed about three inches apart in drills five inches apart; the drills being made about three inches deep, an inch of soil being loosely spread along their bottoms, and the roots pressed therein. These should be taken up as soon as the leaves die down. Gladioli again should be lifted in autumn and planted in April. But as a general rule we may take it that the shorter time bulbs are out of the ground each year the better. Lilies of the valley should only be distributed at intervals of a few years. They should have beds to themselves, and each year one bed or a part of a bed should be lifted and the crowns replanted in well-dug and moderately enriched soil. Nothing else should be grown in a bed occupied by these flowers. Of the lilies proper the number is very large, and different kinds call for special treatment. But as a general rule they rejoice in partial shade and shelter from cold winds in positions such as the open spaces among evergreen shrubs. They like a certain degree of moisture at the roots, and it is essential that the soil be well drained. No manure must touch the bulbs. They should be planted from six to eight inches deep, in light fibrous loam,

## No. 5. SOWING POTATOES AND TURNIPS



1. Cutting seed potatoes.
2. Placing the potato shoots in a trench twelve inches from each other.
3. A trench fully planted.
4. Sowing turnip seeds; the seed is held between the thumb and first finger.

## No. 6. CARROTS AND LETTUCE



A row of carrots before thinning. 2. After thinning. 3. A row of lettuce before thinning. 4. After thinning.

containing plenty of leaf-mould, and, if possible, a certain amount of peat. As a general rule lilies should not be much disturbed. For open cultivation among the most satisfactory lilies are *Auratum*, *Candidum*, *Croceum*, *Davuricum*, *Martagon*, *Speciosum album*, *Speciosum rubrum*, *Thunbergianum*, and *Tigrinum splendens*.

Here it is only possible to name a few of the most beautiful and simplest grown of bulbous plants. In addition to those already mentioned, we have in winter the early flowering irises: *I. Reticulata*, *I. Stylosa*, and *I. Histrio*, the *Chionodoxa*, *Anemone Appenina*, *A. Fulgens*, *A. Coronaria*, and numerous other beautiful species of anemone; the fritillaria *Meleagris*, and the large fritillary, or Crown Imperial; many species of *Scilla*, the numerous spring and summer-flowering irises, including the common and beautiful Spanish iris and English iris with narcissi in enormous variety.

**Bulbs in Fibre.**—A very charming and simple way of growing bulbs for indoor decoration is to plant them in suitable bowls or pots in a special kind of fibre which is sold for the purpose. Almost all kinds of bulbs can be grown in this way—we use “bulb” in its widest and popular sense, including in the class many plants, such as the crocus, which are commonly called bulbs, although they are really corms—and if well grown and flowered they make most beautiful room plants. When growing bulbs in this way in small numbers it is obvious that it is false economy to buy any but the best bulbs for treatment. It is waste of time, labour, and space to grow small and weak plants, some of which may not flower at all. In ordering the bulbs it is best to tell the people from whom they are procured that they are required for this form of culture, and they will select suitable bulbs. At the same time order the fibre, which will be found on experiment to be the best material for filling the bulb bowls. These latter should be simple in shape and colour, so that they may not distract attention from or clash with the flowers growing in them, and should be shallow and glazed. Porous bowls are not good. Mixed with the fibre will be found a certain proportion of lumps of charcoal, and a few of them should be placed at the bottom of the bowl. If the fibre is at all lumpy pick it over and rub out the lumps between the fingers, watering it previously until it is nice and damp. Then fill your bowls to a depth of about one-half for large bulbs, such as the narcissi and hyacinths, three-quarters for the smaller, such as crocuses and scillas. On this layer place your bulbs; if the bulb is very large grouping them in small clumps, not

*spacing them regularly over it ; if it is small the bulbs may nearly but not quite touch. Then fill the bowl nearly to the top with the fibre, so that the extreme tips of the bulbs just show above it, and the planting process is complete.*

The bowls should be kept for the first three weeks in a dark place, preferably an airy one, and certainly not near a fire. A cool airy cupboard or cellar will do. Once a week or so examine the bowls to see whether the fibre is dry, and if it shows signs of dryness plunge them in a tub or basin of lukewarm water, which should cover them completely. When the fibre is well soaked take out the bowls and turn them carefully sideways, so that any superfluous water may drain off. While this is being done care must be taken that the whole of the contents of the bowl do not fall out ; the fibre should be supported by the open hand during the operation. The fibre should be just damp, never sodden. When the bulbs have made shoots about an inch long the bowls should be brought out into the light, but they should not be exposed to full air and sunshine until the shoots have turned a healthy green. While this is happening the bowls should be kept in a shady corner of the room. When the shoots are green the more light and air they have the better, but when they are placed in a window they should always be removed to the middle of the room if there is the smallest likelihood of a frost during the night. It should also be remembered that the plants will naturally grow towards the light, so that to ensure good straight plants and flower stalks the bowls should be turned each day.

**Carnations and Picotees.**—Carnations and picotees are so beautiful and unique among our garden flowers that they are worth a little more care and preparation than are often bestowed upon them. They grow best in a good loamy soil, with which has been mixed a liberal allowance of leaf-mould and a little well-rotted manure. They should not be crowded with other plants, and their flowering shoots should be staked in good time. They are easily grown from seed sown in a cool frame in March, and seedlings are more vigorous than plants raised from cuttings or layers, but if named varieties are desired these latter methods of propagation must be resorted to. Propagation by layers is the more satisfactory, the plant being surrounded by a mixture of loam, sand and peat-mould ; or, better still, a series of shallow pots being sunk in the ground round the plant and filled with this mixture, stems may be pegged down in this soil about the end of July, a slit being made upwards halfway through a joint so as to encourage the formation of roots, this joint being kept

down just below the surface of the soil by means of little wooden crooks or hair-pins. As soon as the layers have become well rooted in the pots they may be separated from the parent plant, and when the pots have become well full of roots the plants may be transferred to their permanent quarters. Tree carnations and Malmaisons are commonly grown in pots, containing similar soil to that recommended for outdoor carnations. They are easily grown in any cool glass-house, and can be made to yield abundance of beautiful flowers through the winter.

Gardeners give the name of pipings to the cuttings from pinks, carnations, and picotees. These are cut about five or six inches long, and the leaves are removed from the lower part of their stalks. They are raised in sandy soil, which should be pressed firmly into the pots, and should be kept either in a cold house, a cold frame, or under a hand light for the first few weeks. When they are well struck, and root formation has begun, they should be hardened off gradually.

**Pansies and Violas.**—The first week in April is a good time to obtain young plants of pansies and violas. They should then be planted out in good, moderately rich garden soil, which has been well and finely dug. For the first few days it is well to shade them from very hot sun, and to protect them at night from possible frosts by means of inverted flower pots. If large blooms are desired not more than four stems should be allowed to grow on any one plant, and only one or two blooms or buds should be allowed on each stem at a time. Cuttings are best taken during August and September. These strike readily, especially with the very slightest heat, though they will strike quite well, at any rate in August, if planted in a bed of sandy soil in a cool place in the garden. Pansies like plenty of leaf-mould in the top four inches of soil. The cuttings should be of young growths, not old hollow stems, and may be between two and three inches long.

Throughout the summer give plenty of water, and during June and July it is well to apply a mulch of leaves or short littery manure. Pansies and violas are easily raised from seed sown in a shady place in August, or in gentle heat in March and April.

**Dahlias.**—Dahlias are easily grown in ordinary garden soil, and in the South of England can be left in the ground all the winter if a heap of ashes or sand be placed over them. They are somewhat tender, and in any case it is better to lift them as soon as they have done flowering and have died down, and store the tubers in a dry, frost-proof place for the winter. The tubers may be planted in April in five-inch pots, and placed in a



frame or greenhouse, transferred to the open a month or so later, or they may be planted directly in the open ground in May about three inches deep. A deeply-dug and somewhat rich soil is preferred by these plants.

**Violets.**—Violets are raised from seed, from runners and by root division, the two latter being the commonest methods of propagation, though seedlings do very well. They like a moderately heavy rich soil, and will not stand a hot sunny border, preferring a north or north-east position, doing best in the shelter of a hedge. They do not like walls, and will not stand being shut in. They like sunshine in spring and shade during summer heats. If grown from runners these should be pegged down until well rooted, and then separated from the parent plant. If increased by root division the plants should be lifted and the roots carefully divided by hand, with as little injury or breakage as possible. For early flowers runners should be taken in spring and set out in rich soil, with frequent watering in dry weather, and the strong young plants thus obtained should be put into cold frames in early autumn. When winter sets in the frames should be filled with leaves and covered with the sashes with a shutter laid over them. Water is needed, and air when the weather is mild. The shutters should be removed one sash at a time at intervals of three or four weeks, keeping up in this way a continual supply of flowers until the plants in the open borders follow in their turn.

**Chrysanthemums.**—Chrysanthemums are best raised from cuttings, and in order to do this easily and successfully glass of some kind is required. The cuttings should be taken from stems which emerge from the soil at a little distance from the main stem of the plant. These will be found to root more easily and will go ahead better from the beginning than cuttings taken from the main stem itself. Where cuttings are made from the main plant, and not from suckers, they should be from two and a half to three inches long, not too straggly, with good healthy buds. The leaves should be removed, and they should then be treated in the same way as the suckers. These side shoots or suckers should be taken in their entire length, rootlets and all, and planted out half a dozen in a pot in three-inch pots, in a mixture of well-rotted leaf-mould, road grit or silver sand and fibrous loam, in about equal parts. This soil should be fine and thoroughly mixed, the rougher portions of it, including lumps of fibre and the coarser leaf-mould, being used in the bottoms of the pots. A light sprinkling of sand should be placed on the surface of the soil in the pot, so that when the hole is made

for the insertion of the cutting a little of the sand may run into the hole. The holes for the cuttings should be just deep enough for the first leaf joint to touch the soil. The compost used should be moist enough not to need immediate watering, a good soaking being given a few hours after potting. The best way of starting these cuttings is to place the pots in fibre in a temperature of from forty to forty-five degrees, and when well rooted potting them out singly, shifting first to a well-ventilated frame, and later to the greenhouse, in an average heat of not less than forty-five degrees. The date of putting out the plants varies with the locality and the season from the middle of April to the first week in May, but the latter date should be quite safe. Each plant should be staked at an early stage, and on putting out they should be gone over again and made secure. The pots should then be placed in rows standing upon slate or tiles to prevent worms from getting into them. Never allow the soil to become dry, and take the plants into the house again at the end of September at the latest. Chrysanthemums like good food, and a little guano or other concentrated manure, with a sprinkling of quarter-inch chopped bones, will help their growth greatly.

A useful and beautiful kind of chrysanthemum, which is very justly popular, is the outdoor summer-flowering kind, many of the varieties of which bloom as early as July, while they may be had in the open border until November. The outdoor varieties, both late and summer-blooming, should be cut down to a few inches from the ground when the flowering season is over, and covered with straw to protect them from the worst of the frosts. Manure in February. They like a rich, well-drained soil, and should be looked over in May, the weaker shoots being pinched out. In August they should be firmly staked and tied, ready for the real flowering season. By choosing your situation, planting the earlier bloomers in borders with a south aspect, and the later in those with north or east aspects, the season may be prolonged. The pompom and the Japanese varieties are distinct and beautiful, the former being very free flowering. The growing of exhibition chrysanthemums is such an extremely technical and complicated process that it is impossible to touch on it in this work.

**Sweet Peas.**—The Sweet Pea is a great favourite among gardeners who specialise in certain flowers, and for ordinary garden decoration, as well as for exhibition purposes, it is hard to beat for general utility and beauty. Sweet peas, to do well, require thoroughly prepared soil, which should be deeply dug

to a depth of two feet, and heavily manured in autumn. If it is left till the spring the same process should be carried out, but the manure then must be well rotted down, and as long a time as possible should be left before planting for the soil to settle. A little lime added while trenching will help. A thin top dressing of soot and superphosphate of lime forked well in during February is also good.

The seed is best sown in pots or boxes in a frame or cool greenhouse, and where choice varieties are dealt with it is well to "chip" each seed before planting; that is to say, to cut a small piece of the hard skin off it at a point farthest from the germinating spot. The seed should be sown in a compost of good garden loam, old manure, leaf-mould and sand, at a depth of not more than half an inch. The seedlings should be hardened off in March, or as soon as they have got their broad leaves, and should be planted out in April, the exact time depending on the weather and season. The easiest method of planting out is to make a hole with a trowel in the previously prepared soil, and to knock out the young plants, soil and all, in a ball into the hand, placing the whole mass in the hole prepared for it. Another way is to plant the seedlings out singly a foot apart, and when this is done great care must be taken in the separating of the plants from each other when removed from the pot. They should be staked with bushy branches, preferably hazel, as soon as possible after planting out, and if the branches are insufficiently bushy at their bases smaller twigs should be inserted between them to help the little plants to climb. During May and June they should be kept watered, and in late June and July the flowering period is at its height. The blooms should be kept cut as soon as they show signs of fading, as if the peas are allowed to ripen seed they will cease to flower. This rule does not, of course, apply to the late flowers where seed is required for next year.

Where sweet peas are sown out of doors they should be placed about three inches deep in shallow trenches, in rows at least five feet apart, six inches being left from seed to seed. Another way is to sow two rows, one on each side of the bottom of the trench, the distance between each seed being still six inches, but the rows alternating, so that the seeds of one row come between those of the other. A method sometimes employed with a view to getting early blooms is that of sowing in pots in frames in the autumn, the pots being plunged during the winter in ashes of cocoa fibre. They should be planted out as advised above in April, and plants grown in this way are nice and strong by planting-out time.

**Ornamental Grasses.**—A large number of ornamental grasses, both annual and perennial, are of very easy culture in ordinary gardens. Many of the larger kinds make handsome specimens growing by the sides of streams or lakes. Such are the Pampas Grasses, *Gynerium argenteum* and *G. Elegans*, *Formium tenax*, the New Zealand Flax, often six or more feet high with long broad glaucous green leaves; *Arundo Donax* and *A. Conspicua*, which much resemble the Pampas Grass; and a beautiful little known kind, *Glyceria Aquatica Variegata*. Many of the smaller grasses are beautiful in herbaceous borders and the rock garden. Among the more interesting of these are *Bromus Brizaeformis* and *B. Lanuginosus*; *Agrostis Laxiflora*, *A. Pulchella*, *Briza geniculata*, *B. gracilis*; *Eragrostis amabilis capillaris*; *E. papposa*; *Lagurus Ovatus* (Hare's Tail Grass); *Stipa lagascae*, and *Tricholaena rosea*. All these are annuals, and should be raised from seed sown in the spring. Among the best of the perennials are the water-side grasses mentioned above: *Apera arundinacea*; (pheasant's tail grass) and the various *Eulalias*.

**A List of Plants for Sandy Soils.**—Most of the bulbous plants do well in a sandy soil: Hyacinths, Snowdrops, Narcissi of all kinds, the wild Bluebell and other Scillas, together with Periwinkles, Anemones, including the common wood Anemone, Primroses, *silene pendula* and *aubrietia*, all coming in the spring. Later we have the Rock Cresses, London Pride, all the Snapdragons, *Coreopsis*, Lavender, Pinks, Sea pinks, Flax, *Achillea*, Irises, Gentian, Foxgloves, *Veronica*, *Saponaria*, Broom, *Honesty*, *Arenaria*, Sedums and *Sempervivums*, Sunflowers, and most of the heaths. Not many of the roses can be well grown in sandy soil, but a few of the teas and hybrid teas can be made to flower by careful treatment and enriching of the soil.

**Plants for Clay Soils.**—The roses are of all flowers the lovers of a rich clay soil, though, as has been said in the section devoted to these flowers, there are clays and clays. In the spring come Daffodils and Hepaticas, the bulbous plants mostly liking a lighter soil. In summer we have a large choice, nearly all the hardy perennials doing quite well in clayey soils. The Day lilies, Paeonies, Hollyhocks, Evening Primrose, *Veronica*, Asters and Sunflowers of all kinds, *Campanulas*, *Nasturtiums*, *Anemone Japonica*, *Columbines*, *Lathyrus*, Cannas, Geums, Bleeding Heart, *Centaurea*, *Gladioli*, St. John's Wort, *Rudbeckia*, *Gaillardia*, Tobacco, Scabious, Love-in-a-Mist, *Montbretia*, Christmas roses and all the *Chrysanthemums* do well in a clay soil, and give us plenty of choice for summer blooms. When growing

annuals in a very clayey soil it is best to rear them in pots or boxes, planting them out later in their permanent position.

**Plants for Chalky Soils.**—Chalky soil demands careful selection of its plants, but among those which love it are many of the most interesting species. It should always be well broken up, and moderately enriched, when Poppies, Snapdragons and Pinks all do well on it. Candytuft will run wild on almost pure chalk, as will the little Virginia Stock, Mignonette, Sweet Sultan, Lupins, Aubrietia, Achillea, Malva Moschata—which is found as a weed on chalky soils—Erigeron, Delphinium, Galega, Cistus, Scabious, Rock Rose, and Echium, are only a few of the chalk lovers.

**Some Hardy Marsh or Bog Plants.**—*Anagallis tenella*, *Calla palustris*, *Caltha*, *Campanula hederacea*, *Carex pendula*, *Chrysosplenium oppositifolium*, *Coptis trifoliata*, *Cornus Canadensis*, *Corydalis nobilis*, *Cypripedium spectabile*, *Drosera*, *Epilobium hirsutum*, *Equisetum*, *Eupatorium*, *Ficaria*, *Galax aphylla*, *Gentiana asclepiadea*, *Gunnera Scabra*, *Habenaria Ciliaris*, *Hemerocallis flava*, *Hibiscus*, *Iris Kaempferi*, *Iris Ochroleuca*, *Iris Pseudacorus*, *Iris sibirica*, *Lastric Oreopteris*, *Leucanthemum lacustre*, *Leucocjum aestivum*, *Linnaea borealis*, *Lobelia sphyllita*, *Lysimachia thyrsoiflora*, *Lythrum*, *Nierembergia rivularis*, *Orchis foliosa*, *Osmunda*, *Petasites vulgaris*, *Phormium tenax*, *Pinguicula*, *Primula japonica*, *Primula sikkimensis*, *Sagittaria*, *Sarracenia sagittifolia*, *Saxifraga aizoides*, *Sibthorpia europaea*, *Spiraeas* in variety, *Tradescantia virginica*, *Trillium grandiflorum*, *Viola palustris*.

**Some Plants to grow where exposed to North Wind.**—White Broom, Yellow Broom, Tamarisk, Mountain Ash, Laburnum, Sweet Briar, Box, Sweet Bay, Paeonies, Phlox, Spiraea, Pansies, Lupins, Foxgloves, Larkspurs, Primroses, Carnations, Pinks, Stocks, Asters, Auriculas, Iceland Poppies, Candytufts, Forget-me-nots.

**Some Plants to grow where Rabbits are abundant.**—Anemones, Azaleas, Box, Choisia, Clematis, Columbine, Daffodils, Euonymus, Forsythia suspensa, Foxgloves, Geraniums, Gorse, Honey-suckle, Irises, Jasmine, Laurel, Laurustinus, Lavender, Leucocjum, Lilies of the Valley, Marigolds, Musk, Myrtle, Pansies, Poppies, Primroses, Privet, St. John's Wort, Snowdrops, Solomon's Seal, Violets, Winter Aconites.

**Some Hardy Plants that thrive in the shade of Trees.**—*Aconitum* (various), *Ajuja reptans*, *Anemone* (various), *Aquilegia*, *Aralia edulis*, *Artemisia* (various), *Arum Dracunculius*, *Arum italicum*, *Asperula Odorata*, *Asphodelus ramosus*, *Aster* (various), *Astilbe*

(various), *Auricula*, *Baptisia* (various), *Betonica grandiflora*, *Bocconia cordata*, *Borago orientalis*, *Buphthalmum grandiflorum*, *Calystegia* (various), *Campanula* (various tall kinds), *Cardamine pratensis*, *Carex pendula*, *Centaurea montana*, *Clematis* (various), *Convallaria*, *Crambe cordifolia*, *Cyclamen* (various), *Delphinium* (various), *Dentaria* (various), *Digitalis*, *Dodecathron*, *Doronicum*, *Epilobium angustifolium*, *Epimedium pinnatum*, *Eryngium alpinum*, *Fragaria* (various), *Fritillaria* (various), *Funkia* (various), *Galanthus* (various), *Geranium* (various), *Geum*, *Helianthus* (various), *Helleborus* (various), *Hepatica* (various), *Heuchera* (various), *Hieracium* (various), *Humulus Lupulus*, *Iris* (various), *Lastrea* (various), *Lathyrus* (various), *Leucojum*, *Lilium* (various), *Lupinus polyphyllus*, *Lysimachia* (various), *Lythrum* (various), *Malva* (various), *Mimulus moschatus*, *Myosotis* (various), *Narcissus* (various), *Oenothera* (various), *Orchis foliosa*, *Ornithogalum* (various), *Podophyllum* (various), *Polygonatum* (various), *Polygonum alpinum*, *Polypodium* (various), *Polystichum* (various), *Primula* (various), *Ranunculus amplexicaulis*, *Ranunculus aconitifolius* pl., *Rubus* (various), *Rudbeckia californica*, *Ruscus aculeatus*, *Sanguinaria canadensis*, *Saxifraga cordifolia*, *Saxifraga geum*, *Saxifraga oppositifolia*, *Saxifraga sancta*, *Scilla* (various), *Sedum spectabile*, *Spiraea* (various), *Thalictrum* (various), *Tradescantia virginica*, *Trillium* (various), *Trollius* (various), *Tulipa* (various), *Tussilago fragrans*, *Valeriana* (various), *Vinca* (various).

**Some good Hardy Perennials 4 feet or more in height.**—*Althaea rosea*, various (Hollyhocks); *Aconitum*:—album, autumnale, napellus; *Anemone japonica alba*; *Achillea mongolica*; *Asphodelus ramosus*; *Achillea eupatorium*; *Bocconia cordata*; *Campanula*:—lactiflora, latifolia (various), macrantha; *Clematis coccinea*; *Crambe cordifolia*; *Centaurea*:—babylonica, macrocephala, *Centaurea ruthenica*; *Delphinium*:—cardinale, formosum (various); *Belladonna*, hybridum (various); *Digitalis purpurea grandiflora*; *Dahlia* (various); *Doronicum plantagineum excelsum*; *Eremurus*:—himalaicus, robustus; *Eryngium*:—Giganteum, amethystinum, Beatsoni; *Echinops Ritro*, *Echinops ruthenicus*; *Ferula tingitana*; *Gentiana lutea*; *Galega*:—officinalis, o. alba; *Helenium autumnale*; *Inula Hookeri*; *Iris sibirica*; *Inula glandulosa*; *Kniphofia*:—caulescens, nobilis, *Uvaria*; *Lathyrus*:—latifolius, l. albus; *Lythrum*:—salicaria rosea, superbum; *Lychnis chalconica*; *Lupinus polyphyllus*; *Malva Alcea*; *Mertensia sibirica*; *Meconopsis Wallichii*; *Phlox decussata*; *Penstemon Torreyi*; *Paeonia* (various); *Phormium tenax*;

*Pyrethrum uliginosum*; *Papaver bracteatum*; *Rudbeckia* :—*laciniata*, *maxima*, *nitida*, *pupurea*; *Rheum officinale* (various); *Solidago speciosa*; *Silphium laciniatum*; *Spiraea Aruncus*; *Scabiosa elata*; *Veratrum viride*.

**Some good Hardy Perennials, 2½ feet to 4 feet high.**—*Achillea* :—*millefolium rosea*, *ptarmica* pl., *serrata* pl.; *Asphodelus* :—*lutens*, *albus*; *Anthericum Liliastrum*; *Asphodelus ramosus*; *Anemone* :—*japonica alba*, *alpina*; *Bupthalmum salicifolium*; *Centaurea* :—*montana*, *macrocephala*; *Coreopsis lanceolata*; *Cephalaria alpina*; *Corydalis nobilis*; *Campanula* :—*latifolia*, *pyramidalis*, *celtidifolia*; *Chrysanthemum maximum*; *Delphinium Belladonna*; *Dicentra spectabilis*; *Doronicum* :—*plantagineum excelsum*, *Clusii*; *Eryngium* :—*giganteum*, *Olivarianum*, *dichotomum*; *Echinacea (Rudbeckia) purpurea*; *Erigeron grandiflorum*; *Erigeron speciosus*; *Echinops Ritro*; *Fritillaria imperialis*; *Gypsophila paniculata*; *Gillenia trifoliata*; *Galega Orientalis*, *Galega officinalis*, o. *alba*; *Geranium* :—*armenum*, *Lambertianum*; *Gaillardia grandiflora*; *Helenium autumnale grandiflora*; *Hemerocallis* :—*flava*, *fulva*; *Iris* :—*tridentata*, *sibirica* (various); *Inula glandulosa*; *Kniphofia* :—*caulescens*, *Burchelli*, *Rooperi*; *Lythrum* :—*roseum*, *superbum*; *Lychnis chalcedonica*; *Lupinus* :—*nootkatensis*, *polyphyllus*, *arboreus*; *Mertensia sibirica*; *Orobus* :—*vernus*, *lathyroides*; *Ostrowskya magnifica*; *Paeonia* (various); *Polygonatum multiflorum*; *Phlox decussata* (various); *Papaver* :—*orientale bracteatum*; *Rudbeckia* :—*subtomentosa*, *Newmani*; *Ranunculus speciosus*; *Scabiosa caucasica*; *Sidalcea malvaeflora*; *Senecio palmatifida*; *Thalictrum aquilegifolium*; *Trollius* :—*Americanus*, *giganteus*; *Veronica angustifolia*; *Veronica longifolia subsessilis*; *Verbascum Chaixi*.

**Good Hardy Perennials, 9 inches to 2½ feet high.**—*Anthericum* :—*Liliastrum*, *Liliago*; *Arnebia echioides*; *Adonis vernalis*; *Agrostemma* :—*Flos-Jovis*, *Coronaria*; *Aconitum japonicum*; *Belamscanda chinensis*; *Bupthalmum salicifolium*; *Coreopsis lanceolata*; *Carnations*; *Picotees*; *Pinks*; *Corydalis nobilis*; *Centaurea montana rubra*, *Centaurea purpurea*; *Codonopsis ovata*; *Cistus* (various); *Chrysanthemum* :—*lacustre*, *maximum*; *Coronilla iberica*; *Dicentra* :—*spectabilis*, *eximea*, *formosa*; *Delphinium Belladonna*, *cashmirianum*, *nudicaule*; *Dodecatheon Jeffreyanum*; *Doronicum* :—*Clusii*, *plantagineum*; *Dictamnus Fraxinella*; *Erigeron speciosus*; *Epimedium pin-natum*; *Eryngium amethystinum*; *Erodium Manescavi*; *Funkia* :—*ovata*, *Fortunei*, *Sieboldi*; *Geranium* :—*armenum*,

platypetalum, eriostemon; *Gypsophila paniculata*; *Geum coccineum* pl.; *Gentiana asclepiadea*; *Heuchera sanguinea*; *Helleborus*:—*niger*, *n. maximus*; *Hieracium villosum*; *Hemerocallis flava*; *Inula Oculus Christi*, *Inula glandulosa*; *Kniphofia nobilis*; *Lychnis*:—*vespertina* pl., *dioica rubra* pl.; *Viscaria splendens* pl.; *Lobelia cardinalis*; *Linum provinciale*; *Lilium candidum*; *Linum flavum*; *Monarda didyma*; *Mertensia virginica*; *Mertensia sibirica*; *Narcissus* (various); *Oxalis floribunda*; *Orchis foliosa*; *Oenothera Youngi*; *Papaver*:—*alpinum*, *rupifragum*, *orientale*, *atlanticum*; *Potentilla* (various); *Polemonium*:—*Richardsoni*, *coeruleum*, *grandiflorum*, *Fergussoni*; *Penstemon* (various); *Pulmonaria arvense*; *Rudbeckia Newmani*; *Spiraea*: *filipendula* pl.; *astilboides*, *palmata*; *Sidalcea*:—*malvaeflora*, *candida*; *Statice*:—*latifolia*, *incana*; *Sedum spectabile*; *Sisyrinchium grandiflorum*; *Trollius*:—*napellifolius*, *americanus*, *europaeus*, *asiaticus*, *Fortunei*; *Tradescantia virginica alba*; *Verbascum cupreum*; *Verbascum phœniceum*; *Veronica*:—*spicata alba*, *longifolia subsessilis*.

**Good Hardy Perennials under 9 inches high.**—*Anemone*:—*pulsatilla*, *palmata*, *fulgens*, *apennina*, *nemorosa*; *Aubrietia*:—*violacea*, *Hendersoni*, *Leschtlini*; *Arabis alpina*, *Armeria alpina*; *Achillea*:—*umbellata*, *argentea*; *Auriculas* (various); *Adonis vernalis*; *Alyssum saxatile*, *alpestre*; *Cheiranthus*:—*alpinus*, *Marshalli*; *Coronilla iberica*; *Cistus florentinus*; *Convallaria majalis*; *Chionodoxa Sardensis*; *Campanula*:—*pelviiformis*, *Rooperi*, *Portenschlagiana mollis*, *carpatica*, *isophylla*, *turbinata*, *hirsuta*; *Cyclamen* (various); *Dianthus* (various); *Dodecatheon integrifolium*; *Epilobium* (various); *Erigeron Roylei*; *Epimedium pinnatum*; *Fritillaria* (various); *Genista tinctoria*; *Geranium endresi*, *sanguineum*; *Gentiana* (various); *Geum coccinimum*; *Galium rubrum*; *Hepatica* (various); *Heuchera sanguinea*; *Hieracium villosum*; *Iris pumila*; *Iberis* (various); *Lamium maculatum*; *Lythospermum prostratum*; *Lychnis Viscaria*; *Mimulus* (various); *Myosotis* (various); *Oxalis floribundus*; *Oenothera taraxicifolia*; *Onosma turicum*; *Phlox subulata*, *amoena*; *Potentilla nitida*; *Papaver nudicaule*; *Primula* (various); *Ranunculus amplexicaulis*; *Saxifraga* (various); *Sedum* (various); *Saponaria Ocyroides*; *Sempervivum* (various); *Silene* (various); *Trollius Americanus*; *Tiarella cordifolia*; *Thymus* (various); *Viola* (various).

**Room Plants.**—Room plants are so generally used, and so deservedly popular, that it seems time that their cultivation and care should be more widely studied. Most people who keep



a plant or two in their rooms have little or no knowledge of their needs, and so long as the plants have water at stated intervals cannot understand why they frequently wither and die off leaf by leaf. Now plants living in an ordinary sitting-room are living under what are to them highly artificial conditions, and care and watchfulness are needed if they are to adapt themselves to these conditions, and flourish as they do in their natural surroundings. First, perhaps, of the necessities to a room plant, is an ample supply of fresh air, though this must not be supplied in the form of a draught. More carefully looked after room plants die of draughts than of anything else, though frost is also a danger. The presence of a valued pot plant in a living room is often the cause of good health in its owners, as the fresh air which it needs is equally necessary to human beings, and without its presence would often be excluded. A pot plant should never be left between open door and open window, especially in a time of drying winds. It is through draughts that most hall plants perish.

The best place for a room plant is in the window, where the maximum of light and sun are obtainable, but in cold weather the plants should be moved from the window at night and placed in a corner sheltered from draughts, further protected if necessary by a light screen covered with tiffany if any severe degree of cold is expected.

Dust is another of the powerful enemies of room plants. Anyone who knows anything of the structure of plants will realise that the pores in the leaves, fulfilling as they do the functions of the lungs in the human body, must never be allowed to become clogged with dust. It is through these pores that the plant breathes and perspires, and the little apertures must always be in a condition to work freely. This is best ensured by careful washing or spraying. Where the character of the foliage renders it possible, as in the case of palms, aspidistras, indiarubber plants, and such thick textured leaves, actual sponging with a soft sponge and warm water two or three times a week, the frequency varying with the degree of dust present in the room, should be carried out. Rain water should be used, and not cold.

Watering must be carefully regulated to the needs of the plant, and good drainage is most essential. If the drainage is not absolutely free the soil will become waterlogged and sour : conditions under which no plant will thrive. Care in the potting of the plants in the first place is never wasted, and the pieces of drainage tile which first cover the hole in the pot should be arranged individually and with consideration, the subsequent

layers of draining material being put in so as not to disarrange them. Watering should be done with rain water, never, unless absolutely unavoidable, with tap water, and even then never with the water quite cold. Rain water is the best spring or well water the next, while tap water, if it must be employed, should be kept in a tub or bucket in a place where the sun can shine on it continuously, and should be warmed by the addition of a little hot water before using. The amateur often finds it difficult to judge whether his plants need water or not, and the best way, on the whole, to find out is to strike the pot sharply with the knuckles, a clear, ringing sound indicating that water is needed, a dull one indicating that the soil is sufficiently moist. This rule does not hold good in every case, however, those plants which make a great deal of roots, nearly filling the pot with them, giving the dull sound even when dry. To judge of the condition of palms it is best to test the leaves. If they seem limp and can be easily rolled up the plant needs water. If they are reasonably firm and stiff they are in good condition. The sound test is useless with palms, as their roots should always fill the pot, the plants thriving best if restricted as to root space.

The morning is the best time for watering plants. In the summer the earlier the better, as if the operation is delayed until the sun is hot it had better be left over altogether until the evening. In winter the morning is the best time. When watering a good soaking should be given. A mere sprinkling does more harm than good.

Pot plants often need a little artificial aid to growth, and the stimulants best suited to this purpose are the chemical manures, owing to their ease of handling. For certain plants, particularly the "foliage" plants such as aspidistras and palms, a little soot water or liquid cow-manure given sparingly at intervals will help the colour.

In buying plants for use in rooms it is always well worth while to get good plants from a good grower. The difference in price is trivial in the long run, and care is wasted upon a sickly, ill-grown plant, forced for the market, the kind that are mostly dealt in by the travelling hawker. If the plant is re-potted, which should not be necessary for some time at least if purchased from a reliable man, the soil should be prepared with care. Most of the plants usually grown in rooms will thrive well in a soil composed of two parts of a fibrous loam to one part each of sand and leaf-mould. The cactuses like a good proportion of broken brick rubble, sometimes as much as one-half of the whole, added to their mixture, while the heaths will do best if peat is substituted for the leaf-mould. All the ferns enjoy a large pro-

portion of peat. The pots which are used should be clean and dry. If they have been washed they should be allowed to dry thoroughly before use.

**Window Boxes.**—There is one form of gardening from which not even the humblest tenement-dweller is entirely excluded. Fortunately there is no one who has not even a window, and whoever has a window may have a window box. It is good, though pathetic, to see how even under the seemingly hopeless conditions afforded by the slums of our great cities the love of gardening persists and manifests itself; and the passer-by may see even in the gloomiest of city streets, bits of healthy greenery and even blazes of floral colour decorating the windows.

Given somewhat more favourable surroundings, the possibilities of window gardening are considerable. If proper care be taken, if the soil be of suitable composition, and replaced or replenished every few months, there are few hardy plants which cannot be grown in this way. For it should not be thought that the only plants suitable for window boxes are the marguerites, daisies, ivy-leaved geraniums, and blue lobelias—beautiful enough in themselves—which one sees with monotonous reiteration in the better-to-do parts of London.

The essential principles of gardening are the same everywhere—that is to say, a good depth of soil is necessary for the healthy growth of nearly all plants, so that the window box should certainly not be less than nine or ten inches in depth. The soil should be of good texture—neither too heavy nor too sandy—and it should contain a reasonable amount of humus, or decomposed vegetable matter. For most plants, therefore, the soil of our window boxes should consist of fibrous loam, with which about one sixth of its volume of leaf-mould has been mixed. Adequate drainage is necessary; therefore the bottom of the box should be perforated in such a way as to allow for the free escape of surplus water, and the lowest two inches of the box should be filled with loose stones or pot-sherds, averaging about an inch and a half in diameter. Great use may be made of hardy, bulbous plants for window decoration, and especially in the early spring such bulbs as snowdrops, crocuses, and the early daffodils, are of the utmost value. Nor should tulips, scillas, and hyacinths be forgotten. The smaller-growing annuals and perennials may nearly all be called into requisition, and primroses, polyanthus, pansies, violas, mignonette, nasturtiums, saponaria, wallflowers, snapdragons, and the whole range of Alpine rock plants may be employed to keep our window box bright and interesting from March to October.

## CHAPTER III.

### THE VEGETABLE GARDEN.

**The Vegetable Garden.**—In all but possibly the very smallest gardens it will be generally wished that a part, at least, should be set aside for the cultivation of vegetables and herbs for the table. Nor does this necessarily involve any sacrifice of beauty or interest. For beautiful as are many of our hardy flowers, few of them surpass in form and colour many of those vegetables which are inevitably associated in our minds with the idea of English gardens. Peas, beans, scarlet runners, asparagus, globe artichokes, cabbages, rhubarb, parsley and sage all possess a beauty, and for most of us associations which are of the very essence of gardening. Badly placed, indeed, must be the garden in which no vegetables can be grown. For the range is great, and nearly every soil and situation can be adapted and used for the cultivation of at any rate some of our English vegetables.

As a general rule we may take it that a deep, medium heavy loam is best suited for the purposes of a kitchen garden, though much may be done to drain and lighten heavy soils and to enrich and moisten light soils so as to make them almost equally useful. Protection from strong winds is essential in the case of most vegetables, and walls, fences, or hedges should, where necessary, be erected or planted for this purpose. Reasonable exposure to sunlight is also necessary.

In any event the ground must be carefully and thoroughly prepared if any success is to be gained. Deep digging or trenching and a liberal application of organic manure are the most important of these preparatory steps. The ground should be broken up not less than two and preferably three spades deep. The lower soil and subsoil must not, however, be brought to the surface, but having been broken up, must be left *in situ*. This is equally necessary in the case of light soils and heavy soils. The addition of stable manure, vegetable refuse, and so on is also equally important in both cases. In the case of heavy

soils, in addition to the actual food value which such manure affords, it also tends to keep the soil open and porous, partly by mechanical action and partly through the fermentation which it undergoes. In the case of light soil organic manure helps to bind the soil together, to increase its food value for plants, and to enable it to retain moisture.

Trenching is, on the whole, the greatest secret of successful vegetable cultivation and the liberal use of organic manure is of little less importance.

Whether it be on a large or a small scale, even when forming part of what is called the mixed garden, the vegetable garden should not form part of a general muddle. Fruit trees, flowers, and vegetables cannot all be grown together anyhow, if justice is to be done. Each plot of vegetables should be distinct, and should not have to fight for its living with the roots of neighbouring trees, bushes, and other plants. Especially necessary is it that vegetables should be given the full benefit of whatever sun and air there are, and good results cannot be expected when they are grown under the shade of picturesque old trees whose roots ramify through the ground over an area of many square yards. The fruit garden and the vegetable garden should occupy distinct parts of the whole, though often bush fruit trees may be used as useful borders for fairly large vegetable plots, separating them from flower borders which may appropriately line the path.

Much greater attention than is often bestowed may well be given to selections of varieties of the highest quality. It costs no more and gives no more trouble to grow the best varieties than it does to grow the worst, and the difference in real value is very great. There has for a long time been among gardeners a struggle for mere size in vegetables, and in attaining this end, texture and flavour have often been sacrificed. The extension of market-growing has tended to this concentration of attention on size and number rather than on flavour and quality, for the market grower's main object is usually to produce as great a bulk as possible. The private grower, on the other hand, should never sacrifice quality to quantity, but should aim at producing vegetables of a finer texture and a more delicious flavour than are possessed by any vegetables that he can purchase in the market.

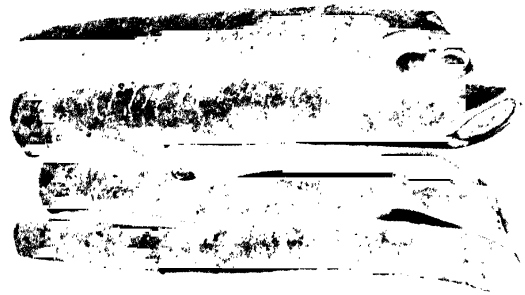
The preparation and manuring of the soil should take place in the autumn, so as to be ready for sowing in the early spring. On fairly dry soil, in warm situations, the sowing may begin about the end of February—a few early peas, early beans, early horn carrots, and lettuce may then be sown. In March some

No. 7. SEAKALE

2



1. Seakale rows, suitable for long mg.



2. Roots trimmed ready for planting.

No. 8. ARTICHOKE



parsnips, onions, beets, turnips, and more peas, beans, and carrots may be sown. In order to obtain a succession of vegetables through the year and not glut at one time and none at another it is desirable to sow the seeds of most vegetables in successive small quantities, so that crop may follow crop. This will be described in speaking of the several vegetables.

Where a small area has to produce a supply of vegetables all the year round, careful study of the due rotation of crops in order to keep the ground in good condition, with no part of it exhausted, is very necessary. With a few exceptions only, it will always be found a good plan to vary the crops taken from any given plot, never growing the same kind of plant on it for two seasons running. Each crop takes out of the soil certain elements, and leaves it enriched by others. Thus, for example, leguminous crops are able to extract nitrogen from the air, and besides using a part of it themselves, leave the soil richer in nitrogenous constituents than they found it. This is a good moment to sow in this soil plants such as the onion, which demand a good supply of nitrogen in the soil ready for their use. It is a good, rough rule that tuberous or bulbous-rooted plants should come after fibrous-rooted ones, and *vice versa*. Crops so similar in habit and nature as cabbages, broccoli, sprouts and kale should not follow one another. They demand much the same constituents from the soil, and the latter will rapidly become exhausted unless it is given a rest by cropping some other kind of plant for a year or two.

**Chinese Artichoke.**—The Chinese artichoke is, like the Jerusalem artichoke, a tuberous-rooted, hardy plant, though of much smaller habit of growth. Its cultivation is almost equally simple, though to get good results it should be given space and a well-drained, well-manured, deeply-dug soil. The tubers should be planted in March, in drills six inches deep, allowing six inches between the plants in the rows and eighteen inches between the rows. The surface of the ground between the rows should be kept well hoed, and early in July a liberal top-dressing of manure should be given. During July and August water should be freely afforded. In light soil the tubers may remain in the ground through the winter, and be dug as required. Or they may be raised about the middle of November and stored under sand or fine soil covered with litter. The flavour of the tuber, especially when light has been excluded from it, is unique and excellent. It is available as a vegetable at a useful time, namely from November to the end of March.



**The Globe Artichoke.**—Apart from its value as a vegetable, the Globe artichoke is one of the most ornamental plants of the garden. It takes up, however, a considerable space, and this, no doubt, accounts for its comparative infrequency in small gardens. Still, it is of fairly easy culture, and its heads are much liked by some. The fleshy base of the immature flower-head is the part that is eaten, and the larger and more succulent these flower-heads are, the more valuable is the vegetable. Any reasonable good garden soil, providing it is not too heavy, will grow satisfactory Globe artichokes, but it should be deeply dug and moderately enriched. The more open the situation the better; the shade of trees, walls, and buildings being avoided. Full exposure to the sun is desirable, and frost is less harmful than damp. The ground should be trenched and heavily manured in the autumn, and the planting should be done about the beginning of April. The best method of propagation is by root division or suckers, as seeds cannot be counted on to come true. To take the offsets or suckers dig a trench round the old plant, so as to show where the suckers may be detached in such a way as to remove a small portion of the stem and, if possible, some small roots of the parent plant with it. The suckers should be about eight inches long. These young growths may be planted in rows three feet apart and three feet between the rows, or three suckers in a clump, twelve inches apart, and four feet between the rows. The former is usually preferable. The soil should be firmly pressed about the roots. The surface should then be mulched with manure, and water should be regularly given. These young plants should give a fair supply of flower-heads the first year, but late in the season, after the old plants have finished. No plants should be kept after three or four years old, and it is well to make a small, fresh plantation each year, so that there may be a supply of plants of different ages, and therefore to some extent different flowering periods. The flower-heads should be picked when about half-grown; after that time they lose their succulent character. Should any flowers be accidentally left beyond that period they should be cut but not eaten. Allowing them to reach maturity destroys the value of the plant as a vegetable bearer. Liberal watering and mulching, and, if necessary, staking, are the principal parts of its summer treatment. At the approach of winter some ashes or sand should be banked round the plant, and before frosts are expected the plant should be covered with litter or leaves. About the middle of March this should be removed, and the earth between the rows lightly forked and dressed with manure.

Where, for any reason, it is necessary to start a plantation of Globe artichokes from seed it should be sown in heat about mid-February, the seedlings being gradually potted off into larger and larger pots, and finally planted out about the beginning of May. Only those plants producing good fleshy heads should be retained.

**COOKERY.**—To boil Globe artichokes cut off the stem level with the base of the head, remove the coarser outer leaves, and trim the long top ones. Then wash the head. Have ready some boiling water containing a tablespoonful of salt to the gallon. Put in the artichokes and boil them from thirty to forty minutes. Drain, and serve with melted butter or with oil and vinegar.

**Jerusalem Artichoke.**—The Jerusalem artichoke will grow under almost any conditions in almost any soil, but it does best in a somewhat light soil, deeply dug, and in an open situation. The tubers should be planted early in March in drills three inches deep, eighteen inches being allowed between the tubers, and three feet between the drills. In very heavy soil it is well to plant only just below the surface. But little subsequent attention is needed. During the early stages of growth it is well to keep the surface of the ground broken up with the hoe, and to destroy all weeds with great care. Later on the artichoke is well able to hold its own against any weeds. The tubers may be left in the ground through the winter and dug as required, although should the frosts be very severe it is well to cover the surface of the ground with a little bracken or other litter, so as to enable the tubers to be dug up more easily. In selecting tubers for planting, it is well to choose those with an even surface, as the rough and nobbly ones are more difficult to peel.

**Asparagus.**—Asparagus has long held rank as the queen of English vegetables. Nevertheless it is by no means generally grown, and its cultivation is still regarded as coming within the province only of the somewhat ambitious gardener. Yet, given a garden soil of average depth and friability, it is of by no means difficult culture. On clay soils its cultivation, it is true, presents somewhat of a problem, though even here, by throwing up the soil into ridges, by the addition of burnt rubbish and leaf-mould, and by surface manuring, asparagus of no mean quality can be raised by a certain degree of effort and persistence. Where, however, the soil is of a more sandy nature, and the natural drainage is efficient, every one, with a little care, may easily grow this excellent vegetable.

Where choice is possible, a warm situation should be selected, preferably with a southern aspect. Protection from the prevailing winds must be afforded, either by planted hedges or by hurdles or other screens. The soil, whether light or heavy, should be deeply dug, and while in the case of heavy soils it is well only to enrich the top foot or so of soil so as to keep the roots near the surface, in the case of medium and light soils the ground should be heavily enriched with manure, preferably to a depth of four feet or more. It is almost impossible, in such soils, to add too much manure, for it must be remembered that asparagus is a perennial plant, and that the plantation is thus of a permanent character.

Much of the comparative failure of asparagus as grown in ordinary gardens may be traced to the practice of setting the plants too close together. Not less than three feet should be allowed from plant to plant in every direction. For planting, one-year-old plants are to be preferred. About the middle of March drills should be prepared about three feet apart or rather more, the drills being three inches deep and about a foot wide. In these drills the plants should be at once placed at a distance of three feet apart, the roots should be most carefully handled, and should be evenly spread out. A sprinkling of artificial manure may be placed in the drills at the same time, and the roots at once covered with soil, which may be conveniently thrown from the parallel drill in process of construction. It is important that the roots shall not be exposed to the air for more than the barest necessary time. The soil having been placed in position should be made moderately firm. Throughout the summer the principal work must consist in keeping the surface of the ground broken up by means of the hoe, and in destroying weeds as soon as they appear. Under no circumstances should any other crop be raised between the plants. About the end of January a mulch of stable manure may be laid on the surface and a sprinkling of earth used to cover it; or alternately a little nitrate of soda or guano may be applied in May. About the second week of February each crown should be covered with a few inches of soil or preferably sand, or sand mixed with soil. Shoots may be cut, or, better, broken, as low as possible, when about eight inches in length, being careful not to injure young shoots not yet fit for cutting. In the case of first-year plants, the cutting should not be too severe, and should not be continued after May. Moreover, a few of the smaller shoots should be allowed to grow up from the start of growth. In the case of older plantations it is unwise to cut asparagus after the middle of June.

In raising asparagus from seed an open situation should be chosen, and the soil should be reduced to a light and friable condition. It should be very clean from weeds, as asparagus seed does not germinate quickly, and any weeds will get a start of it. The soil should be deeply prepared and moderately enriched, but perfect friability is the essential condition. About the middle of March draw drills two inches deep and one foot from row to row. In these rows sow the seed thinly, and at the same time sow a mixture of two parts bone meal, two parts kainit, and one part sulphate of ammonia at the rate of one pound to every ten yards length of drill. Cover with soil, but do not press over-firmly. Keep the surface of the ground between the rows well hoed, and carefully remove each weed as soon as seen.

There is a great advantage in raising plants from seed sown at home, since the roots need be but a short time out of the ground when they are moved to their permanent quarters. By very simple means asparagus may be forced so as to yield a supply of shoots for the table from Christmas to March. Indeed, asparagus is the easiest of all plants to force. Where choice is possible, three-year-old plants should be used for the purpose. Bottom heat is not essential, a tomato-house being excellent. All that is necessary is a moderate temperature, for strong heat is fatal to good results. Cucumber frames or melon frames on which a crop has already been grown do quite well for bringing along asparagus. The plants merely need to be covered with a few inches of soil, and kept watered with water about ten degrees warmer than the temperature of the frame. Plants may be submitted to this treatment at intervals so as to provide a successional crop. Many growers find it useful to have a supply of glass *clôches* or small frames which they place over the crowns in the permanent bed early in February. These not only protect the young plants, but certainly are of help in furnishing an earlier supply than would otherwise be available. Of varieties none are better, so far as quality is concerned, than Perfection and Argenteuil.

**The Broad Bean.**—Broad Beans like best a deep, somewhat heavy soil, which should be deeply dug and moderately heavily manured in the autumn. The earliest sowing may be made in a warm and sheltered situation at the end of October or early in November. Or these early beans may be raised by sowing them in boxes in January and placing these boxes in an unheated frame or cool greenhouse, where the temperature is about fifty

degrees. Seed should be sown in the open for main crop purposes in February and March, successional crops being obtained by sowing a few each month right up to May or June. The early plants, raised in boxes, should also be planted out in rows early in March. About nine inches should be allowed from seed to seed, and about two feet should be allowed between the rows. After the appearance of the plants above ground the only cultivation required consists in the breaking up of the surface of the ground between the rows frequently by means of the hoe. For the very earliest crop Mazagans or early green Longpods may be selected. For main crop planting Green Windsors are perhaps as good as any.

**The French Bean.**—Dwarf Kidney Beans or French Beans like a deep, rich soil, which should be deeply dug and manured in the autumn. They should be grown in an open, unshaded situation. By sowing partly in the open and partly under glass, French beans may be obtained during practically every month of the year, and even without the use of glass or artificial heat a supply can be obtained from June to October. In the open the first sowing should be made under a south wall about the middle of April, sheltering the young plants as soon as they come up with a little loose litter. The principal out-door sowing should be made early in May, but it is well to sow a few seeds at weekly intervals right on to the beginning of July. Seed should be sown six inches apart in drills two inches deep, two to three feet being allowed between the rows. When the young plants appear they should be thinned or transplanted so as to allow at least a foot from plant to plant in the rows. During the summer it is well to dig a shallow trench along each side of the rows in which a little manure can be laid, and water liberally given. The period of bearing will be prolonged if the pods are picked as soon as they are fit. For early sowing the *Ne Plus Ultra* is a suitable variety. These should be followed by such kinds as the *Negro Longpod*, followed again by the *Canadian Wonder* and *Perfection*. The latest sowing should be of such a kind as the *Newington*.

**The Runner Bean.**—The *Runner Bean*, like the *French* or *dwarf bean*, does best in a deep, moderately retentive soil, which has been well manured and deeply dug in the autumn. These beans are somewhat tender, and will not bear cold. The earliest seed should be sown in a sheltered situation about the middle of *May*, though still earlier plants may be obtained by sowing in

boxes under glass in April and planting out about the end of May. Successional crops may be obtained by sowing in the open until the middle of June. The seed should be sown in single drills, three inches deep, five inches being allowed from seed to seed in the rows, and six feet from row to row. As in the case of French beans, it is helpful to dig a shallow trench each side of the rows, to place a little manure in this, and to supply water liberally through the summer. As soon as the plants have formed their first leaves, tall poles should be provided up which the plants may climb. For earliest planting, climbing French beans such as Earliest of All and Tender and True may be used, whilst among the best scarlet runners—which should not, as a rule, be planted quite so early—may be named Chelsea Giant, Best of All, and Mammoth White.

**Beetroot.**—The Beet has value both as a vegetable and as a salad plant, though it is far more commonly used in the latter capacity. It is much hardier than is often supposed, and is not injured by moderate degrees of frost. The soil for its cultivation should be deep and of medium texture. No manure should be added just before sowing, but the beet should follow a crop for which the ground has been heavily manured. For early use, the turnip-rooted kind, of which Sutton's Globe and Crimson Ball are good varieties, may be sown about the first week in April, in a warm border, in drills half an inch deep and fifteen inches apart. The soil should be made firm after sowing, and when the young plants appear they should be steadily thinned out until they ultimately stand at about nine inches apart. The turnip-rooted kinds may also be used for later supplies, where the soil is too poor or shallow for the long-rooted kind. Where the soil is suitable, however, the long-rooted kinds are to be preferred for all but the earliest crops. These should be sown in May, under similar conditions to those suggested for the turnip-rooted kinds. Cheltenham Green-top is perhaps the best variety of all this group. Pineapple and Nutting's Old Dwarf Red are also excellent. Any roots that remain in the ground should be lifted before the middle of October, the leaves should be twisted off, the roots dried, and carefully packed away in dry sand in a cool place. The greatest care must be taken not to bruise or cut the roots or rootlets; or, instead of being lifted, they may be left in the ground and covered with a few inches of bracken or other litter.

**The Broccoli.**—The Broccoli is closely allied to the cauliflower, but is hardier and is grown to supply vegetables in winter

and spring, the cauliflower being used for a summer and autumn supply. A succession of heads may, by care and selection, be obtained from November till June. A well-tilled rich soil is especially necessary for this crop, as rapid growth is essential. For early winter supply such varieties as the Early Cape, Self-protecting Autumn, the Early White and the Early Purple should be sown in April and the first week of May, the seedlings being planted out early before they have got weak and drawn out. The seed should be sown in drills, half an inch deep, one foot being allowed between the drills. The ground should previously be finely prepared and rendered firm. Where labour is no object there is some advantage in transplanting twice, as this encourages fibrous roots and a hardier growth. In the final position broccoli should be planted in rows three feet apart, two feet being allowed from plant to plant. For a mid-winter supply Sandringham Winter White, Penzance, and Superb Early White may be grown, whilst to succeed these we have the Purple and White Sprouting broccolis, Champion, Dwarf White, Late Queen, and Model.

**Brussels Sprouts.**—Like most other members of the cabbage family Brussels Sprouts require for their successful cultivation a deeply-dug and liberally-manured soil. They are a valuable source of winter vegetable, and, providing good kinds are chosen, vegetables of much delicacy. For flavour and quality the varieties which produce small, compact sprouts are much to be preferred to the large, loosely-grown kind. The seed may be sown in drills about three-quarters of an inch deep, and about ten inches apart, the end of February and beginning of March being the best time for this work. A warm situation should be chosen, and the surface should be covered with loose litter until the plants are well up. In April the young plants should be moved either to their permanent quarters or to fresh ground, about six inches apart, so that they can be easily again transplanted with a trowel without much disturbance. For the earlier supplies seed may also be sown very thinly early in August, the young plants being moved to their permanent quarters the following April, having been once transplanted in October. For a late supply seed may be sown in rather rich soil about the end of April. In all cases plenty of room should be afforded the plants, about three feet being allowed from plant to plant. For early sowing Dwarf Gem and Matchless may be chosen, whilst for general crop Market Favourite and Offenham may be selected.

**Cabbages.**—Cabbages are of easy culture, and to this probably is to be attributed the comparative carelessness often displayed both in their cultivation and in the selection of varieties. There is considerable difference in quality between the several varieties in each class, and there is little in common, from a gastronomic point of view, between the small, compact, delicately-flavoured cabbages now available, and the large, coarse cabbages which are fortunately becoming less and less common. With care in selection and judgment in cultivation cabbages may be had practically the year through.

The ground intended for cabbages should be deeply dug and moderately enriched a few months previous to the planting. Very heavy manuring, though it tends to promote increased size, is not so favourable to quality as a soil more moderately enriched. They should be liberally supplied with water at all stages of their growth. For an early spring supply, seeds should be sown about the end of July, and again about the middle of August. It is well to sow a little seed at frequent intervals, so that the crop may mature successionally. The seeds should be sown in finely-prepared soil, in straight rows about one inch deep, the seed being sown thinly, and about eight inches allowed between the rows. Directly the plants show above ground, hoeing should be commenced between the rows, so as to keep the surface of the soil well broken up. About six weeks from the time of sowing the plants may be placed in firm ground which has not been newly dug but has been prepared some two or three months earlier. Twelve inches should be allowed from plant to plant in the rows, and eighteen inches between the rows. Thoroughly soak the ground after planting and give liberal supplies of water, especially for the first few days. The surface of the ground between the plants should be kept well broken up by means of the hoe. Of varieties, among the best are Dwarf Early Spring, Earliest of All, and Mein's Number One.

To keep up the supply of cabbages through the summer such kinds as Main Crop, Sutton's Favourite, and Miniature Marrow may be sown at intervals during the second half of April and the whole of May. They should be treated much as advised in the case of spring cabbages, but they should be planted out into somewhat richer soil, as their growth is much more rapid.

For autumn crops we may rely largely on the Coleworts. They may be sown in May and the first two weeks of June, and treated very much as recommended for spring cabbage. They will produce heads during the last three months of the year.



By sowing about the end of June, a few seeds of such a variety as Hardy Green, good coleworts may be had often so late as January or February. The Rosette, which is probably the most delicately flavoured of all the varieties of coleworts, on account of its rapid growth, is very susceptible to frost, and is consequently only suited to the autumn supply. Being smaller these may be planted about ten inches apart, a foot being allowed between the rows.

For late autumn and winter use savoys and hardy winter cabbages may be sown during the end of May and first half of June. By selection of varieties and sequence in sowing, a supply may be obtained right on till the spring. The crop must be got well forward before frost sets in in the autumn. For this purpose soil should be well prepared and well enriched, and the surface should be kept hoed between the rows. The small-headed kinds have the best quality, though the drumheads are large and hardy. Two good winter cabbages are St. Martin and the St. John's Day. For later use the New Year and Bijou may be grown.

Red cabbages are grown almost entirely for pickling. The cultivation is simple, resembling that of other cabbages. Seed is best sown in March; good compact heads may then be obtained ready for pickling in the autumn. Useful sorts are Dutch Blood-red and the smaller but better Dwarf Blood-red.

**Capsicums.**—Capsicums are occasionally, though rarely, grown as an ornament, as a green vegetable, or as a flavour for pickle. Seeds may be sown in February in light soil, in moderate heat, and may be gradually moved on into larger pots and grown throughout under glass or planted out in a warm situation. In any case they require liberal supplies of manure and water.

Several varieties are grown, Long Red, Long Yellow, and Golden Dawn being all good kinds.

The Chili (*Capsicum baccatum*) is another species of capsicum requiring similar treatment. Among its varieties are the Long Red Chili, which when ground constitutes Cayenne pepper.

**The Cardoon.**—The Cardoon much resembles in appearance the Globe artichoke, to which it is closely allied. Like that vegetable it is comparatively little grown in England, although it is of easy culture. The Spanish cardoon, which is the variety most often seen in this country, is by no means the best, though its leaves are large and spineless. The prickly Tours cardoon, the red-stemmed Marseilles, and the large-growing Puvis are all much the better for garden purposes. Unlike the Globe artichoke,

the cardoon is best propagated by means of seed, which should be sown in a cold frame or under glass without heat early in April, the seedlings being planted out about the end of May. Seed may also be sown early in June in the open. Early in May the trenches in which cardoons are to be grown should be prepared. These trenches should be dug to a depth of not less than eighteen inches, about six inches of thoroughly decayed manure being placed at the bottom of the trench. This manure, together with some wood ashes if obtainable, should be dug in and thoroughly incorporated with the soil at the bottom of the trench.

**The Carrot.**—In growing Carrots it is far better to aim at a succession of young, fresh roots than at one large crop, the bulk of which will have to be stored. Carrots are of fairly easy cultivation, but are a little more exacting in the matter of soil than are any other of our common vegetables. A rather light, sandy soil which has been recently enriched by the liberal incorporation of well-rotted manure suits them best. The first sowing may be made in a warm border at the end of February, Early Shorthorns or Gem being chosen for the purpose. They are best sown about half-an-inch deep in drills a foot apart, thinning to about six inches from plant to plant. Further seed may be sown in April and May, the Scarlet Horn, the Nantes Horn, and James's Intermediate being selected for this sowing. It is also worth while to make a small sowing of Early Nantes about the end of June with a view to obtaining some nice small roots in the early months of the year. In all cases, but especially in the case of these June sown carrots, it is wise to add a fairly liberal dressing of soot and lime to the soil in order to reduce the attacks of insect and other pests to a minimum.

Carrots are liable to attack by the grubs of the carrot fly, which lays its eggs in the ground, in convenient proximity to the young carrots, the natural food of the grubs which will hatch out from them. A carrot attacked by the grub will wither at the top, and the root, if lifted, will show iron-mould-like spots. As there are several broods of this fly in the course of a single season, the carrots are often rendered quite rotten and unfit for use by their repeated attacks. Wood ashes dug well into the soil, as well as employed dressed with paraffin in the proportion of a quart of paraffin to a barrow-load of ashes, as a top dressing when the plants are still quite small, are a good preventive. The surface of the soil should be kept hard, so as to make it difficult for the female fly to penetrate it in order to lay her eggs.

**The Cauliflower.**—Cauliflowers are the most tender of the cabbage family commonly grown, and will not stand much frost. It is important to grow them in the shortest possible time, both on this account and because the delicacy and flavour are thereby increased. Seed of such kinds as Walcheren may be sown about the middle of August in the north of England and early in September in the south. The young plants may be planted out in sheltered situations in October. Where only a small number are grown it is well to cover these with hand-glasses during severe weather. Or they may be planted in three-inch pots and kept in a cold frame till the beginning of March, when they may be planted out in a warm border. Other good kinds for this early crop, which is ready about June, are Sutton's First Crop and Snowball. For a second crop such varieties as Erford, Pearl, and Favourite may be sown out of doors during March and April, the young plants being planted out in May and June.

For autumn use Dwarf Mammoth and Autumn Giant may be sown in March and April, and planted out the first week in June.

**Celeriac.**—Celeriac is a vegetable not grown nearly so much as its good qualities deserve. It is very hardy, of very easy culture, growing well in almost any garden soil. It does well in soil of much lighter quality than that necessary for the successful cultivation of celery, and it is one of the most delicious of our winter vegetables. Its flavour much resembles that of celery, but partakes also of the quality of a delicate turnip. Seed should be sown in March, over moderate heat, the soil being moderately rich, fine, and firmly pressed. The seedlings should be pricked out as soon as capable of being handled, and should be potted in three-inch pots much as advised in the case of celery. About the end of May the plants should be transferred to the open. The ground intended for their reception should have been deeply dug and well enriched and should have been made firm previous to planting. Planting should be shallow, as at no stage should any earthing-up take place, although the ground between the plants should be kept well stirred with the hoe. Rather, indeed, should the soil be gradually drawn from the bulbs so that they may almost stand on the surface as do onions and shallots. Liberal supplies of water should be given throughout the summer, and it is well to keep the surface of the ground between the plants covered with a little leaf-mould or litter. From twelve to fifteen inches should be

allowed from plant to plant in the rows, and about eighteen inches between the rows.

At the approach of winter the roots should be taken up and stored like turnips or beetroots in heaps covered with earth and straw. Or, as an alternative, they may be left in the ground until February, the soil being drawn over the roots, and this again covered with bracken or straw, or, better still, with sand. In February, however, the roots must be all taken up in any case, for fresh growths then begin and the roots begin to deteriorate.

**Celery.**—In common with most other vegetables, Celery prefers a soil not too light. On the other hand, a medium soil is better than a really heavy one. In any case, for the successful growing of celery deep cultivation is a necessity, and manure and water must be liberally afforded. Celery is, indeed, what gardeners call a gross feeder, and it is almost impossible to give it too much water. Seed should be sown under glass over a heat of about seventy degrees. March is the month for the principal sowing, but a pan of early seed may be sown in February. The seed should be sown thinly in pans of rich light soil, made firm, and should be covered with a thin sprinkling of fine soil or sand. Water should be given gently, and slates or sheets of glass should be placed over the tops of the pans to check evaporation till the seedlings appear. As soon as the young plants show themselves, they should be placed near the glass in full light, and a high temperature should be avoided. At the same time there must be just sufficient artificial heat to maintain a steady growth. As soon as they are able to be handled, the young plants should be pricked out singly into three-inch pots, containing soil rich with well-rotted manure. They should be potted firmly. Throughout their growth they should be well supplied with water. From this time bottom heat is unnecessary.

The pots may be placed in a cold frame or a cool greenhouse. Later the plants may be transplanted into bigger pots preparatory to the final planting in beds or trenches. Those who require an extra late supply may sow a few seeds in April in addition to the sowings suggested above.

The ultimate planting-out takes place for the main crop about the end of June, the earliest plants from the February sowing being put out about the end of May and the late crop about the end of July. Two systems are in vogue: the bed system and the trench system. When planting in beds the ground should have been deeply dug and heavily manured some time before the planting. It is as well to bury a considerable depth

of manure about nine inches below the surface, in addition to that which has been incorporated with the soil. In this bed the plants may be placed in rows fifteen inches apart, one foot being allowed from plant to plant in the rows. Holes should be made with a trowel and the ball of earth and roots from the pot placed therein, the soil being slightly broken up in planting, and the whole made thoroughly firm afterwards. Water should be liberally given at once, and some shade afforded by branches of trees or other means. The soil between the plants should be kept mulched with old manure so as to afford additional nourishment and to check evaporation. As growth proceeds, earth should be gradually hoed up round the plants, though the principal earthing-up should take place about a month before the celery is required. Where only a small number of plants are grown it may be well, before this final earthing-up, to tie up the plants with matting or with a paper band. In any case the leaves should be held together while the earthing-up is in process, so that no soil may be allowed to enter between the stalks. The hearts must be kept well above the earthing-up. The last earthing-up in the case of the general crop should take place about the end of October. Should severe weather set in it may be well to protect the crop by means of bracken or other dry litter.

The blanching of celery, leeks, and endives, as well as sea-kale, rhubarb and lettuces, has the effect of making stems and leaves less tough and less bitter. Most of these plants acquire a white, crisp, nutty quality by excluding light. Celery and leeks, and sometimes sea-kale are commonly blanched by being partly covered with soil. This is most easily effected by growing them at the bottom of a trench, filling up the soil as the plants grow. Rhubarb and sea-kale are more commonly blanched by covering them with an earthenware pot, and lettuces and endives by tying up with a bit of raffia.

The trench system of growing celery is that usually adopted, and is, on the whole, the most satisfactory. A common mistake is to make the trenches too deep. They should, it is true, be deeply dug, and even the sub-soil should be broken up to some extent, but it should be left in position, covered with a layer of manure, and manure should be liberally incorporated with the soil itself. When actually ready for planting, the trenches should be about sixteen inches wide and four inches deep. When parallel trenches are made four feet should be allowed between them. In the trenches the young plants should be placed at intervals of about a foot. It is well to prepare the trench finally

only just before the actual planting, so that the surface of the ground does not have time to dry up. The process of planting and subsequent treatment are similar to that advised in the case of planting in beds.

For early use White Gem is a good variety, as also is Ar, which is an early red variety. For main crop, Superb White and Major Clarke's Red, are as good as any. Celery is liable to the attacks of two insects—the celery fly and the celery-stem fly. During winter the pupæ of the former lie buried in the earth, and in spring these hatch out into flies which in the summer lay their eggs in the celery leaves. These eggs hatch out into brown, maggot-like larvæ, which penetrate the substance of the leaf, and check the plant's growth. Directly they are observed the affected leaves should be picked off and burnt. Some degree of protection is afforded by repeated sprinkling of the leaves with fine dry soot and lime, or occasional syringing the foliage with Gishurst compound. But here, as with most other diseases of plants, perhaps the most important measure for securing health is to obtain good seeds, and by proper preparation of the soil and general good treatment to secure steady and continuous growth of the plants.

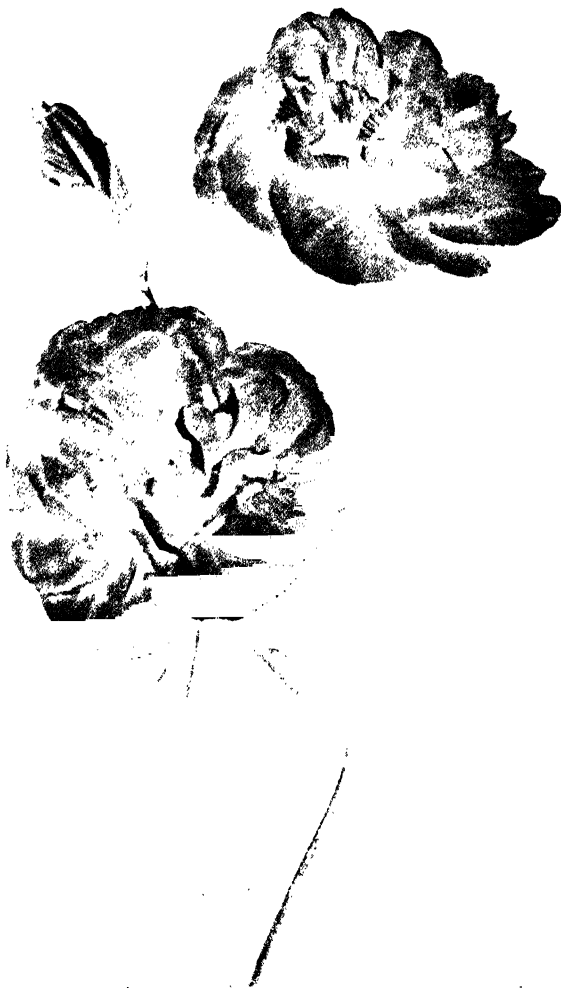
The maggots of the celery-stem fly bore into the stems, causing them to rot, and as the larvæ are hidden right inside the stems they are extremely difficult to get at. The only useful measures are preventive; that is to say, wherever the maggot is known to have been found, the young celery plants should be sprayed with a paraffin emulsion; and all parts of diseased plants should at once be burnt. For both of these flies a good preventive step is the dressing of the soil with quicklime after the plants are lifted.

**Chervil.**—Chervil is rarely grown as a vegetable, though the flavour of the roots is distinct and pleasant. It is easy enough to grow in ordinary garden soil; nevertheless, like all other vegetables it well repays careful cultivation, deep digging, and moderate enrichment of the soil. In the southern and warmer parts of the country seeds may be sown early in September, the seedlings being thinned to about six or seven inches apart. In other parts of the country the seed may be mixed with fine soil or sand in the autumn, and the boxes containing the mixture may be placed in a frost-proof room for the winter. About the end of the following February seed and soil may be sown together in drills in the situation that they are permanently to occupy.

**Chicory.**—Apart from its uses as a salad, Chicory affords two possibilities for culinary use. Its early growth may be forced and blanched after the manner of sea-kale, and its unforced green leaves may be used in spring much as spinach is used. Seed may be sown in fine soil which has been well manured for a previous crop, in rows eighteen inches apart, the seedlings being thinned to about nine inches apart in the rows. The seed may be sown from the middle of April to the middle of June. About the end of October the roots should be lifted, packed in boxes, and blanched in perfect darkness, a little forcing being applied if an early supply is wanted, much as sea-kale is forced. The Witloof and Christmas Salad are good kinds.

**The Cucumber.**—In warm seasons and mild climates Cucumbers of selected kinds may successfully be grown in the open air, much after the manner of vegetable marrows. Perhaps the most satisfactory way of growing these open-air or "ridge" cucumbers, as they are called, is to prepare in April a heap of fermenting stable manure and decomposing leaves, covering this with six or eight inches of soil, and planting out in May young plants which have been raised under glass. About thirty inches should be allowed from plant to plant in every direction. In cold seasons good results can hardly be looked for.

It is, however, in frames that cucumbers are generally grown, and here success can be guaranteed provided reasonable care is taken. Assuming a two-light frame is selected for the purpose, four cartloads of stable manure should be placed in position early in March, turned twice at intervals of a week, and, at about the end of March, arranged compactly as the basis of the bed. It should be pressed firmly with the fork, but should not be trodden upon. All this should take place within the four walls of the frame, the light should then be put on, and in about six days about nine inches of light yet rich soil should be placed over the manure. Seeds may now be sown in the bed, rather more being sown than plants are required. Surplus plants can generally be disposed of to friends or neighbours. As soon as the plants appear, a day temperature of about eighty degrees and a night temperature of sixty to sixty-five should be aimed at. The temperature should be regulated by the opening of the lights so as to admit air. Should the night temperature much exceed sixty degrees, it is well to wedge up the lights about half an inch when shutting for the night, and during hot weather this amount of night ventilation may be increased. Liberal supplies of water are essential. Twice, or, in hot weather, three times a day, the plants



CARNATIONS.





and bed should be well wetted, either from the watering-pot by means of a fine rose, or by means of a garden syringe. The water used should be soft, and should be of the same temperature as the interior of the frame. The watering-pot, full of soft water, should, therefore, always be kept in the frame ready for use. The supply of water must vary with the heat of the bed. The more heat the more water required, and should the heat produced by fermentation give out before the sun's heat is great enough to take its place, the supply of water should be greatly reduced.

From two to four plants will be sufficient for a two-light frame.

The management of frame cucumbers is extremely simple, though many amateurs are persuaded that elaborate stopping, training, and artificial fertilisation are necessary. Beyond nipping out an occasional shoot to prevent overcrowding, the maintenance of moisture without swampiness at the roots, and the regulation of the heat in the manner suggested above, little attention is required.

**Dandelion.**—Dandelion is grown not only as a salad, but occasionally as a vegetable. Seed may be sown from March till June in drills a foot apart, the seedlings being thinned to nine inches apart in the rows. In November the roots may be lifted and stored in sand until they are wanted, when, by the application of a little heat in a dark place, nice blanched growths are obtained. When used as a vegetable the plant may be left out of doors, and the young leaves gathered from March till June. The improved thick-leaved and improved broad-leaved are both good varieties.

**Egg-Plant or Aubergine.**—The Aubergine is a half-hardy annual plant not much grown in English gardens. These plants are very decorative in their growth, and by some are highly esteemed as a vegetable. Their seed should be sown over bottom heat about the end of January or early in February. As soon as possible after their appearance, the seedlings should be potted in small pots and placed near the glass. About three weeks later they should be transplanted into larger pots, being ultimately transferred to nine-inch pots. The soil should be good fibrous loam, to which some thoroughly decayed manure has been liberally added. Up to the time when the fruits are full grown and are beginning to colour, water and liquid manure should be very freely given.

**Garlic.**—Garlic should be planted and treated exactly as shallots.

**Gourds and Pumpkins.**—Gourds and pumpkins are varieties of two or three species of cucurbita, all being half-hardy trailing annuals, with large, more or less globular fruits, some beautifully furrowed and richly coloured. Many of them are edible. In this country, however, they are cultivated more for ornamental than for culinary purposes. They are of simple culture, being almost as easily grown as the ordinary vegetable marrow, which is itself a variety of pumpkin. Seed should be sown in a frame in gentle heat, about the middle of April, the young plants being placed outside in the last weeks in May. Hand lights should be used as protections until the plants have become established, and all danger of frost is past. A rich soil, with a very liberal amount of manure, together with unlimited supplies of water, are the chief requisites. Moderate exposure to sun is desirable.

The fruits may be baked or boiled, when young, or may be ripened and then kept hung in a dry, airy room for use in the winter months. Apart from their use as vegetables many varieties of gourd make beautiful coverings for fences and walls.

**Kale.**—The Borecole or Kale is one of the most useful of our winter vegetables. For although the flavour of them when properly grown is extremely delicate, they are so hardy that certain kinds, at any rate, yield tender, green vegetables in the hardest winter. Right from October till April a continuous supply can generally be obtained. A rather stiff, deeply-dug, and well-enriched soil is desirable. The manure should be added some time previous to planting, preferably before the preceding crop. The seed should be sown from March till May in drills about one inch deep and about eight inches apart. The seedlings should be thinned out where necessary as soon as they appear, for it is most important that the plants should not be weak and drawn-out. The plants may be planted out when about six to eight weeks old, about two-and-a-half feet being allowed from plant to plant in all directions. Firm planting is desirable, and the surface of the ground should be kept stirred by the hoe throughout the summer. The early autumn supply needs more liberal manurial treatment than is expedient in the case of the late winter supply, since in the former rapidity of growth must be the first consideration, in the latter hardiness. Of varieties, we have for autumn use **Al** and **Dwarf Green**

Curled. For Christmas we have Curled Scotch, and Read's Improved Hearting, whilst for early spring we may select the Asparagus Kale, the Welsh Kale, and the Cottager's Kale. The spring varieties, instead of being sown the previous May, may be sown in early autumn, often with advantage.

**Kohl-Rabi.**—The Kohl-Rabi, or turnip-rooted cabbage, is more grown abroad than in England. It is especially useful as an alternative to the turnip in a hot year, or where the soil is specially light. The roots have a flavour not unlike that of the turnip, though it is scarcely so delicate. It requires very much the same cultivation as does the turnip. Seed should be sown in March for a summer supply, the seed being sown in drills about three-quarters of an inch deep, and eighteen inches apart between the rows. The young plants should be thinned as soon as possible to about nine inches apart. Transplanting is undesirable. For autumn and winter supplies seed should again be sown towards the end of July.

**The Leek.**—Although by many it is supposed that a good deal of mystery attaches to the cultivation of the Leek, as indeed is the case with all vegetables which are ordinarily "blanched" before being gathered, as a matter of fact the leek is one of the hardiest and most easily grown of all our vegetables. Growing in trenches, though by many considered preferable, is by no means necessary. Good crops and good specimens can be grown in richly-manured soil on the flat. Very deep, rich soil is almost essential to the satisfactory cultivation of this vegetable. Seeds may be sown successively from the end of February in a warm border, till the end of March. The seeds should be soaked in lukewarm water for about twelve hours previous to being sown. They should be sown about a quarter of an inch deep, thinly, in drills, about six or eight inches being allowed between the rows. As soon as they are large enough to handle, the young plants may be transferred to their permanent sites. If the ground is rich and moderately heavy, the leeks may be planted on the flat in rows, two feet apart, about fifteen inches being allowed from plant to plant. When the soil is not so rich and heavy, it is desirable to grow leeks in trenches. These should be about a spade's width wide, about two feet apart, and about fifteen inches deep, and at the bottom of each should be placed a liberal dressing of well-rotted manure. On this should be placed a little soil, in which the plants should be planted. As they grow, earth is to be thrown into the trench so as to keep an increasing portion

**Maize.**—In many parts of England maize can be grown successfully, and its fully formed but unripe heads are much enjoyed as a vegetable by some. It is, however, in this country, a half-hardy plant. Seed may be sown under glass in April, and planted out about the middle of May.

**The Melon.**—Melons are best grown in special houses, heated by hot-water pipes. But in most gardens frame culture will necessarily be resorted to, and in frames carefully managed, melons of the highest quality can undoubtedly be grown. The cultivation is somewhat similar to that of the cucumber, but it should be remembered that whereas the cucumber is picked in the green stage, the melon is of value only when it is fully ripened. Consequently a high temperature is needed, and it is hopeless to attempt to ripen the melon after the month of October. A firmer soil and less water are needed in the case of the melon than in the case of the cucumber. Also, a stronger light and more air are necessary for the successful growing of the former.

Not less than a two-light frame should be employed, and a three-light frame is to be preferred, as it is easier to maintain an even heat with a larger body of fermenting material. For a three-light frame six loads of farmyard manure should be laid in a heap, and turned two or three times in the course of a fortnight, so as to let out a little of the fire. Fresh manure is necessary, and it is important that fermentation should be in active progress. At the end of the fortnight the manure should be pressed down firmly with the fork, but not trampled upon, and it should be covered with about six inches of good, ordinary garden loam. This should bring us to about the end of March. Seed may be sown in the bed itself, or young plants may be otherwise raised and be planted out as soon as an even temperature of about eighty degrees may be counted upon. Double as many seeds should be sown as plants will ultimately be required. Very little pruning is necessary, the cutting and slashing so commonly resorted to being very harmful. It is well as soon as two secondary or rough leaves have appeared, to pinch out

the terminal shoot, thus causing two lateral shoots to be produced. As soon as each of these has produced six or seven leaves its terminal point should be pinched off. No more pruning should be performed until fruit appears, when the feebler fruits are to be eliminated, leaving only one on each shoot. The shoots should then be pinched back to one eye beyond each fruit. To ensure a good crop of fruit it is desirable artificially to fertilise the female flowers. The best time to do this is early in the morning when the sun is shining and the plants are dry.

As has been said above, water, though a reasonable quantity is absolutely essential to healthy growth, should be given with much greater caution than in the case of cucumbers. During the early periods of growth the plants must never be allowed to be dry at the root, and twice a day the leaves should be sprinkled with water. When the flowers open very little water at the roots should be given, and the plants should only be sprinkled once a day. During the whole period of growth air should be liberally afforded, a careful eye being, of course, kept on the temperature. Throughout their whole lives melon plants require an abundance of light, and this is especially true during the period of fruit ripening.

**The Onion.**—Onions are by no means a difficult crop to grow if the soil is well dug and moderately enriched some time previous to planting. Before sowing the soil should be made very firm, by rolling or treading. Spring onions may be sown at intervals from the last week of February to the third week of March. They should be sown in drills half an inch deep and about ten inches apart. The seed should be sown thinly, and then covered with a thin layer of soil, and trodden well over. As soon as possible after the appearance of the plants the surplus should be pulled out, without loosening those which remain. At least three inches should, at the first thinning, be left from plant to plant. If there is any choice, showery weather should be chosen for this operation. It is important to keep the plants growing, and surface dressings of nitrate of soda (about five pounds to the rod) are valuable. The surface of the ground between the rows should be kept well broken up with the hoe. When the stems begin to droop, showing that growth has practically finished, all the remaining stems which have not naturally fallen over should be bent down. A little later all the bulbs should be pulled and laid in the sun. Their dried stems should then be tied together so as to form bundles, which may then be suspended from the roof of any dry store-room. For salad

purposes and also for pickling, seed of spring onions should be sown about the second week in May. For both these purposes, of course, the bulbs may be allowed to remain much thicker and closer together than is advisable for those intended for storing or cooking.

Autumn and winter onions should be sown from the end of July to the first week in September. They also should be sown on land which has been made firm by rolling or treading. The seedlings are allowed to remain where sown until the end of February, when they should be planted out in a moderately but not too rich soil. This also should be firm. About nine inches from bulb to bulb should be allowed in the case of the larger varieties, and at least a foot between the rows. Among the kinds especially worth growing are the *Giant Rocco*, *White Queen*, and the small, silver-skinned kinds.

**The Parsnip.**—The Parsnip, being a native plant, will grow in almost any garden soil, and this fact is no doubt responsible for the careless way in which it is often grown, and the consequent disrepute into which it has fallen. To grow the parsnip properly, deeply-dug soil, which has been previously well manured, is desirable. It is better to grow parsnips after a crop for which the soil has been heavily manured rather than to add fresh manure. In order that the roots may be sweet, succulent, and crisp, growth should be rapid. Though it is not necessary, growth is promoted by forcing into the ground a dibber or bar to a good depth, and filling the hole thus formed with fine, rich compost, such as that from some old manure bed. Two or three seeds may be sown on this soil, and when they appear all the seedlings but one may be removed. Seeds may be sown at intervals from March to May, the best-flavoured, though not the largest roots, being obtained by sowing at the later date. When sown in the ordinary way drills should be made half an inch in depth and eighteen inches apart. In these seeds should be sown thinly, lightly covered, and well trodden in, and when the young plants appear thinning should be begun, until ultimately not less than six inches remain between plant and plant. The surface of the ground between the rows should be kept well broken up by means of the hoe. As soon as they are large enough, they may be pulled and used. During the winter the roots are best left in the ground as when growing, but any that remain over should be lifted early in March before growth restarts. For flavour two of the best varieties are *Student* and *Tender and True*.

**Peas.**—The Pea is by many considered the most delicious of all vegetables grown in English gardens, and in comparatively recent years great improvements have taken place in the quality and flavour of this vegetable. There is no longer any excuse for growing in gardens any but peas of first-rate flavour. Like most other vegetables peas require for their successful cultivation deep, loamy soil, which has been well enriched and deeply dug or trenched in the autumn. It is a good plan to dig a shallow trench on each side of the rows, so that during the summer months manure and water can be easily supplied, to meet the requirements of the growing plants. June and July are the principal months during which peas are in season, but by care they may be also obtained in May; and in favourable situations peas may be gathered in the open as late as the end of September or even a little later still. The very earliest peas are obtained by sowing early in December at the rate of nine or ten seeds in a five-inch pot, and placing the pot in a cold frame. The plants should be thinned to six per pot. They must have little or no artificial heat, abundance of light, and free ventilation on every possible opportunity. These plants should be planted out in a warm, south border about the second week in March, in deep drills. For these early sowings suitable kinds are Sutton's Seedling and Chelsea Gem.

The first sowing in the open may be made towards the end of February, providing the land is not too wet, three splendid varieties for this crop being Early Giant, May Queen, and Bountiful. Other sowings may be made in March, Gradus and the Daisy being good kinds for the purpose. The seed is best sown in flat-based drills, which may be made with a spade or shovel, two or three inches being allowed from seed to seed. The distance between the drills naturally varies with the height of the variety, the distance between the rows being roughly the same as the height to which the plants attain. Seeds may be sown every two or three weeks until the beginning or even the middle of June. To follow the varieties already named we have such kinds as Telephone, Dr. Maclaren, Duke of York, and Duke of Albany. These again may be followed by such kinds as Best of All, Satisfaction, Windsor Castle, Reading Giant, Autocrat, and Veitch's Perfection. These should carry us well into August. Following these we have the section of so-called late peas, success with which can only be hoped for in favoured localities. Among the best of these varieties are Ne Plus Ultra, Sutton's Late Queen, Latest of All, and Carter's Michaelmas. The principal secret of success with late peas consists in thoroughly



**The Potato.**—Potatoes do best in a deep, sandy loam, which has been well and suitably manured before winter. When only heavy, damp clay is available, it should be thrown up into ridges and the potatoes planted in rows along the crown of the ridges. Cabbages may, in that case, be planted in the hollows between. Before Christmas farmyard or stable manure should be applied at the rate of about sixteen tons per acre. This manure may well be supplemented by a mixture of five hundredweight of superphosphate of lime, two hundredweight of nitrate of soda, and two hundredweight of kainit per acre, half of this chemical manure to be applied in the drill at the time of planting, and the other half between the rows just before earthing up.

The soil should be trenched in the autumn, and left exposed to the atmosphere through the winter. No fresh animal manure should be allowed to come into contact with the planted tubers.

Tubers which are intended to be used for "seed" should be selected at the time of lifting. They should be evenly shaped and should weigh from two to three ounces each. They should be spread on the floor in an open shed until the skin is set and hard, and should then be packed in single layers in trays or shallow boxes and stored in a room inaccessible to frost, where, nevertheless, they are fully exposed to air and light. In the case of very early potatoes these shallow boxes or trays may be placed under the stage in the greenhouse or other warm place. A little fine soil may also be sprinkled over the potatoes, which should be slightly watered. By this means a certain amount of growth results, and the potatoes, if carefully planted

out without damage to the new rootlets, will be more forward than others not treated in this way. In all cases seed potatoes placed in boxes should be arranged with their crowns upwards. The eye in the centre of the crown is that from which growth should be encouraged, as it is much the more prolific, and makes the strongest plant.

It seems wise to introduce at intervals tubers from another district, especially from a higher latitude. For the earliest potatoes a south border, preferably sheltered by a wall, should be chosen. The potato is peculiarly susceptible to frost, and it is therefore generally useless to plant before the middle of February even in such a situation. In heavy soils it is generally better to plant after the middle of March. For the main crop March is the best month to plant, but some late kinds should also be planted in April.

The soil having been prepared and levelled, drills should be drawn with a hoe, mattock, or light spade, about four inches deep and three feet between the rows. The tubers should be laid at the bottom of the drills, at a distance of about twelve inches apart, and should then be covered by the hoe. When planting the early kinds only two feet need be left between the rows. As soon as the plants show above ground the soil between the rows should be loosened with a fork or hoe, and when the plants are about three inches high the first earthing-up should take place, and this should be continued every three or four weeks until the plants are nearly full grown. Except in the case of early potatoes for immediate use the tubers should not be dug up until the tops are quite dead. They should be cleared of earth, and dried by exposure to the sun for a day or two. Afterwards they should be stored in a dry cellar or other frost-proof building. Where no building is available they may be piled up on some raised site, and covered with a thick layer of earth, so as to be protected from frost and heat.

Potatoes are very subject to a disease caused by a fungus (*peronospora infestans*), and numerous applications have been suggested for its treatment. The most effective of these is a solution of copper sulphate sprayed over the leaves before the disease shows itself. The so-called Bordeaux mixture consists of one pound of copper sulphate or bluestone dissolved in warm water, three-quarters of a pound of freshly-slaked lime, dissolved in water and added to the copper, additional water being added to make up to ten gallons. But the great and only satisfactory method of attacking the potato disease consists in good cultivation, selecting the right kind of soil, growing vigorous

and disease-resisting varieties, and the avoidance of growing potatoes year after year on the same ground. The number of varieties is legion. Of early kinds Myatt's Ashleaf, Ninetyfold, Ringleader, and Sharpe's Victor are among the best. Main crop varieties include Windsor Castle, Schoolmaster, and Supreme, whilst among late varieties may be named Up-to-Date, Bruce, and Magnum Bonum.

**POTATO SCAB.**—This curse of the potato-grower has not yet found its antidote, though many remedies are tried and recommended. Such dangerous measures as the steeping of the seed before planting in corrosive sublimate are so risky in the ordinary conditions of gardening that they can hardly come into general use. Flower of sulphur dusted into the rows is said to give good results, while an American investigator recommends the application of a solution of formalin of a strength of one pint to thirty gallons of water.

**Rhubarb.**—Rhubarb is a plant perfectly easy to grow in any ordinary soil, but in order to produce really good stems a deeply-dug and somewhat heavily-manured soil is requisite. The situation should be sheltered from east winds, as it is important to obtain good stems early in the spring. Carefully selected roots should be planted, with the top bud two inches below the surface, six feet being allowed from plant to plant. The ground should then be trodden firm, and lightly raked over. It is better to plant in the spring, and to cut no stems during the first season. Farmyard manure is the most satisfactory of all, but where artificials have to be resorted to, bone manure undoubtedly yields the best results. Growers should be cautioned against weakening the plant by pulling too many stems from any one plant in any one year, as it is only by the healthy leaves of one year that the plant is enabled to store up nourishment with which to produce the crop of the following year. A mild degree of forcing can be effected by covering the young shoots in the early spring with sea-kale pots or drain-pipes, and surrounding these with a heap of fermenting manure. Or a few roots may be lifted and packed in boxes with moss or light soil, and placed in a dark situation, under the staging of a greenhouse or other warm spot, when a good supply of delicate early stems can be counted on.

**Salsify.**—Salsify is a vegetable much less used now in England than was formerly the case. It is much more popular in France than with us. When well grown, however, it is a desirable

vegetable, and has a flavour quite distinctive, a little like parsnip. It does best in a deep, sandy, well-enriched soil, and in heavy or recently manured soil it is difficult to get good straight roots. In preparing the soil the manure should be buried nine or ten inches deep, the surface being enriched either for a previous crop or by the addition of some well-spent hot-bed soil or old manure. The seed should be sown about the end of March, in drills one inch deep and twelve inches apart, the soil having been deeply dug and then made fairly firm. The seed should be sown thinly, and as soon as the seedlings are about two inches high they should be thinned to five or six inches apart, and the surface of the ground between them should be kept well broken up by the hoe. The roots are best left in the ground throughout the winter and pulled as required for use. Any that remain in February must, however, be lifted before growth recommences, and stored under sand or earth and straw as advised in the case of celeriac.

**Scorzonera.**—Scorzonera requires similar treatment to that advised for salsify. Being a perennial plant, however, the surplus roots may, though undesirable, be left in the ground over the second year. It is far better, however, to raise a fresh crop each year, as the roots tend to deteriorate. It should be remembered that scorzonera roots must be handled carefully. Their surface should not be cut or scraped before they are cooked, but they should be peeled after they have been boiled.

**Sea-Kale.**—Few vegetables yield a better return for the trouble they entail than does Sea-kale. It is one of our most delicious vegetables, and may easily be had at a season of the year when other vegetables are comparatively difficult to obtain. It is a native plant, and is of the easiest culture in almost any soil, being indeed quite difficult to eradicate in soils in which it has once become established, every little fragment of root seeming capable of producing a new plant.

Although of such easy cultivation, sea-kale well repays generous treatment. The ground intended for a permanent plantation should be deeply dug, the top of the sub-soil being broken up and left *in situ*. A very liberal dressing of manure should be incorporated with the soil, and the whole ground should be thoroughly cleaned of weeds. Sea-kale may be raised from seed sown thinly in March in drills about two inches deep, eighteen inches being allowed between the drills. As soon as the seedlings have made six leaves they may be transplanted to

rows eighteen inches apart, allowing nine inches from plant to plant. Ultimately about two and a half feet should be allowed from plant to plant in every direction.

Far better than propagation by means of seed is propagation by root cuttings. Small roots, or rather pieces of root, about the size of the little finger and about four inches long, are to be planted about the end of March, bud-side upwards, the bud or the top of the piece of root—where there is no bud—being just on a level with the surface of the ground. Eighteen inches should be allowed between the rows in which these are planted, about fifteen inches being allowed from set to set. The holes for the roots should be made with a short, blunt dibbler, the hole being made about an inch deeper than the length of the cutting. A little soil will fall to the bottom of the hole, and on this the bottom of the cutting should rest. The top should not be more than about half an inch below the surface in any case. The surface between the rows should be kept broken up by the hoe, and two or three inches of manure may be used as a top dressing. On light soil a dressing of salt, about half a pound to the square yard, may also be given with advantage. Water should be liberally given throughout the summer. By November these young plants will have formed strong roots fit for planting where they stand, or for forcing. If intended for early use the roots should be lifted about the end of November, as soon as the leaves part readily from the crowns. These roots can be packed closely together in light soil, the crowns being on a level with, or just below, the surface. They should be placed in a dark cellar or darkened part of the greenhouse, a large case placed under the staging being excellent for this purpose, and exposed to a continuous temperature of about sixty degrees or a few degrees less. The soil in which the roots are packed should be gently watered and then covered with a layer of dry leaves or straw. Half a dozen roots may be planted in this way in a ten-inch pot, and the necessary darkness may be given by inverting another ten-inch pot over it and covering the whole with matting. The kale should be cut when about six inches long, and for a continuous supply it is important to place a fresh lot of roots under the forcing conditions weekly. The roots which have been lifted for purposes of forcing which are not wanted for the moment may be stored away in soil crown uppermost, so that they can be placed in the forcing-house as required.

If it is intended to force sea-kale where it stands in the open the plants should be covered with sea-kale pots (or large drain

In cutting sea-kale care should be taken to remove not less than half an inch of the old wood at the same time. Quite reasonably good sea-kale may be obtained without any forcing at all simply by covering the crowns with about a foot of sand and gravel in the autumn when the plants die down. Beautifully blanched young growths can in this way be obtained in the following spring. The absolute exclusion of light during the whole period of growth until the shoots are cut is the essential condition.

**The Shallot.**—Shallots are easily cultivated in almost any soil. They do best in an open situation, and in soil that has been well manured for previous crops. The ground should be made fairly firm before planting. The bulbs should be planted early in March just deep enough to make them firm, but should not be quite covered with soil. Six inches should be allowed from bulb to bulb and twelve inches between the rows. It is a good plan to place over each bulb a handful of old compost from a cucumber bed or the like. Beyond keeping down weeds and doing a little hoeing between the rows no further treatment is needed. About the end of July or early in August, when the stems begin to die down, pull up the bulbs and dry them in the sun, turning them each day and taking them indoors at night, until they are nicely dried, when they should be stored in a dry cellar or other room.

**Spinach.**—Spinach may be had during most months of the

year. It is a very rapid-growing plant, and consequently may often be grown between other crops as an alternative to leaving the ground idle. The spring crop is actually ready for gathering often as early as six weeks from the time of sowing. It is difficult, and indeed undesirable, to attempt to obtain good spinach during the hot months of late summer, as the plant is exceptionally susceptible to the effects of drought. A deeply-dug, rather moist soil is to be preferred, a sandy, gravelly, or very sloping situation being unsuitable. It is a good plan to soak the seed in water for twenty-four hours before sowing. Seed may be sown in the permanent quarters, in drills one inch deep and one foot apart. The seed should be sown very thinly, and the seedlings should be afterwards thinned out to six to eight inches apart. The ground between the rows should be kept well hoed. Sowing in the open may take place from the end of February to early in May. It is well to make small, successional sowings, in order to keep up the supply. The Victoria Round-leaved is as good a variety as any. If autumn supplies of spinach are desired the New Zealand or Prickly sort should be sown early in August. Of this variety the shoots and not the leaves are used. In gathering spinach, pick only the largest leaves, do not pick the whole of the leaves from any one plant. In this way a succession of leaves is obtained, and even in winter good growth is made.

**The Tomato.**—In the southern parts of England tomatoes of moderate quality can, in favourable seasons, be grown in sheltered situations in the open air. But in most districts of England, and in average seasons in almost all districts, some kind of glass structure is necessary if ripe fruit is to be obtained. For the tomato is a tender plant, and requires abundance of sunlight and a moderate degree of heat to ripen it properly. At the same time a close atmosphere is fatal to success, and whatever structure is employed a free supply of air is absolutely necessary.

The majority of tomatoes imported from abroad are picked before they are ripe, and the ripening which takes place on the voyage yields a result very different from that consequent on the natural ripening which takes place on the plant itself.

Seed may be sown in September, December, February, and March. The beginner would do well to sow at weekly intervals throughout February and March, sowing thinly in pans placed close to the glass in a warm greenhouse or moderately warm frame. As soon as two leaves appear on the seedlings they should be pricked off singly into thumb pots, the soil used for

potting being stored for some days previously in the greenhouse, so as to acquire the same temperature as that from which the plants are taken. In a small greenhouse it is well that these young seedlings should be kept near the glass, to keep them short-jointed. As they grow they should be moved on into larger pots, and in about ten or twelve weeks they should be ready for planting out into borders or into the final pots in which they are to be fruited.

The soil required for the successful growing of tomatoes is ordinary good fibrous loam, mixed with road sweepings or a little sharp sand, together with leaf-mould and some well-decayed manure. Over-manuring definitely tends to unfruitfulness, and no manure must be used which has not fully fermented. A generous amount of potash is required in the soil for successful tomato-growing. This is even more necessary than in the case of potatoes. It is, therefore, desirable to add a pinch or two of kainit or nitrate of potash at intervals through the growing season. Generous watering is essential at every period of growth, though a permanently saturated condition of the soil is, of course, undesirable. If proper drainage is afforded and the atmospheric conditions are suitable, over-watering is unlikely. In any case it is useless merely to sprinkle the surface of the ground. Sufficient water should be given to saturate down to the roots, and no more should then be given till another soaking is called for. Under glass three feet should be allowed from plant to plant. Some support is necessary, stakes being, on the whole, best for the purpose. Wires may be employed to run the plants along under the glass. Although warmth is necessary, over-heating is to be avoided. A night temperature of fifty-five to sixty degrees and a day temperature of sixty to seventy or seventy-five should mark the extremes.

When it is proposed to grow tomatoes in the open-air, seeds should be sown in March under conditions similar to those already suggested. Suitable varieties should be selected for the purpose. The young plants should be cautiously hardened, and should be planted out about the end of May, holes a foot square and a foot deep being made to receive them, and these holes should be filled with light, moderately rich soil. For the first week or so the plants should be protected at night by means of sea-kale pots or drain-pipes. And here it may be remarked that, although only in favourable seasons and favoured localities can good results be counted on when tomatoes are grown on a considerable scale in the open air, still, in almost all localities and in almost all seasons, a few plants can be successfully grown



in sheltered nooks where the gardener is enthusiastic and knows how to make use of simple means of protection.

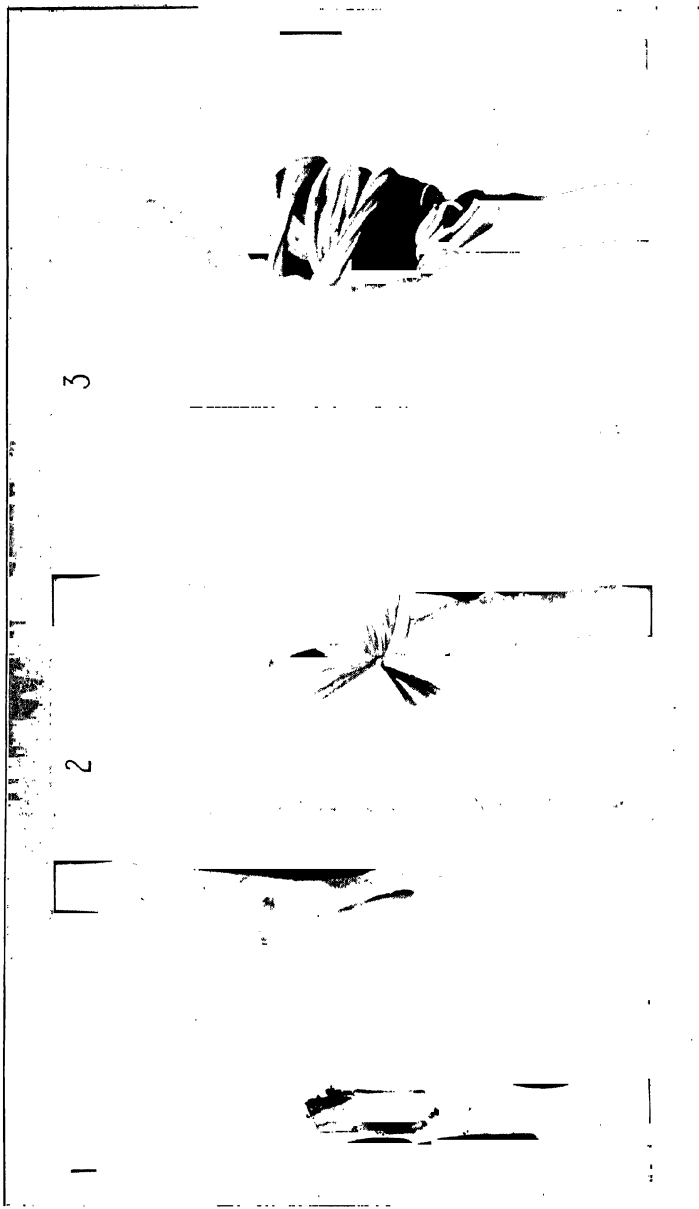
On the whole, the most satisfactory form of plant is the cordon, or single stem, though some people prefer plants with two branches. Cordons are produced by removing lateral branches as soon as they appear, and after the fruit has set pinching off the main stem as soon as the desired height is reached. On the question of thinning of foliage, there is among gardeners great difference of opinion. Some advocate leaving plants with their full crop of foliage, others remove four-fifths of the leaves. It seems likely that the path of wisdom lies between. No leaves should be removed until the fruit is set, after which time just those leaves which threaten to shade the fruits unduly should be pinched out.

**TOMATO BLACK SPOT.**—Black spot or black rot is a well-known fungoid disease of tomatoes, and is usually due to too moist an atmosphere in the greenhouse, with too little ventilation. It shows itself as a small, black spot on the skin of the fruit, which gets deeper and bigger. The spots are most frequently found on the end of the fruit furthest from the stalk. The disease seldom shows itself until the fruits are more than half full-grown, and may spread to the stems and leaves as well as the fruit. All affected plants should be pulled up and burned, while the others should be sprayed about every ten or twelve days with a fungicide solution of an ounce of sulphide of potassium to three gallons of water. Where tomatoes are grown in large numbers it will be found worth while to spray all plants with this solution quite early in the season, as this will often keep the disease from appearing at all. The spraying must be done in any case as soon as the first signs of the disease are seen, as it spreads very quickly and will soon infect a whole house.

**THE SLEEPING DISEASE OF THE TOMATO.**—This disease is of fungoid origin, and is almost impossible to combat. It will often destroy an entire greenhouse full of fine tomato plants that a short time before have appeared in perfect health. The chief and indeed only symptom of the disease is the sudden complete collapse of the whole plant, and the only thing to be done is to check the spread and continuance of the disease by at once burning every affected plant, treating the soil with lime, and spraying or washing the whole house with some fungicide.

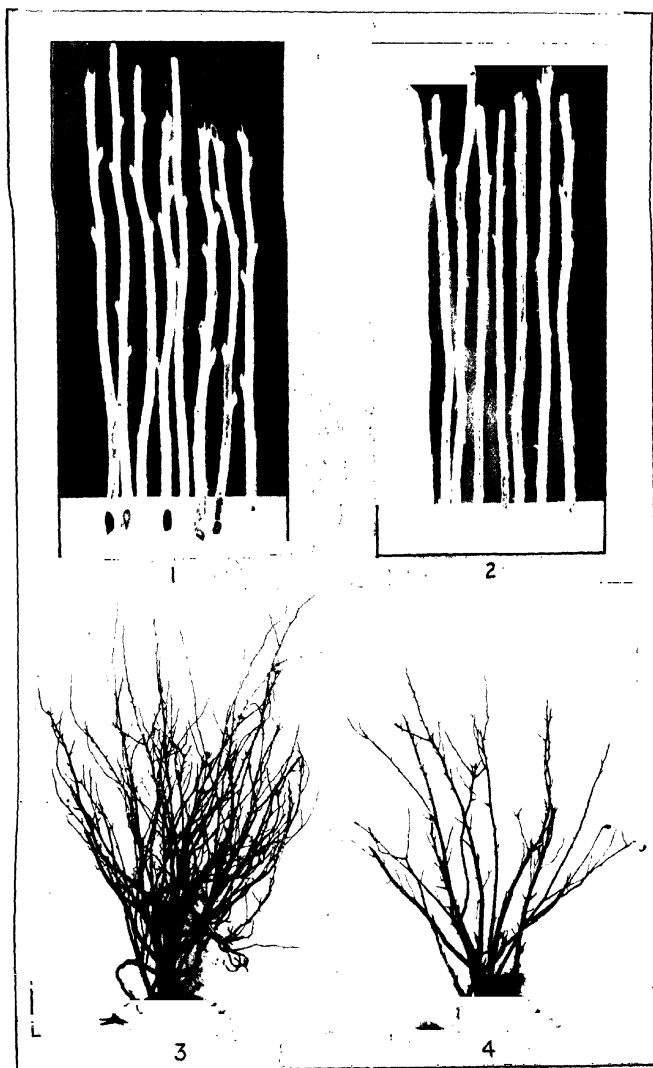
**The Turnip.**—If wished, turnips may, by selection of varieties

RUIT TREE GR TING



1. The slips prepared for binding. 2. The same, bound with bass which is (3) afterwards covered with clay and again bound

No. 10. CURRANT<sup>s</sup> BUSHES (Propagation of)



1. Black currant cuttings prepared for planting and lower buds removed. 2. Red currant cuttings prepared for planting, showing lower eyes removed from stem. 3. Old bush of black currant, before pruning. 4. The same, after pruning.

and care in sowing and the preparation of the soil, be obtained in almost every month of the year. They are, however, at their best in autumn, as then the cool nights and the moisture of the ground promote succulence and tenderness. This vegetable would be held in much greater general esteem if small, good-flavoured roots were more commonly grown, instead of the large, coarse, soft, flavourless turnips which one sees far too often. The most suitable soil for this vegetable is a sandy loam, which has been deeply dug and well manured for a previous crop. For spring use a few seeds of such a variety as Carter's early Forcing may be sown in a frame in February. Successional sowings may be made in the open in March, April, and May, the Red and White Milan varieties, the Early Paris Market, and the Snowball being chosen. In any event the plants should be thinned as soon as possible, not less than six inches being allowed from plant to plant. Turnips intended for autumn and early winter use should be sown in an open situation in July, the Redtop Mousetail and Veitch's Red Globe being suitable kinds for autumn use. Seed may be sown the first week in August for mid-winter crops, Orange Jelly and Golden Ball being good mid-winter kinds. When frost sets in the turnips should be covered with a few inches of leaves or litter and left in the ground, or, as an alternative, the roots or a part of them may be taken up, the tops cut off to within half an inch of the crown, and stored either in a cellar or under earth or straw, as is done with potatoes. A better plan than the latter is to dig a deep drill, and to place the roots therein, covering them lightly with earth, leaving their leaves only above the ground. In this way their flavour is better preserved. The smaller roots are better left where they stand, the adjacent soil being hoed over them. In the spring any roots left will send up a crop of young green shoots—"turnip-tops"—which have considerable value as a green vegetable at this season.

The principal pest to which the turnip is liable is the turnip fly. As with most other diseases and pests the most important measure consists in frequent change of soil, and its proper preparation. Liberal dressings of lime, soot, or wood-ashes may be given to the growing crop, and frequent hoeing should be performed between the plants. The best method of prevention is to keep down the plants known to harbour it, as these nourish the insect and shelter it until the young turnips are ready for its attacks. Among these host plants are the charlock, the hedge mustard, and the shepherd's purse, and these should be rigorously dealt with whenever they are seen. If the young



and much the best plan is to grow only small ones, and cook them whole.

**Lettuces.**—The Lettuce is the acknowledged King of Salads, and should be grown in every garden where vegetables are cultivated at all. Lettuces are of two kinds—those coming under the heading of Cabbage lettuces, which are short and globular in shape, and the Cos kind, which have long leaves. Of the two, the Cos lettuce is, perhaps, the better flavoured, and is best adapted for simple plain salads, but the cabbage kinds are good in all mixed salads, and are, moreover, more easily obtainable in winter and spring, the Cos being pre-eminently a summer lettuce. Both kinds like a light, rich soil, good garden loam liberally enriched with stable manure suiting them well. For the main crop of summer lettuces a piece of ground that has already been well cultivated should again be trenched, incorporating in the process plenty of good fresh stable manure. The layer of manure should be a spade's depth below the surface, so that by the time the roots of the lettuces have penetrated to it it will have matured to a perfect condition for their use. This process, well carried out, will prevent many of the lettuces from "bolting," as is so apt to occur in hot, dry weather.

Lettuces may be sown under glass any time from January to March, but it is unsafe to sow them in the open until after this date, when successive sowings should be made in the bed in which the majority of them are to remain. Transplanting is necessary in the case of part of the crop, but the best plants are obtained by sowing in the permanent position. The seed should be sown in drills a foot apart and one inch deep on the bed prepared as above, and when the plants are big enough to handle they should be thinned to about six inches apart, the thinnings being themselves planted out at the same interval elsewhere in the plot. The thinning need not be done all at one time, the larger plants being first removed, and it must be remembered that small lettuce plants, from the size of a couple of inches upwards, make excellent additions to the salad bowl. Hence any superfluous plants should not be thrown away, even if not needed for planting out. Thinning must be thorough if good lettuces are to be grown, and it is better to leave too few plants than too many.

The chief enemies of the little lettuce plants are slugs and snails, and careful picking over of the seedlings is necessary in order to capture these.

Lettuces raised from seed sown under glass will need two

transplantings, the first when about three weeks old, when they should be planted out into a bed of good soil in a frame, and kept there until old enough to plant at six-inch intervals in the open beds. They will need protection against both wind and sun at this early stage, and should be well hardened off before actual planting out.

Winter lettuces are obtained partly from special sowings and partly by the preservation of part of the late summer crop, the latter only providing for a small part of the late autumn. Frames are, however, necessary if a full supply of lettuce is to be had during the winter, and even then the plants should not be allowed to make growth too rapidly or they will be more liable to injury from frost. These winter crops should be sown in successive lots from August to the latter part of October, the earlier sowings being made both in the open and in frames, but the later ones—those sown in October—being in frames only. Fine soil, well mingled with old rotted manure, is necessary for the seedlings when pricked out. Of these seedlings some should be planted in frames on light soil, not too far from the glass, at three-inch intervals, and when the young plants touch each other they should be thinned out by pulling for use and for planting out. These thinnings may be planted out on a warm border at six-inch intervals, leaving a crop still in the seed-bed. All the crop in frames needs careful handling, plenty of moisture being allowed, or warm, bright weather will cause the plants to bolt. Slight protection given to the outdoor crop will keep them safe through the hard weather, and it is probable that the plants will be crowded enough to need the removal and transplanting of every other one, a process which needs and is worth extreme care. If placed in March in a good warm sunny border, the lettuces will be useful in the very early summer.

It is usual to tie the leaves of Cos lettuces when nearly ready for cutting, so as to blanch their hearts, though a good, well-grown lettuce should be close enough not to need this.

Cabbage lettuces do not need tying, as their leaves are short and close. One essential for the production of good summer lettuces is a free and plentiful supply of water. In a very hot, dry climate, or in a hot, dry position, the red-leaved lettuces do best, but they are not much used in this country. Next to them, in the matter of bearing heat and drought, come the smaller kinds of cabbage lettuce.

**The Radish.**—Radishes should, if grown at all, be well grown. It is essential, if crispness and succulence are to be obtained, that

growth should be rapid. They do best in a deeply-cultivated soil, which has been well manured for a previous crop. It should therefore be rich but yet not rank. It is well to add a little lime to the soil in most cases. The early crops should be sown in sheltered situations facing south. The later crops in a slightly-shaded place. In hot weather water should be freely given daily. The seed should be sown at weekly intervals, from February to the end of May, or even later. The seed should be sown about one inch deep, and thinly. Any seedlings that press on their neighbours should be at once thinned out.

**Mustard and Cress.**—Cress and Mustard are, perhaps, the most easily grown of all garden plants. Seed should be sown at weekly intervals throughout the spring and summer, the seed being only just covered with light soil. They should both be cut when young and mild.

**Horseradish.**—Horseradish is so easily grown that it is generally badly grown. If once planted it will grow like any weed, in the most difficult soils and situations. But for culinary purposes horseradish grown in this way bears no comparison with properly grown roots. For its proper cultivation a trench about eighteen inches deep should be taken out and four or five inches of manure laid at the bottom of it. On this two inches of soil should be laid, and on this horseradish crowns with about six inches of root should be planted about a foot apart in the spring. All small, fibrous roots should be cut off at the time of planting. On the crowns should be placed six inches of rich, light soil, and on this another six inches of poor, light soil. The roots will be ready for digging in two years.

**Endive.**—Endive seed should be sown in light, moderately rich soil at weekly intervals from April to August. The seed should be sown about one inch deep, thinly in drills. As soon as they can be handled, the young plants should be thinned to four inches apart, and later to twelve inches apart, the seedlings being easily transplantable. Water should be liberally given throughout the period of growth. Broad-leaved kinds should be blanched by tying up with raffia after the manner of Cos lettuce, the curly-leaved kinds by covering them with a flower-pot, the hole in which has been closed with a cork.

**Mushrooms.**—Mushrooms are so generally liked and so easily grown in almost all places, with so few appliances, that it is a



wonder that they are so little cultivated. Where there is any shed or cellar or even cucumber frame available, mushrooms can easily be obtained in every month of the year. For their successful cultivation they merely require a supply of stable manure, and a certain degree of warmth and moisture. During the months of summer and autumn, mushrooms may, perhaps, most conveniently be grown in the open air, but during late autumn, winter and spring, some building or frame is absolutely necessary.

As a rule, about eight or nine weeks must be allowed from the commencement of operations to the gathering of a crop, though this period naturally varies according to the season, being sometimes so short a period as a month, in others so long a one as three months. A supply of stable manure obtained from stables where straw, and not peat moss, is used, is the first requirement. The longest litter should first be shaken out, retaining all up to the length of about a foot. This should then be made up into a heap about two or three feet high and from four to six feet wide. In winter-time this heap should be made up under cover, or the heat will too quickly evaporate. Every second day the heap should be thoroughly turned, so as to bring the central portion to the surface and the surface to the centre, and during this process all lumps should be broken up. This turning should be continued for about a week in winter and about two weeks in summer. The manure should then be placed in position and well trodden down. The temperature of the heap should be taken by means of a thermometer plunged to a depth of about eight inches. As soon as this temperature thus indicated gets to about seventy-five or eighty degrees, the spawn, which is bought in bricks composed of a mixture of manure and soil, containing dry mycelium of the mushroom, should be inserted in pieces, each piece being about two inches square. These pieces should be planted by means of a trowel about two or three inches deep in the manure, and about six inches apart. The heap of manure is then at once to be covered with about two inches of soil obtained from just below the grass of meadow land. Old garden soil is totally unsuitable for the purpose. This soil should be just, and only just, moist enough to hold together, and should be beaten firm with the flat of the spade.

In the case of big beds it is well before covering with soil to leave the heap for a day or two so that it may be observed if the temperature is rising.

If the bed gets very dry, it should be sprinkled with a moderate

amount of tepid water, but mushrooms are very intolerant of stagnant moisture. So far as possible, the temperature of the air of the building in which mushrooms are being grown should be kept at from fifty-five to sixty degrees.

If the bed is to retain its health mushrooms should not be cut but should be twisted off, separating the stalk as near the base as possible.

**Herbs.**—Every garden should contain a few herbs. They take up but little room, require but little care, and are useful in the kitchen both in their green state and carefully dried. Only quite a few of the most common of the herbs are usually grown, though there are many more which deserve a place in the herb patch, and furnish a pleasant variety of flavours in cooking. Such herbs as fennel, which is practically never seen in the shops, though much in demand for use in sauces, may easily be grown in the kitchen garden, while where preserves and such things are made at home, Angelica may be grown for the sake of its stalks, used for candying.

The commoner of the pot herbs are mint, sage, parsley, and thyme, and all should be planted for household use. All of these except mint enjoy full sunshine, with a good but well-drained soil. They cannot put up with a damp foothold, and a soil which is cold and water-logged in winter does not suit them at all. A good loam, rather on the light side, well dug and manured before planting, will give good results in the case of sage, parsley, and thyme, but for mint the soil should be rich and moist, though a water-logged soil is not good. Two kinds of mint are cultivated—spearmint, the ordinary kind used in the kitchen, and peppermint, grown only for distilling. The first is the kind to grow, and will do well in a not too sunny corner of the garden, though not in full shade. It is propagated by division of the roots, or by cuttings, the former method being preferable. The roots should be lifted in March, divided, and replanted nine inches apart in small trenches about a couple of inches deep. Liberal supplies of water are needed, and the plants should never be allowed to get quite dry. Each autumn the shoots should be gathered for drying, and the plants should then receive a top dressing of well-rotted manure. To get good results, the mint should be replanted each third year, and during the first year, while the plants are still small, such crops as radishes or lettuce may be grown in the spaces between the rows, though this is unadvisable unless thorough weeding can be carried out by hand.

Parsley requires a light loam, doing well with a good admixture of sand, but the loam must be rich and well and deeply cultivated. Starved parsley never does well. Two sowings should be made, to ensure a continual supply, one for the summer crop, sown in April, the other, for winter and spring, sown in July. The seed should be sown thinly in drills fifteen inches apart and an inch deep, in soil finely broken up and raked. The seed is long in shooting, and about seven or eight weeks after sowing will begin to show above ground, when it must be kept carefully weeded. The seedlings should be thinned out, when old enough to handle, to five or six inches apart. They should not be allowed to flower, any buds being nipped off at once. The crop required for winter use should be picked close in September, when a fresh crop of leaves will shoot up. Parsley for winter use requires a little protection from frost, but this need be of the simplest kind only.

Sage requires much the same conditions as does parsley. It may be raised from seed or grown from cuttings, the latter being the simplest method. If grown from seed it should be sown in a sunny, sheltered spot in late March or early April, the seedlings, when large enough, being transplanted to a nursery bed about four inches apart, and later re-transferred to their final bed: this at about a year old. If grown from cuttings, these should be taken in April from bushy plants with a good number of basal shoots, which should be pulled by hand from the old plant with a piece of the old woody stem attached. Some of these slips will be found to have a few rootlets attached to them, and these may be treated at once as plants, and put in in rows two feet apart, a foot being allowed from plant to plant. The unrooted slips should be put in temporary rows, closer together, until rooted. The subsequent treatment is similar to that of parsley.

Thyme enjoys full sun and a light soil—in a heavy, moist soil it is useless to try to grow it well. Its cultivation is of the simplest, and it may be raised from seed, from cuttings or by division. The latter is the easiest way, and should be done in April, the old plants being lifted and divided up, replanting them at intervals of a foot in each direction. Seed should be sown in March or April, the former only in a mild season, and the seedlings, when about a couple of inches high, should be transplanted into nursery beds, with spaces of three inches between them each way, being finally transplanted in the following April at intervals of a foot. Cuttings should be made in summer, and should merely be dibbled in, three inches apart in

a light, sandy soil. They should be shaded from direct sun for a while, preferably by mats supported on sticks, and should be kept moist until well rooted. Little further care is needed for the cultivation of thyme, except thorough weeding.

The less-usually cultivated herbs include borage, chives, fennel, marjoram, savory, and tarragon, among pot-herbs; and lavender and rosemary among herbs used for distilling and perfume. Borage is a good plant for bee-keepers, whilst its flowers are used in claret-cup and its young leaves in salads. It grows in any good, ordinary soil, and should be sown in March or April, either by broadcasting or in shallow drills, the seedlings being well thinned subsequently and kept free from weeds. Chives is of the onion tribe, and its shoots are used in soups and salads by many people in preference to its commoner relative, as its flavour is milder and more delicate. It likes a good garden soil, and is propagated by division, the roots being divided and replanted in March or October. The plants should be in rows a foot apart, with six inches between the plants. The bed will need replanting each third year. Fennel likes a rich soil, but will do well in good garden loam, and is propagated by seed and root division. Seed is sown in drills an inch deep, the drills being fifteen inches apart. The sowing should be done in March, and the seedlings well thinned out when large enough to a foot apart. Root division is done in March, the plants being replaced a foot apart in rows at the distance of a foot. Weeding and the removal of all flower-stems will be necessary later. The young leaves are the part used in cooking. Marjoram likes a sunny spot and good ordinary garden soil. It is of two kinds, sweet marjoram, which is the most common kind, an annual, which should be raised from seed sown in gentle heat in March and planted out in May eight inches from plant to plant, and pot marjoram, which is a hardy perennial and is raised from seed in the same way or increased by root division. Both kinds can be sown out of doors in April, the seedlings being thinned later to their proper intervals of eight inches, the plants increased by root division needing an interspace of a foot. The pot marjoram, as it outlives the winter, needs a dry soil and a warm position, or a cold winter may injure it.

Savory likes a rich but not too heavy soil, and the summer kind should be sown in April in drills six inches apart, subsequently thinning the seedlings to six inches apart in each direction. The winter savory may be raised in the same way, or the old plants may be divided and replanted in March. The winter savory is the simplest to grow, as it does not need yearly renewal;

but both kinds should be grown for a continuous supply. The young shoots are the part used in cookery. Tarragon is, perhaps, the most particular of the herbs as to the soil in which it will flourish. It will not thrive in any soil which is stagnant or cold in winter, and needs a light, rich, well-drained loam if it is to do well. It is useless to attempt to raise it on a cold clay. Where the soil is of such a nature special preparations must be made for the tarragon in the shape of a bed raised a foot above the rest of the soil, and composed of soil mixed with plenty of leaf-mould and well-decayed manure. The plants are propagated by root division, and this should be done in March, the little plants being put in drills three inches deep and fifteen inches apart. There should be eight inches from plant to plant. The surface of the bed should receive a dressing of well-rotted manure, and another dressing again each year in autumn. The bed will need renewal when the plants show signs of exhaustion. The young shoots are the part used.

Lavender is another of the plants which will not tolerate a wet, clay soil. It needs good drainage and deep cultivation, together with a fair enrichment with old manure. A south aspect is best. Raising lavender from seed is a very slow affair, and is seldom worth while. The simplest and best method of propagation is by offsets or slips, pulled off exactly as described under "Sage," but done in October, the plants being placed a foot apart, and transplanted a year later to three feet apart. When the shoots appear in the first year after planting, their tips should be pinched off to cause the plants to "bush" instead of straggling, and no flowers should be allowed for the first year. An autumn dressing of decayed manure and a thorough digging in the spring of the soil between the rows is all the culture needed. The plants will do well for a period varying between three to ten years, but each year a few slips should be taken to replace accidental losses and deaths. The flowers should only be gathered in fine, dry weather, or they will not keep their scent well.

Rosemary likes much the same conditions as does lavender, and may be propagated by means of slips in the same way, almost any time during the summer. It can also be raised from seed sown in April in shallow drills six inches apart, the young plants being first transferred to a nursery bed and later to their final positions, when they should be three feet apart. The same treatment as advised for lavender should be given. The plants will last in full health for many years.

## CHAPTER IV.

### THE FRUIT GARDEN.

DIFFERENT fruit-trees do best in soils and under conditions to some extent peculiar to each kind, but there are certain general conditions which are more or less applicable to all. As a rule, it may be laid down that the most suitable soil is a medium loam, of moderate depth, resting on a well-drained subsoil. Soil that is water-logged is almost hopeless unless extensive drainage operations are undertaken, and very light, sandy soils are only satisfactory when kept frequently enriched by the addition of vegetable manure and by generous watering in dry weather. In any case the soil should be prepared by digging or trenching, and in the case of poor soils, by the enriching of a foot of the soil nearest to the surface. Ordinary stable manure is the most generally satisfactory for this purpose, and if some fibrous loam can also be added so much the better. In any event, the subsoil should be broken up to a spade's depth, but it should not be brought to the surface. The situation should be such as to afford shelter, particularly from winds from the east and north, cold biting winds from these quarters being common in the early spring, when the trees are in blossom and very susceptible to frost. Low-lying, damp situations should, where possible, be avoided. Exposure to sun is essential, as otherwise the wood becomes weak through incomplete ripening, and the fruit, if any forms, is likely to be of poor flavour and size.

Of course, most of us have our soil and situation determined for us, and we have to make the best of them. Much can in most cases be done to improve them, and by careful selection of the kind of fruit attempted to be grown, a moderate degree of success may be attained under most unpromising conditions. Where natural protection is lacking, walls or hedges should be constructed, and, on the sunny side of the former, fruits may be grown which in our climate are almost impossible without wall

protection. Many plants may be used for the making of effective hedges—the myrobalan plum, the privet, the elder, the hawthorn, and, if higher shelter is required, the black Italian or the Lombardy poplar are but a few among the many possible selections. Then, again, much may be done to improve naturally unsuitable soils. Heavy soils may be lightened by deep digging, thorough drainage, the addition of stable manure, leaf-mould, sand, road sweepings, or burnt earth. Light soils may be improved by the addition of stable manure and clay. The aim must be, in any case, to create a soil which shall be at least of moderate depth; which shall be capable of retaining moisture, yet be well drained from stagnant water; which shall be alive through the presence of a reasonable proportion of organic matter; which shall have a loose, open texture, and yet possess some cohesion and fibrosity.

Needless to say, the choice of trees, as well as of the stocks on which they are grown, should to some extent be regulated by the conditions one has to offer them.

As to the arrangement of the fruit garden, there is room for almost infinite variety, dependent on the space available and the idiosyncrasies of the owner; from the large fruit plantation covering many acres, through the small orchard so characteristic of English landscape, to the mixed fruit, vegetable, and flower garden which is the lot of most of us.

The choice of the form of the trees and to some small extent of the varieties also is influenced by the effect desired in the final garden or orchard. Where the fruit-trees have their own plot of land set aside for them they are not bound by any conditions, but where they have to mix with vegetables and flowers, they must conform to the plan of the complete garden. In the vegetable garden there will probably be walls available for the growing of the more delicate fruits, for which, in the orchard, special protection must be afforded. Thus the grower with a walled kitchen garden can include in his selection of fruit-trees apricots, peaches, and nectarines, which the orchard-grower would have difficulty in protecting adequately. In the mixed garden, again, space is too valuable to allow of standard trees being planted. The bush forms and the useful cordons are far preferable, as they can occupy spaces hardly larger than those required by, say, hardy perennials. The cordons are handsome and useful, trained as edgings to the flower and vegetable beds, and do well in such situations, fastened upon wire trellises. Where standards are used in the mixed garden they are best planted upon any small lawn or grass-plot, where

their graceful shape and slenderness will be seen to advantage, while there will be no plants near enough to them to suffer from their neighbourhood. The grass should not be allowed to grow right up to the stem of the tree, even when grown thus, but a little less clear space may be given than in the orchard, and efficiency sacrificed a trifle to beauty. A very pretty effect is produced in a mixed garden of fair size by the bordering of the principal walk for some distance with two strips of grass, some yards wide, kept close shorn and planted with standard fruit-trees, each strip giving the effect of a tiny orchard, beautiful in spring, and no less ornamental in the autumn, when the fruit is ripe.

**The Apple.**—Of all the fruits commonly grown in England the apple is the most popular, as well as the easiest and most generally satisfactory to grow. It is by no means fastidious as to soil and situation, doing well in any moderate loam, providing that the situation be not too low-lying, too exposed, or, on the other hand, too much shaded from the sun. According to the amount of space available and the nature of the plantation so may the form of the tree vary. In planting an orchard on grass land what is known as the standard form is undoubtedly the one to be selected. This form of tree is usually, in fact almost invariably, grafted upon the crab stock, which sends out strong and deep roots capable of fighting their way and obtaining nourishment in the rough and untilled ground. In this form no branches are allowed to develop in the stem until it has reached a height of about six feet from the ground, this part of the tree being kept straight and clear. Even in large, mixed fruit plantations on arable land the standard form of tree is often desirable, and in this case the ground underneath the standard trees is given up to bush trees and small-growing fruit-trees, such as gooseberries and currants. Standard fruit-trees have many advantages where space is not an object. Thus, as we have said, they are able to fight their way in uncultivated ground; they do not materially interfere with the grazing value of the orchard, and once planted they require comparatively little attention, beyond an annual top-dressing of manure and a little simple annual pruning. On the other hand, they have certain disadvantages. For small gardens they are obviously unsuitable on account of the space they occupy, and they do not come into good bearing until six or seven years after planting, whilst it may be some twenty or more years before full bearing capacity is reached. For most purposes the bush form of apple-



tree is well suited. It takes up very little space, and is therefore adapted to even quite small gardens; moreover, these trees come into bearing very quickly, often yielding a small crop of quite excellent fruit a couple of years after planting. It takes many years for the diameter of a bush tree to reach even six feet, so that the number of such trees which can be planted on an acre of land is considerable. In this form of tree the branches spring almost horizontally from the stem about nine inches above the ground. Other branches are allowed gradually to occupy the centre of the bush, but one great object in pruning and training the tree is to allow plenty of space between the several branches. The bush tree is grafted on the Paradise stock, the roots of which are fibrous, and tend to keep near the surface. Consequently it is less suited for rough, uncultivated ground, but much more suited for the cultivated ground of gardens. Also it is much more suitable than the standard for planting on wet or ill-drained soil, since its roots do not tend to penetrate into the stagnant sub-soil. What may be considered as a variant of the bush form of tree is the Pyramid, which differs in having a central stem from which horizontal branches proceed. It is not so economical of space as the bush tree, nor is it so generally useful. Apples are also sometimes grown as cordons or espaliers, trained against trellis or wire fence.

**PLANTING.**—The best time to plant apple-trees is in the late autumn, November being the month to choose. They may also be planted early in March, after the worst of the frosts are over. They should not be planted between Christmas and February. In very heavy soils spring planting has certain advantages over autumn planting, but in the ordinary way, and especially on light soils, November planting is preferable. When trees are planted in spring, especially on light soils, it is absolutely necessary to keep the ground continuously moist by frequent watering and surface mulching with manure. Before ordering the trees the ground should be thoroughly prepared and ready to receive them. Standard trees should be allowed a space of twenty to twenty-four feet in all directions from tree to tree. The turf should be removed over an area of five or six feet square for each tree, and in the centre of this space a circular hole should be dug about three feet in diameter and two feet in depth. The soil below this should then be broken up to a depth of at least another foot. If the sub-soil is thus involved, it will be as well to incorporate with it an allowance of stable manure, which must, however, be covered with a sprinkling of earth, as manure must not be allowed to come

into direct contact with the roots. The bottom of the hole should then be beaten or trampled firm, care being taken that the centre of the hole is a little higher than the sides. A little soil should then be thrown into the hole, so as to raise the level to such a point that when the tree is placed on it, with the roots spread out, the top roots when ultimately covered shall be about four inches below the surface of the ground. It is most important that the tree should not be planted too deep. The depth of the hole being thus corrected, the tree should be placed in it, with its lowest roots laid out horizontally. Earth should then be loosely thrown over them, and carefully pressed firmly over them. The next layer of roots should be treated in a like manner, and so on until the whole of the roots are covered. It is most important that the rootlets should as far as possible assume their natural position, thoroughly penetrating and permeating the surrounding soil. It is also most important to make the soil firm at each stage of the planting in order to minimise the depth to which the tree will sink as the soil settles. Moreover, it is well, throughout the proceedings, to keep the level of the soil at the centre higher than at the edges, so that water will not tend to stagnate round the stem. Do not replace the turf within two or three feet of the tree-stem. This ground, instead, should be covered with a generous mulching of stable manure. A strong stake about six feet high should be driven into the ground for nine inches or more at a distance of six inches from the stem of the tree. A band of leather or cloth should then be fastened around the stem near its top and around this some tarred string should be wound whereby the stem may be attached to the stake.

Bush trees, pyramids, and espaliers should be planted in a very similar way, equal care being taken to lay out the several roots and to have the interstices between the rootlets occupied by soil made firm by pressure. Bush trees should be planted eight feet apart.

**SUBSEQUENT TREATMENT.**—Apart from pruning, which is separately described, the subsequent treatment of apple-trees consists principally in the taking of steps to maintain a degree of moisture in the soil and to afford supplies of nourishment for the growing trees. During the spring and summer surface mulchings of farm-yard manure should be given. This not only will add plant food to the soil, but will also materially assist in keeping the ground moist. Breaking up the surface of the soil with a hoe during the hot, dry weather has a somewhat similar effect. The loose soil interferes with the continuity of the capillary tubes

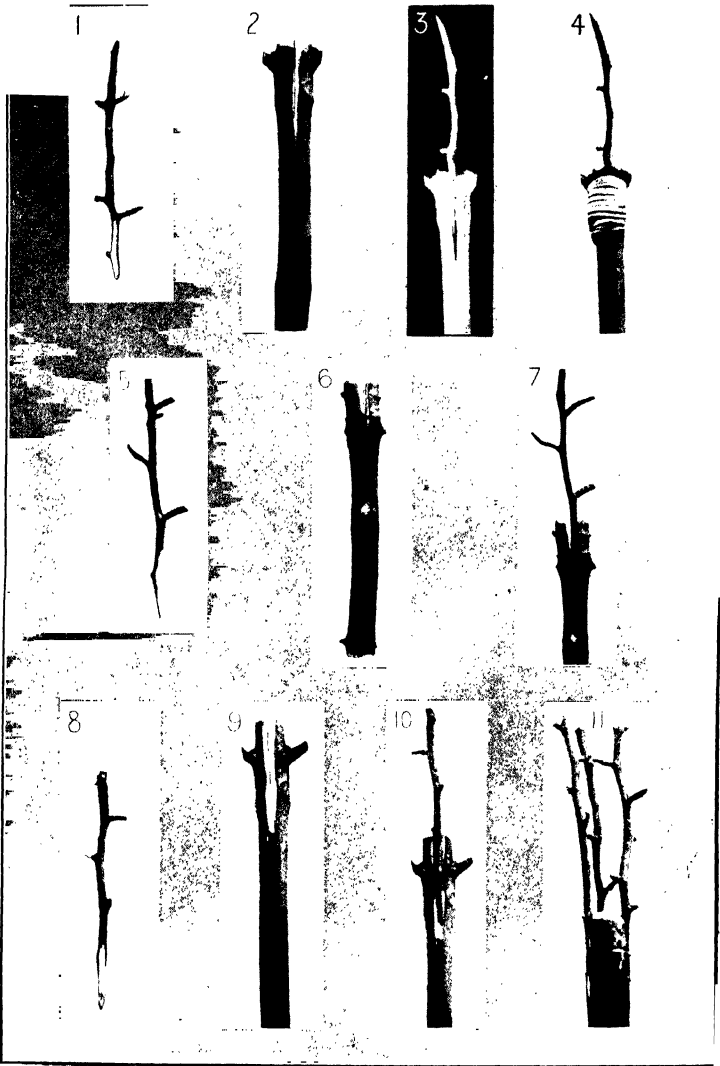
through which water evaporates, and, as it were, stops the pores of the soil and so prevents moisture from escaping. During the summer, water should be liberally afforded during the early morning and evening.

There is one point which often tries the resolution of the amateur, and that is the necessity for thinning out the fruit in those years where a superabundance is produced. It is undesirable that a tree should be allowed to ripen in any one year much more than an average crop. Not only is the size and quality of the fruit affected, but the bearing capacity of the tree is likely to be diminished for several years to come.

**GATHERING OF FRUIT.**—Different varieties of apples ripen in different months, and early varieties should, of course, be picked when they are ripe. Most of the later varieties, however, have to be gathered before they are strictly ripe in order to be stored before the frosts. October is the great month of the apple harvest. Much the most important point to be attended to in picking apples for storage is to avoid bruising. Every fruit must be carefully picked and gently placed in a basket, subsequently to be taken, without jolting, to a storage room. The storeroom should be cool and dry, the temperature being kept between 40 and 50 degrees. Before they are actually put away in a close room, however, the fruits should be allowed to "sweat" by being exposed to a free current of air for a week or two.

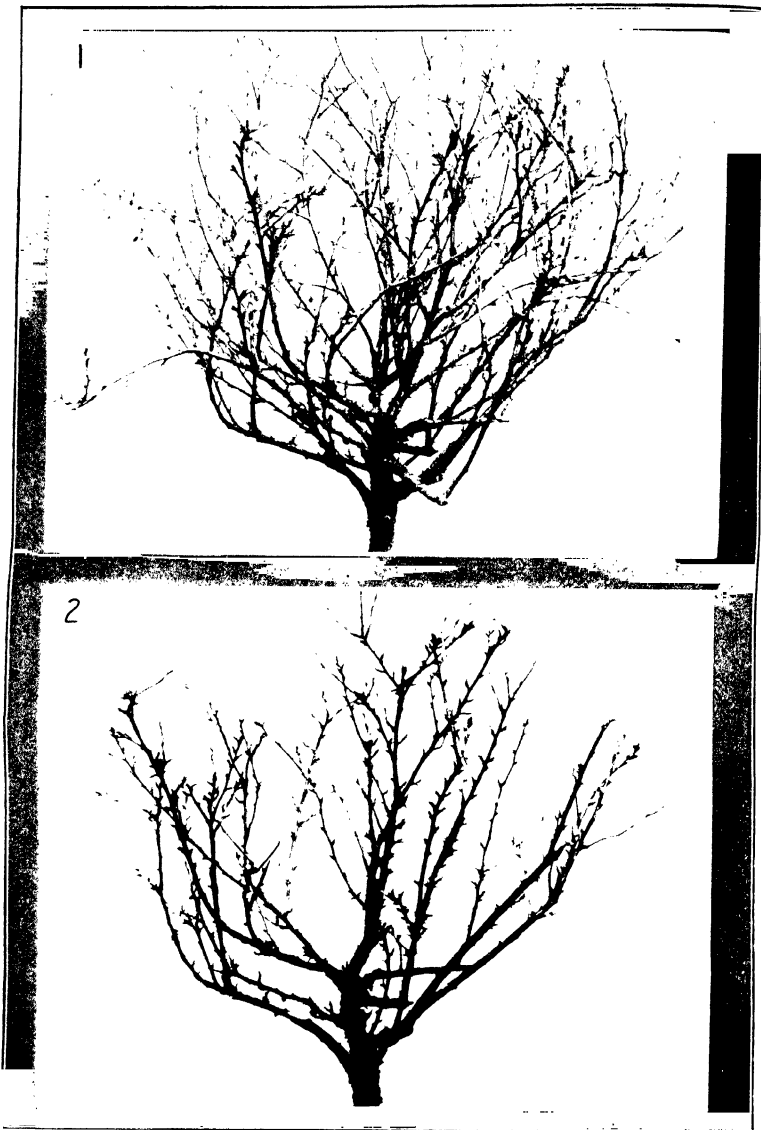
**VARIETIES.**—By careful selection a supply of apples may be had almost the year through, at any rate from July to May. During July and August we have Mr. Gladstone, Irish Peach, the Red and White Juneatings, the Devonshire Quarrenden, and Beauty of Bath, among dessert apples; and Lord Grosvenor among cooking apples. In September we have Lady Sudeley, Kerry Pippin, Duchess of Gloucester, and Worcester Pearmain among dessert apples; and Lord Suffield, Bismarck, and Stirling Castle among cooking apples. From October to December we have, among dessert apples, Ribston Pippin, Cox's Orange Pippin, Allington Pippin, King of the Pippins, and Adams' Pearmain; whilst among cooking apples we have Cox's Pomona, Ecklinville Seedling, Warner's King, Lane's Prince Albert, Newton Wonder, and Bramley's Seedling. After Christmas we have among dessert apples, Lord Burghley, Rosemary Russet, Baumann's Winter Reinette, Adams' Pearmain, Margil, Blenheim Pippin, and Mannington's Pearmain; whilst of cooking apples we have Wellington, Sandringham, Striped Beefing, and Betty Geeson. Latest of all are Sturmer Pippin, Cockle's Pippin,

# No. 11. GRAFTING



1. A shoot ready for placing in the (2) tree which is slit in the manner shown. 3. Shows the slip inserted, and (4) the same covered with clay and bound with bass. 5-11 show various ways of grafting.

No. 12. GOOSEBERRY BUSHES



1. A bush, before pruning. 2. The same, after pruning.

and Duke of Devonshire among dessert apples; and Norfolk Beefing, Northern Greening, and Hambleton Deux Ans among cooking apples. As some guide to the novice who wishes to plant ten dessert apples and ten cooking apples, the following list may be useful: Mr. Gladstone, Worcester Pearmain, Ribston Pippin, Allington Pippin, Cox's Orange Pippin, Blenheim Pippin, Adams' Pearmain, Rosemary Russet, Lord Burghley, and Sturmer Pippin for his ten dessert apples; and Ecklinville Seedling, Lane's Prince Albert, Bramley's Seedling, Newton Wonder, Wellington, Bismarck, Sandringham, Blenheim Orange, Lord Grosvenor, and Northern Greening for his cooking apples.

For those who are handicapped by a heavy soil the following list may prove useful, all the varieties being comparatively able to withstand this unfavourable condition: Bramley's Seedling, Lord Grosvenor, Wellington, and Worcester Pearmain.

**DISEASES AND INSECT PESTS.**—The apple is subject to many diseases, and is liable to the attacks of several destructive insects. Several moths attack apple-trees, one of the most destructive as well as the commonest being that named from its habitat, the Codlin moth. "Worm-eaten" apples are those which have been spoiled by the larvæ of this insect. The moth lays its eggs singly, one in the eye of each fruit, in early June, and fixes it inside the calyx with a gummy fluid. As the little apple grows and swells the grub eats its way further and further in, until a little before the fruit would normally be ripe, the maggot has reached its core, feeding upon the pips, a proceeding which causes the fall of the fruit. The caterpillars, released from the fallen apple, creep up the tree-stem until they find a sheltered crack in which they pass the other stages of their life, till the perfect moth emerges in the following spring to repeat the process. The chief preventive operation consists in tying strips of sacking or haybands round the stems of the trees to prevent the caterpillars from climbing them, together with the gathering up and destruction of all prematurely fallen apples. The trees should also be sprayed with insecticide as soon as the blossoms fall in spring, to kill the grubs before they have been able to bore into the young fruits. The protective bands should be placed on the trees about a foot from the ground, and are best applied in July. It is usual to remove them at the end of October or early in November, replacing them by the bands of grease that are used as preventives of the attacks of the Winter moth. All bands removed should be burned at once. The Winter moth, mentioned above, attacks the foliage of the apple as well as that of most other fruit-trees, doing enormous damage.

The female moth is not fully winged and, being unable to fly, crawls up the tree-stem to lay her eggs. The grubs hatch out early in April, and begin at once to feed upon the young leaves, when fully fed letting themselves down from the tree by spun threads and burying themselves in the ground to pass the next stage of their life. The eggs are laid all through the winter, and the best method of prevention is, as has been said above, the encircling of the stems of the trees with bands of some material which the crawling moth will be unable to pass; such materials as brown paper coated with cart-grease mixed with tar, or any other coarse grease of the kind. The bands should be kept greased at intervals throughout the winter months. Spraying of the trees with Paris green, of a strength of one pound of Paris green to 200 gallons of water, should be carried out in the period between the middle of March and the middle of April, when any grubs that have been laid will be destroyed.

There are several other moths which attack the apple, the commonest of them being the Lackey moth, which lays its eggs in rings round the bark of a branch or twig; the caterpillars when hatched living in colonies, and covering themselves with webs spun over the leaves. The caterpillars are black, or nearly so, when first hatched, but become brightly coloured as they mature, also covering themselves with long hairs. The moths emerge in July and August. To keep them down the trees should be looked over in May and June, all infested leaves being picked off, shoot and all, and dropped into a bucket of strong insecticide. If a dull, damp day is chosen, the caterpillars will be all inside their little webs, and are more easily dealt with.

The Apple Sucker is growing in importance, as it seems on the increase of late years. The larvæ are provided with peculiar mouths, with which they suck the juices from the buds and young shoots. They emerge from the egg in spring, the perfect insect being seen in July, and secrete themselves in the buds. They are, when perfect, about an eighth of an inch long, and though they vary a little in colour during the course of the season, they are generally green. The perfect insects live on the leaves. Spraying is the best means of combating this pest. Soft soap and quassia should be liberally applied with the syringe as soon as they begin to hatch out, and the application should be repeated frequently throughout the hatching season, which is about a fortnight. Three pounds of soft soap, four pounds of quassia, and fifty gallons of water make an efficient wash.

The Apple Blossom weevil is really a little winged beetle,

and attacks the unopened flower-buds early in spring. It pierces the bud, laying its egg in the hole, never attacking the opened flowers. The grubs eat the ovaries of the flower, which is thus rendered sterile. The perfect insect appears in midsummer. It has the habit, common to all the weevil family, of dropping to the ground if alarmed, and much may be done to thin it out by spreading sheets of tarred paper on the ground under the affected trees on a warm, summer day, and shaking the trees suddenly. Many of the insects will fall on the papers, and be trapped.

The American Blight is perhaps the commonest of all the apple pests, scarcely an old orchard being without a little of it. It is found on the trunk and limbs of the tree, never on the leaves, and is so well known, with its tufts of cotton-like down, that it hardly needs description. These aphides injure the tree in a direct manner by sucking its vital juices, and also cause the bark to split, exposing the inner wood to all sorts of fungoid growths, and in this way they often give rise to canker. Where the number of trees affected is small, and the whole operation within reasonable limits, it is best to deal with the pests by hand, brushing the limbs affected with a strong solution of good carbolic soap. More drastic methods are required in the case of large orchards, where the trees should be sprayed when absolutely dormant with a fine spray of an insecticide consisting of a pound of caustic soda, ten ounces of soft soap, three-quarters of a pound of carbonate of potash, and ten gallons of water. This is a very strong insecticide, and should, as has been said, only be applied in a very fine spray and only when the trees are at rest, or it may injure them. Leather gloves should be worn when dealing with the fluid.

Of fungoid diseases of the apple, that popularly known as Apple Scab is very common. It is very disfiguring to the fruits, making roundish patches, and attacking both them and the leaves. Trees attacked by it should be sprayed with weak Bordeaux mixture, not more than half its full strength, in the beginning of the flowering season, just as the buds are opening; and the operation should be twice repeated—once when the petals are falling, and again when the young fruits are just beginning to grow, and are about the size of a pea.

Bitter Rot and Brown Rot are both diseases of the fruit, and cause patches of soft brown in the flesh, the latter, when the Bitter Rot is the cause, tasting most unpleasant. For both, the best application is that of a mixture of ammoniacal copper carbonate and potassium sulphide, the latter of a strength of half-an-ounce to a gallon of water. This is sprayed on the



trees at intervals, beginning in the middle of July. The Brown Rot is combated by washing trees known to be infected in the early spring or winter with a sulphate of iron solution, of a strength of four pounds of the sulphate to six gallons of water. This should be done while the trees are leafless, as the fluid is injurious to foliage.

Apples, both on the tree and when gathered and stored, are liable to attack by a fungus which causes the familiar apple rot, the fruit becoming brown and rotten inside, and marked outside with blackish spots. The first sign of the disease is the spotting of the calyx end of the apple with brown. These brown spots spread and grow deeper into the substance of the fruit, and finally the black spots and patches show themselves on the skin. These black spots contain the spores of the fungus, and if the disease is allowed to develop until this stage is reached the mischief will be widely spread. As soon as the disease has been observed the apples showing any signs of disease should all be picked and burned, as should all fallen fruit that has the brown spots. The trees should be sprayed with a solution of sulphide of potassium of one ounce to three gallons of water. Where apples are stored in any quantity they should be looked over at intervals for signs of the disease, and any infected ones should be removed and burned.

Canker is a disease of fungoid origin which affects the bark of many forest and woodland trees, and, within the province of the gardener, apples and pears. Canker used to be classed as a disease arising purely from bad cultivation and carelessness, but although these are undoubtedly predisposing causes, they are not the true cause. The wound fungus, which finds a lodgment in any crack or fissure in the bark, and flourishes on trees whose vitality is for any reason below the normal, is the true cause of canker. Canker is usually first noticed through the dying away of certain of the shoots, and on closer observation cracks in the bark will be observed, containing groups of small red, dot-like fungi. The symptoms may also appear on the trunk itself, and when once the fungus has found a lodgment in the bark the wood itself is soon involved and great damage done, the tree often dying if neglected. Steps should be taken immediately the first signs have been observed. All diseased shoots should be cut clean away and burned at once, while other portions of the wood which are affected should be cut out and burned also. The wound left from the cut should be dressed with Stockholm tar. This will not only preserve the cut from rot, but will protect it from re-infection by the fungus spores.

Absolute severity is necessary in dealing with canker, and any trees badly affected, or those which are only of slight value should be stubbed up and burned. Unfortunately, some of the best varieties of dessert apples are the most liable to canker, among them the Blenheim Pippin, Cox's Orange Pippin, and Ribston Pippin. To avoid canker the grower should take care that his soil is well drained, and neither damp nor over cold. These conditions help to render the trees more susceptible to canker.

The Red-footed Beetle is a mischievous insect which lives on the leaves of apple and pear trees, the leaves affected by it looking as if they had received a shower of small shot. The insect is black, with red feet, and it is often found in numbers on the young leaves in spring. The female lays her eggs in the ground at the foot of the trees, and by lightly forking into the soil in the autumn and again just before spring a dressing of soot or lime, many of the insects may be destroyed as they hatch out. When they appear on the leaves, a sheet may be laid on the ground below the tree, and the latter shaken, when the insects that fall may be gathered up and destroyed, or an insecticide may be sprayed over the tree. The presence of the beetles is not easily overlooked.

**The Pear.**—Pears can be grown in most garden soils, providing they are not too dry or, on the other hand, undrained. The best soil is a slightly clayey loam, though even on light soils success is often obtainable if stable manure and clay or marl be liberally incorporated. A somewhat moister and heavier soil is needed to produce the best results than is required in apple-growing. It is useless to plant on a north aspect, even against a wall. Shelter is, of course, required on the east and north. Abundance of sunshine and warmth is almost essential. Bush and pyramid trees should be grown on the quince stock, but for large standards in orchards and in light, unfavourable soils, the pear stock should be used. Notoriously, however, much patience is required by the planter of pear-trees on pear stock, eight or ten years being the shortest time in which any result may be expected. On the quince stock, on the other hand, a fairly early result may be expected. The difference between these two stocks is parallel with the difference between the crab and Paradise stocks used for apples. The pear sends down deep tap-roots, whilst the quince produces numerous fibrous roots not far below the surface of the ground. Pears are often grown against walls, where they should be trained either as espaliers or fan-shaped trees, the latter being more suitable in the case of high walls.

**PLANTING.**—Pears, like apples, are best planted in November, but, where this is impossible, they may be planted early in March, though not with such great advantage. The soil should be thoroughly dug to a depth of three feet, the lowest foot being left *in situ*. Holes should then be dug, twenty feet apart in the case of standards, twelve feet apart in the case of pyramids, and eight feet apart in the case of bushes. Each hole should be about two-and-a-half feet in diameter, and eighteen inches in depth. Deep planting should be avoided, the top roots being but three or four inches below the ground. The actual planting should be performed very much as in the case of apple-trees (*which see*), and standard trees should be staked as advised in the case of apples.

**AFTER-TREATMENT.**—During the spring and summer the surface of the ground around each tree should be kept covered with a mulch of stable manure, and during dry weather water and weak liquid manure should be liberally given. The roots should never be allowed to get dry. Useful artificial manures are the following: In the autumn, four ounces of basic slag with one ounce of kainit per square yard over the area measured by the roots, followed in early spring by a mixture of two ounces of superphosphate with one ounce of sulphate of ammonia. No tree should be allowed in any one year to ripen an excessive crop of fruit. Fruits should never touch one another on the tree. The pear comes into blossom earlier in the year than does the apple and is consequently more exposed to frosts. In the case of trees grown against walls, protection may easily be afforded by hanging netting about nine inches from the face of the wall. The fruit of the early kinds should be gathered before it easily separates from the tree. Early fruit should then be laid out singly and allowed to ripen for a few days. Choice fruit should be protected whilst still growing on the tree from the attacks of birds and wasps by means of thin muslin bags, which may be used year after year. Pears should be stored in a cool room, at as uniform a temperature as possible. Before being put away they should be dried for a day or two by being exposed to a current of air, preferably in a warm room. They should be stored in a single layer, and should not be allowed to touch one another.

Of varieties the earliest are Doyenne d'Été, Chalk or Crawford, Crapp's Favourite, Williams's Bon Chretien, these being followed by Beurré Hardy, Doyenne du Comice, Marie Louise, Comte de Lamy, Dana's Hovey, Pitmaston Duchess, Josephine de Malines, Winter Nelis, Easter Beurré, and Olivier de Serres.

Of cooking pears, *Beurré Clairgeau*, *Catillac*, *Uvedale's St. Germain*, *Verulam*, *Bellissime d'hiver* are among the best.

**DISEASES AND INSECT PESTS.**—The pear is attacked by a number of insects and fungi. One of the most mischievous is the Pear Gnat Midge, which lays its eggs on the stamens of the flower as soon as the petals are sufficiently opened to allow of her entry—generally when the first petal has expanded. The grubs hatch out in a day or two, and bore into the ovary, feeding on it as it swells. The injured fruits finally fall to the ground, when the maggots bury themselves in the soil and remain till the following spring, when the perfect insect appears. This is a gnat-like fly, very tiny, being only about a tenth of an inch long, greyish black in colour. Where the tree is affected all stunted pears should be removed and burned, and, if practicable, the surface of the soil surrounding the tree should be removed and burned to sterilise it thoroughly. Dressing this surface soil with kainit just before the insects come out in spring, working the stuff well into the soil, is very useful, as is dressing in a similar way with bisulphide of carbon. The affected fruits are easily dealt with, as they will fall if the tree is shaken.

The Blister-mites are injurious to the leaves of pear-trees, and secrete themselves during the winter under the enveloping scales of the young buds. They are extremely minute, and hide there throughout the winter, attacking the young leaves as soon as they unfold, and causing blister-like spots on both surfaces. In the under side of the swelling there is a minute hole, through which the insects emerge and remove to a fresh spot, repeating their process of damage. As the creatures are hidden securely within the buds they are practically safe from all insecticides, so that hand-picking of the diseased leaves is almost the only remedy. These should be burned at once, and if thoroughly done should greatly check the ravages of the mite.

Certain of the Sawflies attack the pear as well as the plum and the cherry. The social Pear Sawfly is one of these, living in colonies on the leaves, which the grubs cover with a protecting web. Like all the sawflies, the grubs finally let themselves down into the earth, where they pass the winter, sometimes remaining two entire seasons in this condition, only emerging in the next year but one to their hatching. Picking off of the colonies with the leaves which harbour them, together with dressing the surrounding ground as advised above for the Gnat Midge, are the two best remedies.

The pear has its Sucker, as the apple has, but as the treat

ment of the two is similar, the reader should look to the latter for details. The Winter Moth also attacks the pear.

Of fungoid enemies Pear Scab is the worst, and is like Apple Scab except in that it causes the fruits to crack. The treatment of the two is the same. Pear-leaf Blister is a fungoid growth which gives rise to swollen, blister-like patches on the leaves, not unlike those caused by the Blister-mite. It is best dealt with by disinfecting the fallen leaves in autumn by dressing them with a dusting of quicklime, or by gathering them up and burning them. Bordeaux mixture should also be sprayed over the trees at intervals during the whole period of leaf growth, a fortnight being as long as it is safe to leave between the applications.

Pear-leaf Cluster Cups are caused by another fungus, but are not so common as the other fungi. The fungus causes small, thickened patches on the leaves, and the latter, when diseased, should be picked off and burned. Junipers are commonly infested with this fungus, and if the orchard is badly diseased, any junipers that there may be in its vicinity should be removed, as they may be harbouring the pest.

**The Pear and Plum Sawfly.**—One of the most destructive of the enemies of the pear and plum is the Sawfly, *Cladius Pyri*, whose larvæ feed upon the leaves of both these trees. The insects are flying late in April, and lay their eggs on the under sides of the young leaves. These eggs hatch out in a month or slightly longer, and are difficult to find, as when not actually feeding they lie curled up in the leaves. Their attacks cannot be overlooked, however, as they strip the surface skin from the leaves, and eventually pierce them with holes. The insects breed both in spring and autumn.

The best way of dealing with them is by spreading a sheet under the tree to be cleansed and sharply tapping or shaking it. The larvæ fall at once when alarmed, and may be swept up in the sheet and burned. The tree should, at the same time, be well sprayed with soapsuds. Where the larvæ escape they finally spin a cocoon in the soil beneath the food tree, and there pass the pupa stage, emerging as the perfect insect. It is a good precautionary measure, where these insects are suspected, to dress the soil lightly under these trees with soot and lime, pointed in.

**The Plum.**—The Plum is a very hardy fruit-tree, and will thrive in most situations and most soils. It likes best a fairly

deep, well-drained soil, providing that it contains lime or chalk in some form or another. It does not thrive in sandy or gravelly soils, though by heavy manuring and the addition of lime much may be done even with these. Undrained soil in which stagnant water remains suits plums no better than pears or apples. Indeed, pears on the quince stock will often succeed in clay loams in which plums would fail. At any rate for the dessert varieties, a southern aspect is necessary, but for cooking kinds a north or a north-east aspect will often serve. Shelter should be afforded from the east and north. On sunny walls dessert plums grown as fan-shaped trees produce fruit of greater flavour and sweetness. Plums are grown, apart from walls, as standards and as bushes. In either case they should be planted not too deep, and the same precautions should be taken as are advised in the case of the apple. Standard trees require about twenty feet from tree to tree, and bush trees about ten feet. Mulching, manuring, watering, and thinning are as necessary in the case of plums as in the case of apples and pears (*which see*).

**Damsons.**—Damsons require exactly similar treatment to that advised for plums.

**DISEASES AND INSECT PESTS.**—The common green fly is one of the worst pests on Plum-trees, and does a great deal of damage to the young shoots and leaves. The leaves which are eaten by the insect roll up, thus covering the aphides and protecting them from any sprayed insecticide, while the excreta of the flies stops the pores of both shoots and leaves and prevents their development. Besides its own peculiar aphid, the plum is often attacked by the Hop aphid, an equally mischievous creature.

Cleansing with the finger and thumb, as is done in the case of rose-trees, is the most effective method where it is practicable. Where it is out of the question much may be done by spraying with a kerosene emulsion, so diluted as not to injure the young leaves.

The Mottled Umber Moth is destructive to plum-tree foliage, attacking, also, many other orchard trees. It is very troublesome in dry seasons, and is only to be dealt with by using the same precautions as in the case of the Winter Moth of apple-trees, namely, the affixing of unsurmountable bands of greasy material to the stems of the trees, to prevent the wingless female moth from climbing them to deposit her eggs.

The effect of one of the fungus enemies of the plum is very curious. It causes what are known as "pocket-plums" or "bladder-plums," often thought to be a mere natural freak.

The diseased plums begin to swell very soon after the flowers have fallen, and grow long and slightly curved, at first being yellowish-red, but later turning to a mealy grey. The surface is wrinkled, and at last the plum falls, its centre being found to contain no stone, but a small bladder or hollow. The malformation is the work of the parasitic fungus, which gets into the actual wood itself, and cannot be eradicated without the removal of the whole affected branch. The fungus is peculiar in one respect, and it is well for the grower that it is, in that it never spreads backwards from the point of attack, but always on-wards towards the young point of the branch. Thus, wherever the disease shows itself, the "bladder" fruits should be at once gathered and burned, and the branches should be cut away from beyond the point at which they have been attacked, the wood being burned also. If the tree is very badly infested it should be dug clean up and burned, or the disease is extremely likely to spread to other trees in the orchard. Where it has appeared among plum-trees, the healthy ones should be kept sprayed with Bordeaux mixture, but this is merely a preventive, and can do nothing to cure already infected wood.

Gumming is a common disease among plum-trees, as well as cherry and peach. It appears after any injury to the bark, and seems to be a constitutional disease, occurring in trees that are grown in badly-drained soils, or even in soils so rich that they make very strong growth, and consequently need severe and frequent cutting back. The actual gumming appears to be the work of a fungus. Nothing can be done against it except to improve the general health of the trees, and as far as possible to maintain well-balanced growth. Any cutting of or injury to the bark should be avoided as far as may be.

Plum-tree rust is common on the Almond, Apricot, Peach, and Cherry, as well as on the Plum. It affects the under sides of the leaves, covering them with small, reddish-brown spots, which in bad cases spread and almost cover the surface. The leaves, where badly injured, fall, and check the tree, often doing great harm. Spraying with Bordeaux mixture in the spring, and, if necessary, later also, will usually prove effective. All fallen leaves should be swept up and burned. This latter step will be needed also if the plum suffers from Plum-leaf Blotch, appearing in the same way as the foregoing on the under surfaces of the leaves. The Damson and Sloe suffer much from this.

**Peaches and Nectarines.**—Peaches and Nectarines can only be considered a hardy fruit in the milder parts of England, and even

these branches are not always well ripened in the open air. Still, in the south of England, at any rate, both peaches and nectarines may be grown in sheltered situations against walls or fences facing south, south-east or south-west. They like best a soil somewhat on the heavy side, though any good garden loam will serve. It is essential that the ground be deeply dug, and that the top eighteen inches be well manured some time previous to the planting of the trees. It is a good plan to mix a good quantity of mortar rubble with the soil. When grown against a wall they should be planted in autumn, about four inches from the wall at a sufficient depth for all the roots to be covered with at least six inches and not more than nine inches of soil when they have been well spread out. The bottom of the hole should be made firm previous to placing the roots on it, and the fine soil which should be used for covering the roots should be made as firm as possible after planting. Not less than eighteen feet width of wall space should be allowed to each tree. Although the soil should be rather heavy than light, thorough drainage is essential. When the soil has been filled in level, its surface should be covered with a mulch of stable manure.

The fan-shape is, on the whole, the most satisfactory for both these trees when grown against walls or fences. The lowest branches should be almost horizontal, one on each side of the basal stem. The ultimate aim should be to cover the whole of the wall space with new shoots about four inches apart. Surplus shoots should be removed before they are an inch long. This "disbudding" should be performed gradually, but vigorously, quite five out of each six young shoots will need to be removed. The work should be begun in April, and should extend over a month. Peaches and nectarines bear on the previous year's wood, and as far as possible, old wood which has borne fruit should be removed during the winter. When disbudding in the spring, one good young shoot must be left at the base of each of the established shoots, as this will have to replace the fruit-bearing branch when the latter is cut away in the following winter. A young shoot must also be left at the end of the fruit-bearing stem so that there are plenty of leaves being borne beyond the fruit. During the summer the surface of the ground should always be well mulched with stable manure, and plenty of water or weak liquid manure should also be given, especially in dry weather.

The cultivation of these fruits under glass is essentially similar to their outdoor culture. Plenty of air should be given, especially during the flowering season, and in order to ensure fertilisation



the branches should be tapped every day to make the pollen fly. It is unwise to allow the trees to overbear themselves, and not more than one fruit for every nine inches square of wall space should be allowed.

One of the greatest enemies of the peach and nectarine is the Peach-leaf Blister, or Peach-leaf Curl, which is caused by a fungus, and gives rise to ugly and injurious blisters and bulges on the leaves, curling them up from side to side. Its appearance is well known to most gardeners, but the conditions which help the pest to flourish are still undiscovered. There seems to be no peculiar atmospheric or other conditions which assist it, though it has been noticed by some observers that exposure to cold winds, especially from the east or north-east, coincides often with a bad attack. Shelter is the best preventive of the disease, and a south wall should be given to peach-trees in consequence. Hard pruning to beyond the point of infection, together with the removal and immediate burning of all infected leaves is the best check on the spread of the disease. Spraying, when the leaf-buds are just beginning to open, and again repeating the process in three weeks, with ammoniacal solution of copper carbonate, will help by rendering the tree immune from infection by wind-borne spores from itself or a neighbouring tree.

Peaches and nectarines are also very subject to "gumming," a subject dealt with under the heading of the Plum, also much affected by this. Peach rust is a fungus attacking the under side of the leaves, and a mysterious disease known as "Silver-leaf" is also now believed to be one of fungoid origin. Peach Mildew attacks both leaves and fruits, and should be combated by dusting the leaves, when the mildew is first detected, with flowers of sulphur, or, if the affected tree is grown within doors, fumigating the house with sulphur—most easily done by painting the heating pipes with sulphur whilst very hot, and closing the door of the house for an hour or two. This is best done late in the evening. A damp, cold atmosphere is the usual cause of mildew.

Peach Scale attacks both peaches and nectarines, and both leaves and shoots are affected. The trees should be painted with a kerosene emulsion, the application being made with a stiff brush so as to remove as many of the insects as possible. All fallen leaves should be burned. The aphides attack the young leaves, and are comparatively easily removed, but in the green-house both red spider and thrips are troublesome. The garden syringe filled with rain-water frequently applied to the

leaves is the remedy for both, together with care in the regulation of the heating and ventilating of the house.

The Apricot shares many of the diseases of the peach and nectarine, but is, on the whole, less liable to the attacks of insects than are other fruit trees. The worst thing likely to happen to the apricot is a mysterious dying-off of certain branches, with no apparent cause, and with no visible injury. This dying-off is, so far, of absolutely unknown origin, and there has, as yet, been found no remedy for it. Some growers hold that it may be prevented or at any rate lessened by the liberal supplying of water to the roots, but this is as yet theory only. The effects of this habit are very unsightly as well as destroying the balance of the tree, while, when grown on a wall, the lopsided look of a tree with two or three branches dead on the one side offends the eye.

**The Apricot.**—What has been said of the cultivation of peaches and nectarines applies also to that of apricots, but the pruning is somewhat different, as apricots bear principally on and around spurs, and on last year's ripened wood. Consequently young growths should be moderately shortened, and at the same time disbudding should take place just as in the case of peaches.

Good varieties are Hemskirk—which is very hardy; Moor Park; Shipley; and Kaisha, which should only be grown under glass.

**The Quince.**—The Quince requires for its satisfactory growth a somewhat moist, deep soil of moderate richness. It does well when planted near a pond or stream, and the tree being a beautiful one, living to a very great age, and requiring but very little attention when well established, it seems a pity that the quince is not more frequently planted, especially as the conserves made from its fruit are delicious and most universally popular. The quince may easily be propagated by means of layers or cuttings or suckers planted in the autumn. The young trees should be pruned much in the same way as advised for the pear.

**The Fig.**—Few fruit-trees grown in England are grown more wastefully than the fig. Capable as it is—given correct treatment, which is ever so simple—of yielding an enormous crop, it is rare indeed to find a fig-tree in England yielding any approach to a reasonable harvest. Certain conditions it must have if success is to be obtained. It should have a wall facing south; it should have a situation fully exposed to sun throughout the day, and it must

have a free supply of air to enable the branches to ripen. At the same time it should be effectively sheltered so as to preserve as much warmth as possible. Its rooting space should be somewhat limited, and it is well to prepare the actual site rather carefully. Indeed, the actual hole, which should be about three feet deep and four feet square, is often walled in by bricks and cement, so that the roots cannot possibly escape beyond the space allotted to them.

At the bottom of this hole should be placed about a foot in depth of broken bricks or gravel. On this should be placed about a foot depth of turves, grass side downwards, and the top foot should consist of a mixture of fibrous loam and broken rubble. In this mixture the trees should be planted in late autumn about one foot deep.

The fig may be trained against a wall in a fan-shape, as advised for peaches. As soon as the young shoots are about two inches long about three-quarters of them should be removed so as to allow a shoot for every five or six inches. Other pruning is not much required, except so far as is necessary to maintain the shape of the tree, and to prevent overcrowding. The fruits mature principally on one- or two-year-old wood.

The fig suffers little from diseases, the Scale insects of various kinds being its chief enemies. The usual treatment should be given to them, the branches and shoots being brushed with kerosene emulsion, with a hard, stiff-bristled brush. Mealy-bug also sometimes attacks this tree, and should be guarded against by painting the trees in the winter with a mixture similar to that applied to vines at the same period, which is prepared as follows: Six parts of clay and one part of coal-tar are required, the clay being dried and powdered finely enough to pass through a quarter-inch sieve. The tar and clay are then worked together with boiling water to the consistency of a thick paint, which should be smeared well over the stems and branches, avoiding the buds, which should be kept clean. Whilst applying the mixture it must be kept well stirred, or it will separate.

Mice are very fond of the fruits of the fig, and will steal it if they are not watched and trapped.

The Red Spider is troublesome to fig-trees grown under glass, and is got rid of by seeing to the proper atmosphere and ventilation of the house, together with thorough syringing twice a day with lukewarm water, the underside of the leaves being dealt with in particular.

Canker attacks the stems of fig-trees, and causes falling off of the bark, but as it can only gain a foothold on injured or

diseased wood, it is only necessary to coat all wounds with some such application as tar as a preventive of infection.

**The Cherry.**—Cherries require a well-drained, moderately deep loam, and do well on soil overlying the chalk. They do not thrive on dry, gravelly soils, nor on heavy clay. They like an open situation, facing west or south, though Morellos and Kentish do well on a north wall. Protection from frost in the early spring is desirable. Cherries may either be grown as standard trees or against walls—trained horizontally—or as bushes or cordons. The standards should be planted twenty-four to thirty feet apart, and bush trees about eight feet apart. Stable manure does not seem always to agree with cherries, and better results are usually obtained by applying to each tree shortly before active growth begins three pounds of a mixture of one part nitrate of soda, two parts superphosphate, and three parts kainit.

The details of planting, with this exception, are similar to those suggested in the case of the apple (*which see*).

**CHERRY MOTH.**—A great deal of the loss which is ascribed by many cherry growers to frosts, cold winds, and the like causes, in the shape of the falling of the fruit just as it is set, is really due to the depredations of the caterpillar of the Cherry Moth, which enters the tiny fruit just as it is fertilised, and remains in for a fortnight or so, falling to the ground with it as it falls. The cherry moth is very inconspicuous, of a light-brown colour, with a dark band and light, or whitish edges to the wings. The moth may be identified by its curious position when at rest, the tail being elevated, as if the insect were standing on its head. The eggs are laid on the shoots and do not hatch out till spring, although laid in middle and late summer. As the caterpillars remain in the fallen fruits and pupate in them, hatching out as perfect insects, it is a good plan to sweep up all fallen fruits and burn them. In this way many of the pests are destroyed, and birds will help to keep down the remainder. Once the eggs are laid on the shoots, nothing much can be done by way of remedy.

**Raspberries and Blackberries.**—Raspberries do best in rather damp soils, though, of course, the soil should not be waterlogged. Early in the autumn this soil should be dug to a depth of two to two and a half feet, and a liberal dressing of manure incorporated with it. The canes, which should be young ones, are best planted in November, though when this has been impossible, they may be planted in February. They may be

planted singly, two feet apart, in rows four feet from one another. The top roots should be but an inch below the surface, the ground being made thoroughly firm at the time of planting. It is usually well to cut down these canes to about ten inches from the soil. In the following year new rods will be produced from the base, and these will bear the year after. It is only on the one-year-old shoots that fruit is borne, so that in subsequent years all old canes that have borne fruit should be at once cut down to the ground. All weak young shoots should be cut out at the same time, leaving only about four of the strongest to bear fruit the following season. The only other pruning that is required consists in cutting off the sappy, curved tops of the young mature canes in the winter. A liberal dressing of manure should be given as a mulch early in the spring. The autumn varieties should have their canes cut down to about four inches from the ground in February. Raspberries need some form of support, the simplest and most useful consisting of a couple of wires strained horizontally at heights of about two feet and three feet six from the ground. These wires follow the lines of the rows, and to them the canes should be tied.

Perhaps the most destruction is done to raspberries in the garden by the larvæ of the Raspberry Beetle. The grubs hatch out from eggs laid by the female in late spring within the buds or half-expanded flowers. They are small and yellowish, and when fed fully upon the fruit, take refuge in cracks of the bark and spin themselves cocoons, from which they emerge in the following spring. In the perfect stage the beetle is covered with either a yellowish or a grey down or wool. Tared paper should be laid under infested bushes, and the latter smartly shaken, when many of the grubs will fall and can be destroyed. The operation should take place early on a spring morning. The old canes which are cut down after fruiting is over should be burned.

The Raspberry Spot is the only fungoid disease of sufficient importance to merit description. This appears first as little red spots on the canes, which, growing together, turn into small grey patches with a red margin. The leaves become affected in the same way and if not attended to, the canes are likely to die in their second year. The diseased canes and leaves should be cut away and burned, whilst the canes should be sprayed with a solution of two pounds of sulphate of iron in five gallons of water. This should be applied before the expansion of the leaves. Bordeaux mixture, diluted down to about half strength, should be sprayed on subsequently.

No. 13. ROSES



1. Method of budding.

2. Use of the seccateur.

No. 14. ROSES



Rose cutting, prepared for potting or planting. 2. The same potted up.

**Bordeaux mixture**, one of the most useful of our fungicides, can be made by dissolving half a pound of sulphate of copper in a little hot water, and half a pound of quicklime in a little cold water. Mix these together in an hour's time, and add five gallons of water. Half a pound of treacle may with advantage be added to the lime and cold water before mixing with the copper. The whole having been well mixed together, is best applied with a spraying machine or a syringe with a fine rose.

The Parsley-leaved Blackberry, the Logan-berry, and the Japanese Wineberry may be grown almost exactly as advised for the raspberry, but they are much more vigorous plants. Their rods grow to a much greater length, and they consequently require considerably more space and a higher trellis to support them. They need plenty of manure, and generous watering throughout the summer.

**Nuts.**—The principal nuts cultivated for their fruit in England are the Walnut, the Cob, the Filbert, and the Sweet Chestnut. The latter, however, is grown primarily as an ornamental tree, its fruit-bearing in this country being irregular and unreliable. The walnut is easily grown in almost any soil, but it takes a great many years from the time of planting to the time of fruiting. The small English walnut has a far better flavour than the large walnut.

Cob-nuts and Filberts are easily grown, and in well-drained soil will thrive almost anywhere. The filbert, though the smaller nut, has much the better flavour. The cultivation of both is the same. The pruning necessary is of the simplest kind, consisting merely in the removal of some of the oldest wood each year. The fruit is borne on the little thin twiggy shoots. Nuts should not be gathered until they are perfectly ripe. The Kentish White and Prolific are among the best Filberts, whilst the Kentish Cob and the Cosford Cob are among the best Cob-nuts.

Amongst the enemies of the nut, the caterpillars of the Nut Sawfly are most destructive to nut-trees in the orchard, and if unchecked, will strip the trees of leaves, only the mid-ribs remaining. They are large, and of a lovely blue-green colour, with a yellow tip to the body and numerous black spots. They have a curious habit of jerking their bodies on the approach of danger, twitching themselves spasmodically when disturbed. This odd habit, together with their manner of feeding in groups on the same leaf, makes them unmistakable at first sight. The Nut Sawfly in the perfect state makes its first appearance in May, and the eggs hatch out at the end of June or beginning



of July. When full grown they drop off, and pass their chrysalis state in the soil.

The best method of dealing with them is to spread sheets of paper covered with some sticky substance under the trees and then to shake or gently sweep the insects off on to the paper, which should then be gathered up and burned. A spraying of Paris green all over the trees will do some good, whilst the grubs should be dealt with by lightly pointing in a dress of lime and soot around the roots of the trees during the winter and again in early spring.

**Strawberries.**—Like most other fruit, strawberries do best in a deeply-dug, well-drained, loamy soil, which has been well dressed with manure some two or three months previous to its planting. The manure should be generously given, especially in the case of poor soils, for it is impossible to grow the strawberry successfully unless the plants are liberally fed. The soil intended to be devoted to this crop should be well dug to a depth of at least two feet, and the holes should be got ready for planting during the latter half of August or the first week in September. By planting at this season everything has a chance of settling down before winter comes, and a moderate crop of fruit may be expected the first year after planting. Just previous to planting, the soil should be made firm, and a hole should be made with a trowel large enough for the roots to be well spread out almost in a horizontal direction, very little below the general surface. The thing to avoid is that bundling of the roots into a vertical hole that is so commonly done. The roots should be covered with fine soil, and the whole made firm by pressure with the foot. Water should be liberally given for a few days if the weather is dry. Every year a liberal top dressing of manure should be given between the rows early in March, and it is well to select rather strawy manure which is only partly decomposed, as the litter which remains after the more soluble part of the manure has been washed into the ground by rains will help to keep the fruit from being splashed with mud. About eighteen inches should be allowed from plant to plant, and two feet to two feet six between the rows. As it is undesirable that a strawberry bed should remain more than three years, it is wise to arrange each year for the raising up of a stock of fresh plants to replace such as have reached that age. The usual and the best method of propagation is by layering. Early runners should be selected for this purpose, and care should be taken to avoid taking layers

from plants which do not bear flowers. Three or three-and-a-half inch pots should be filled with good potting or garden soil, and plunged up to their rims in the ground adjacent to the plant whose runners are to be employed for propagation. The young plants are to be pegged down on the soil in these pots, and rooting may be encouraged by earthing-up around the base of the plantlet. When rooting has become well established, the runner may be cut through an inch or two from the young plant, and the pots may be removed to a shady place, where they should be kept moderately watered. It is as well not to leave the pots in their original position for more than a fortnight or three weeks after rooting has begun, as if the roots go through the bottom of the pot into the surrounding soil their removal causes much greater disturbance than is necessary or expedient. In transplanting these potted layers into their permanent quarters in August, the whole contents of the pot should carefully be placed in the hole made for the purpose. The ball of soil should not be broken and its surface should be level with the surface of the surrounding ground.

The strawberry is damaged by mice and also by several kinds of beetle. The fruits, from their position so near to the ground, are particularly liable to attack by several creatures. Both the mice and the ground beetles do their damage by removing the seeds which lie on the surface of the fruit. The beetles may be trapped by the method adopted by Messrs. Laxton, which consists in placing round and among the strawberry plants pudding-basins sunk to the level of their rims in the soil. The basins should be baited with sugar, water, and pieces of lights, and the beetles will fall into them in great numbers, being unable to climb out again.

The small and very beautiful beetle called the Rose or Golden Chafer does much injury to the flowers of the strawberry by eating off the anthers, and preventing fertilisation. The grubs are laid in the soil or in decomposed manure, and the frequent turning of the surface soil and any litter lying on it would expose the grubs to the attacks of birds, their natural enemies. Rooks and tame starlings kept in the fruit garden would do much to rid it of these pests.

The eelworm also damages the strawberry. Of fungoid diseases it is liable to that known as Strawberry-leaf Spot, too well known to need description. It is not, as a rule, serious enough to affect the crop, though it probably weakens the plants to some extent. The leaves of such plants should be cut off in autumn, and the litter which is still left round the plants

should be shaken up and covered with a little fresh straw. As soon as the leaves which have been cut off—mowing with a scythe is as good a way as any of doing this—are dry, the fresh straw should be set fire to—a proceeding which will not only destroy the fungus-infected leaves, but many of the insect pests which take refuge in the surface soil. The crown of the strawberry plants will not be injured but will rather benefit from the operation. When the young plants are about half-grown in the spring, they should be sprayed with Bordeaux mixture as a preventive measure.

**Gooseberries and Currants.**—There are few garden soils in which gooseberries and currants cannot be successfully grown, though they do best in a deep loam reasonably well drained. Young trees should be planted in autumn, preferably early in November, though where this has been impossible, planting may take place during January and February in mild seasons. In any case the ground should be thoroughly and deeply prepared well in advance of the time of planting, and a moderate dressing of manure should be thoroughly incorporated with the soil. When planting, holes should be dug of sufficient area for the roots to be well spread out, and of such a depth that when the trees are planted the highest roots shall be but an inch or so above the surface. The bottom of the hole should be made firm, and the roots then spread out on it; fine soil should then be used to cover the roots, and this also should be made firm by stamping. When the soil has been made up to the general level of the ground, a surface mulch of stable manure may be given, but raw manure should not touch the roots themselves.

Gooseberries and currants are often planted between apple and pear trees, but where they are planted alone in rows, six feet should be allowed between the rows, and four feet, at least, from bush to bush. For general purposes the bush form is most useful, but gooseberries and red and white currants also do well when trained as cordons or against a wall. The pruning of these fruit bushes is important, and naturally depends on the character of the wood which bears the best fruit. In the case of gooseberries the best fruit is borne on the young wood, consequently the strongest young growths should be allowed to make their full length. It is wise to cut out the weaker of the young shoots, and gradually to remove old wood. It should not be forgotten that unless care is taken to allow spaces between the several branches of the whole bush soon becomes a tangle,

and gathering the fruit is, to say the least, a very painful proceeding. The young shoots which are retained should merely have their soft ends cut off in winter, just beyond a bud pointing upwards. In the case of many varieties there is a distinct tendency to a weeping habit, and this should be fought against, as the fruit is liable to become earth-stained. Every year liberal top-dressings of manure should be given in early spring, and young bushes should be raised from cuttings so as to build up a stock to replace a few of the old trees each year.

Red and white currants fruit on spurs, and consequently should be pruned much as the apples and pears are pruned, that is to say, young shoots should be cut or pinched back to about three buds from the base. Probably the best form of bush for red or white currants is the goblet form, there being about six or seven main branches, the side shoots from which are to be kept cut back, as described. Black currants differ from red and white currants in that their fruit is borne on one-year-old shoots only. Old wood should, therefore, as far as possible, be cut out every year, and the more thoroughly this can be done, the more vigorous will be the young growths on which the following year's crop depends. Black currants should not be attempted to be grown on very light soil.

**CURRANT PESTS.**—The garden currant is liable to damage by several kinds of insect and animal. One of the most difficult to deal with, as well as the most destructive, is the Currant-bud Mite, which is responsible for the disease known as "big bud." The disease is confined to black currants, the buds of which are entered by the mites, setting up an irritation which causes the bud to swell abnormally. The terminal bud of the shoot is usually that selected for attack, and where currant mite is suspected, the bushes should be examined in the autumn for signs of such abnormal buds. The only thing that is of the least use is individual destruction by hand, removing each bud and destroying it. Spraying in July with a paraffin emulsion might help to free the bushes, but this is seldom practicable.

Spraying, on the other hand, is in nearly all cases effectual in getting rid of all the pests which attack the foliage. A warm solution of carbolic soft soap, putting two ounces of soap to the gallon of hot water, should be sprayed thoroughly over both sides of the leaves. This is a fairly effective remedy for the Currant Scale, an enemy of recent introduction, probably from the Continent. Its characteristic sign is the white cottonwoolly material which it exudes as a protection, and which contains both the eggs and the young scales. This, unlike the

**Currant Mite**, attacks all kinds of currants, and it should be dealt with by spraying as soon as its presence is detected.

The **Currant-shoot Moth** is another insect which selects its host with care. It only attacks, so far, the red and black currants, none having, up to the present, been found on the white varieties. As, however, it was at first believed to be confined to red currants, it is possible that its tastes are widening. The larvæ attack the young shoots, which are noticed to be withering. The moth and its larvæ are extremely small, and easily escape notice unless they are searched for. The perfect insects are flying late in May, and lay their eggs inside the berries of the plant attacked. They are of a brownish colour, with a purple sheen in some lights, the wings being naked and spotted with yellow. The skin of the fruit in which the eggs are laid is first pierced with an appendage borne by the female moth, who then deposits them within it. Here they hatch out, and the larvæ feed on the fruit and the seeds which wither and dry up. At the end of June they leave the berry, and spin themselves small, white cocoons on the shoots, from which they emerge in the following spring and bore into the young shoots. When once they have bored into these, they cannot be touched by insecticides, and the caterpillars themselves are so minute that they are almost invisible to the eye. All prunings from suspected bushes should be burned, and the bushes sprayed thoroughly with a soft soap insecticide.

The **Currant Clear-wing Moth** is another whose larvæ pierce the shoots of the currant bushes, causing them to wither off. The moth is about three-quarters of an inch across, with the wings expanded, and its wings are clear, like those of a fly, except for the veins, the wing tips, a spot on each wing, and a border, all of which are blackish in colour. They appear on sunny days in July. Their bodies are black, banded with fine, yellow stripes. It is almost impossible to prevent the attacks of this pest. The only thing possible is to go carefully over the bushes, removing and burning all dead or dying shoots.

The gooseberry is more liable to attack by insects than by fungi, the Magpie Moth being one of the chief enemies of both gooseberry and currants. The pretty black and white markings on the wings of the perfect insect render it unmistakable, and when the moths first hatch out they may be caught with tolerable ease and destroyed, thus checking the egg-laying. The caterpillars are also marked with black and white, and feed on the leaves of the bushes, sometimes stripping them almost bare. The eggs are laid in July, and the caterpillars begin to feed in

August. They live through the winter, hatching out and feeding in the spring, turning into chrysalides in June. In the winter all material which might harbour the caterpillars should be removed, preferably when the pruning is done, and with these fallen leaves and prunings about an inch of the surface soil should be raked off and burned. The remaining caterpillars should be picked off by hand in the spring, while spraying with the kerosene emulsion is useful in this early period, before the fruits are much formed. The Gooseberry and Currant Sawfly is another most injurious insect, the perfect form being about a third of an inch long. The eggs are laid on the under sides of the leaves, and the voracious little caterpillars begin to feed at once. These latter are greenish with black spots and a black head, with tips of orange when fully grown. The best preventive step to take in the case of these, as of all other sawflies, is the removal during the winter of the top two inches of soil around the plants and burning this or burying it deeply in a trench. Quicklime is also sometimes stirred into these top inches of soil, while in the spring, hand-picking should be carried out with thoroughness. A wash of hellebore in water of the proportion of two and a half pounds of hellebore to ten gallons of water may also be sprayed on where the attack is a very severe one, this latter mixture not being allowed, however, to reach the fruits, as it is poisonous.

**The Medlar.**—The medlar is one of our handsomest fruit trees, and is easily grown in any good garden soil. In any case the soil should be deeply dug and well drained, though soil of a somewhat retentive character is to be preferred. The cultivation of the medlar, so far as pruning is concerned, is almost identical with that advised for the apple. The fruits should be gathered about the middle of November, and should be stored in a single layer on some dry silver sand placed on a shelf in the store-room. The stems of the fruit are liable to be attacked by a fungus. The ravages of this mould are said to be prevented if the stems of the medlars are dipped in a strong solution of common salt before placing the fruit on the sand. The stems should point upwards. It is usually necessary to store the medlars for at least a fortnight before they are ripe for eating.

**The Mulberry.**—The mulberry-tree is apparently less cultivated than was formerly the case in England, but it is easily grown in ordinary garden soils, the trees live to a great age, and the fruit is not unpleasing for dessert, and is useful for tarts and

preserves. As the fruit is borne on spurs and on short-jointed young wood, it is well to cut back young shoots to about four or five buds, only removing such as are calculated to lead to overcrowding. The mulberry is easily propagated by cuttings or layers, which readily root. It is well to plant the mulberry in grass, which should be kept close cut at fruiting time, as the fruit should be allowed to remain on the tree till it falls from ripeness. Needless to say, it should be carefully protected from birds.

**The Grape.**—In former times the grape was much more cultivated in the open air in England than at the present day. Outdoor vineyards of considerable area and apparently satisfactory productivity were attached to many of the monasteries in the fourteenth and fifteenth centuries. Owing, however, to the introduction and popularity of small glass-houses heated and unheated, and the consequent increase of indoor grape culture, this has come to be looked upon as purely an indoor fruit. When carefully grown under glass there can be no doubt that better fruit can be obtained, better varieties grown, and a higher degree of certainty assured, than by open-air culture in a climate such as ours. When grown under glass the grape rejoices in a rich, deep soil, because the luxuriant growth thus produced has there opportunity of ripening and of being kept within bounds. But when grown in the open, better results are obtained when the vine is planted in a poorer and less stimulating soil. For it is found that under these circumstances the growths of more moderate luxuriance ripen the better. For open-air cultivation a situation at the base of a wall facing south, south-east, or south-west should be selected when such is available, and the ground should be broken up to a depth of about two and a half to three feet. Manure should not be added unless the soil is very poor indeed, but it is well instead to incorporate with the soil a reasonable proportion of gravel. A slight top-dressing of manure may often, however, be given with advantage. It is well to plant the young vines about six inches distant from the wall, late in November or early in January. The roots should be spread out, and should be about four inches below the surface of the ground. The soil should be moderately pressed down, but not trodden hard. About six inches of litter or stable manure should be laid on the ground, more to protect the roots from frost than for any manurial value it may have. The young plants should be lightly tied to stakes, but should not be nailed or attached to the wall or fence to which they are to be trained for at least a month after planting. During the first



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year only superfluous shoots should be removed, the young shoots intended to remain being allowed to grow to their full length. In the following November these should be pruned back to two buds, with the exception of the leading shoot, which should be pruned back to about twenty inches from its base. Spurs will result, and the young shoots which grow thereon must at an early stage be reduced to one in each instance. Each of these shoots allowed to remain must subsequently be pinched back to the third bud, and the little shootlets that branch from it must be pinched back just beyond the first leaf, as soon as this appears. The branches must at all times be kept carefully and closely attached to the wall or fence. Muslin bags should be used for protecting the ripened grapes from the attacks of flies and wasps. For outdoor culture good varieties are Royal Muscadine, Sweetwater, and Black Cluster.

GRAPES UNDER GLASS.—By carefully selecting suitable varieties grapes of a high quality may be grown in glass-houses of the simplest construction. In suitable situations really excellent grapes can in most seasons be obtained without any artificial heat at all, though, of course, where this is available, much better results may be counted on. The best form of house is in general that known as the lean-to, providing that a wall facing south is to be had. Otherwise a span-roof house must be used, in which case the house should run from north to south, so as to obtain the maximum amount of sunshine. The situation chosen should be a high one, so that there may be no possibility of stagnant water in the borders. Where artificial heat is provided it is desirable to have much more piping than is usually afforded, since thus it is unnecessary to heat the pipes to excess in order to get the average temperature to the required height. The border in which the vines are to be planted should be dug out to a depth of from two and a half to three feet, because although the vine is not very particular as to soil, it is very particular as to drainage. The borders should, where space is available, be about ten feet wide. Still, where choice can be had, there is no doubt that the grape vine thrives best when the sub-soil is of chalk or limestone. Consequently, at the bottom of the border it is well to lay about six inches depth of broken-up chalk or concrete, where the sub-soil is not naturally of this composition. On this base should be laid a mixture of fibrous loam (preferably the top three inches of sheep-grazed down pasture which rested on a chalk sub-soil, cut and stacked a few months previously) with wood ashes, horse droppings, and a little soot (a barrel-ful to five cart-loads of loam). A

hundredweight of crushed bones may be added for each load of loam. On the broken chalk and other drainage, turves a couple of inches thick should be laid, grassy side downwards, and on this the mixed soil should be placed. In the case of quite small houses a narrow border about two feet wide may be constructed on lines similar to those suggested immediately within the front wall of the house. In this border the vines are to be planted, and their roots should be able to make their way into a wide, similarly-prepared border outside. In the case of wide, span-roof houses, beds may be prepared on similar lines anywhere within the house.

The vines should be planted about three feet apart, and about one inch deeper in the soil than the old planting mark. They should not remain in the pot sufficiently long for the roots to become entirely matted. At the same time, the ball of earth should, when carefully removed from its pot, remain practically coherent until slightly squeezed by the hand. This should be done at the moment of planting, in order to break up the soil about the roots a little and so bring about a more ready extension of the rootlets into the adjacent soil. Before removing the plants from the pots, holes should be dug at the required intervals, ready to receive them. The surface of the ground should be covered with about three inches of short manure as soon as planting has taken place. Although the soil should be well broken up it should be made firm as soon as the plants are in position.

A good time to plant indoors is early in January, when the canes should be cut back to about eighteen inches long.

During the first year three new shoots should be selected and given special attention. When the vines have shed their leaves, the leading shoot should be cut back to about two feet from the start of the current year's growth, and the two side shoots should be cut back, leaving two buds. Each year the same treatment should be carried out. The vines should be trained to wires, fixed nine inches apart, and kept eighteen inches from the roof-glass. Vines should not be allowed to bear grapes the first year.

Newly-planted vines should be allowed to become well established before any unnecessary heat is employed, fires being only lit to exclude frost. Early in March the temperature may be raised to a minimum of about fifty-five degrees, and from the middle of April onward the temperature from sun heat alone may be allowed to rise to eighty-five, a night temperature of about fifty-five degrees being afforded. From the time when the young leaves are fairly developed until the grapes are in flower a night

temperature of sixty-five to seventy degrees should be given. Proper ventilation is essential, indeed it is probable that success or failure depends more on the proper management of the air supply than on any other single factor. Apart from its chemical necessity, the temperature should be prevented from rising above the desired point by the timely introduction of fresh air. It should always be remembered that fresh air should be used to keep the temperature from rising above the desired point and not for the purpose of lowering the temperature. Plenty of moisture is necessary at almost all stages. Ventilation should always be started just before the sun rises, and should be increased as the heat increases, until noon. After two o'clock the ventilation should be diminished, and the house should be finally closed at about half-past four. During very hot weather and when the grapes are beginning to colour a little top ventilation should be afforded at night. Should the weather be cold and dull while the grapes are ripening heat should be given, but ventilation must be provided. Except when the grapes are colouring, the floor and walls should be freely damped several times a day during the hot weather. When the grapes are colouring, however, a good damping twice a week is sufficient.

As soon as the bunches have set their berries it should be decided how many bunches are to be left, and how many grapes on each bunch. It has been estimated that each foot of rod of a well-matured vine should bear about one pound weight of grapes. Thus a fully-established vine about nineteen feet long of such a variety as Muscat of Alexandria or Black Hamburgh, should not be allowed to bear more than about seven or eight bunches, averaging three pounds a bunch, whilst of such varieties as Trebbiano or Grosse Guillaume not more than two, three, or four bunches, each averaging from twelve to seven pounds in weight, are as much as it should be permitted to hold. Surplus bunches should be removed as early as possible, and on the bunches that are allowed to remain the grapes should be thinned out at an early stage so as to make shapely bunches, allowing one inch from berry to berry.

The two great enemies of the vine-grower in this country are the Mealy-Bug and the Red Spider, both greenhouse pests, and both very troublesome if neglected, though simple as far as treatment goes. The mealy-bug is so called because a white, downy material grows on the bodies of the insects when dead, but the living mealy-bug is red in colour, and its attacks, besides injuring the health of the plant, disfigure the fruits so as to render them almost useless. It is well not to allow other

Of fungoid diseases the vine has quite a selection. Mildew is one of the best known, being very common in heated vineries in spring, when equable ventilation is difficult, and the vines are making quick growth. Sometimes over-dryness of the roots will cause mildew, both in indoor and outdoor vines. A slightly drier atmosphere than is usually good is best in the greenhouse when the mildew is spreading, and whilst ventilation should be ensured the heat should be kept level. Except at the time immediately after the setting of the fruit, sulphur may be applied to the heating pipes as advised in the case of red spider. The treatment of mildew where it occurs out of doors is less easy. The chief means to be employed are dusting the plants with flowers of sulphur while the leaves are damp; syringing them with water containing flowers of sulphur, or spraying with a solution of potassium sulphide of a strength of half an ounce to a gallon of water.

Grape Rot attacks leaves, shoots, and fruit alike, and should, of course, be dealt with whenever possible before the fruit can become involved. It takes the form of greyish spots edged

by a line of dark, while the disease spreads quickly from point to point, diseased fruit remaining hanging on the vine. At ten-day intervals flowers of sulphur should be dusted on to the leaves and shoots, a little quicklime being mixed with it at the second application. The quantity of the lime should be increased at each subsequent dressing until the proportions of the two are nearly equal. The branches should be washed in winter with a sulphate of iron solution. Black rot appears on the leaves in the form of a brownish patch, soon spreading to the fruits, the latter shrivelling and becoming black and hard, but as a rule, remaining on the plant. Removal and burying of every diseased part is the first step, while the spraying of the plant with Bordeaux mixture is most useful. This, however, is only to be employed where the leaves are unfolding; where the fruit is half grown an ammoniacal solution of copper carbonate is used instead, so as to avoid injury to the fruits. Shankling is common in overcropped or underfed grapes; in fact among those which are improperly grown in some way. The fruit develops well for a time, when the stalk begins to shrivel and becomes discoloured, while the berries themselves shrink up and grow sour and uneatable. Thorough remaking and enrichment of the vine border, together with the avoidance of overcropping, will get rid of the tendency.

**Fruit-growing in Pots.**—In certain conditions it may be impossible or inexpedient to grow the more delicate kinds of fruit-trees in a suitable situation, against a wall. Where, for example, the garden is enclosed, not with walls, but with hedges, and where these hedges, for some reason of beauty or age, are required to be preserved, a difficult problem presents itself to the gardener who wishes to grow either peaches, nectarines, apricots, and late pears, with the better kinds of dessert plum. Where a moderate supply of fruit only is required, and where there is some glass available, an excellent plan is that of growing the trees in pots, placing them in the open for a certain part of the year, and bringing them into the fruit-house in succession as they require shelter and warmth. This system of orchard-houses was first introduced by Mr. Rivers, and may be varied in many ways.

The best house for the purpose is one not less than twenty feet wide, and about six feet high at the sides, rising to twelve at the ridge. The "run" of the house does not very much matter, some people preferring a north to south house, others liking it to lie east and west. The latter is, perhaps, slightly

preferable, as it exposes a smaller surface to the easterly winds, which are most prevalent when the fruit-trees are in blossom. The doors should be in both ends, and should be double, allowing ample space for the entrance of the trees. All the sides of the house should be made to open panel-wise, as free ventilation, whatever the wind, may be necessary. Sufficient heating should be allowed to keep out frost in March and April, though, where the difficulties seem insuperable, this may be dispensed with. It has the advantage, however, of making the house far more generally useful, as it may then be used during winter for such things as chrysanthemums, while the trees are wintering outside. A floor of beaten ashes is the best.

An important part of the process is the preparation of the compost in which the plants are to grow. This should be prepared in September, in order that it may have a clear month in the open under cover to amalgamate. It should be composed of a barrow load of leaf-mould, one of drift sand, one of old mortar rubbish, one of rotted dung, and five of yellow loam. This is further enriched by the addition of two gallons of bone meal, and another gallon or so of some good fertiliser or vine manure. A bushel of quarter-inch bones is also mixed in the compost. Every year, in about the middle of October, the trees should be repotted. They should be taken out of their pots while their soil is fairly dry, so that their roots may be easily freed from it. The method of repotting, described by the Rev. W. Wilks, who has had considerable success with pot fruit-trees, is as follows :

“A strip of board is placed across a barrow, a tree is lifted out of its pot : the drainage crocks are loosened and fall back into the pot, which, with the crocks, is taken away to be washed and dried. The ball of roots and soil is then lifted on to the board, while the operator stands between the handles of the barrow with the head of the tree turned from him. The latter thus has free room, and there is less danger of injury either to shoots or bloom buds. The stem of the tree is held in the left hand, while with the right a short, pointed stick is used among the roots to loosen the soil as much as possible, taking great care not to break the root fibres. The ball of roots should be shaken from time to time during this process. When the roots are as free as possible from soil they should be carefully looked over, all woody and long fleshy roots being removed with clean cuts with a sharp knife, leaving all the useful fibrous ones untouched. It is better, if anything, to err on the side of over-severity with the larger roots, as with strong growers such as

pears and apples these long roots would soon take the tree beyond the possibility of pot culture. The pots used should always be large enough to allow of the fibrous roots lying out horizontally in the soil, but so long as this is possible the smaller the pot the better. Pot-grown fruit-trees ought never to exceed a sixteen-inch pot, and smaller sizes—the twelves and fourteens—are used extensively. While the trees are young it will be usually found advisable to give a larger-sized pot each year at the annual repotting, but with older trees this is seldom needed, the trees going back into a pot of the same size as before.

“All pots should, of course, be clean and dry, as should the crocks for drainage. A good layer of these latter is placed in the bottom of the pot, and covered with a little soil. The ball of the tree is set firmly in the centre and the upper two-thirds of the fibrous roots are held upwards with the left hand, while with the right compost is rammed down very firmly and evenly over the bottom third in the pot. A wooden rammer is used for this purpose. A few more roots are then laid out, and covered with firmly rammed soil, and so on until the pot is almost full, a space of two inches being left at the top for future top-dressings.

“The trees, when potted, should be plunged in the open in some unused space in the garden. This should be done not later than the first week in November, and if possible earlier by a fortnight. They will then require no further care or attention until February, when they are moved into the house, except that in January they will need looking over, and the pruning of the pears and plums should be completed. The leading shoots on all the branches should be looked over, and will probably need shortening.

“Before bringing in the trees, at the end of January, the orchard-house should be thoroughly cleaned, the floor raked and rolled, the glass washed, the woodwork brushed, and the brickwork limewashed.”

The peaches and nectarines should come into the house between the first of February and the first of March. The exact date must be determined by the weather, and they should not be brought in whilst the ground is very wet, nor yet when there is hard frost. A time should be chosen when there is a spell of bright, open weather, fairly dry, and the trees brought in while it lasts. The house need not be heated at all until the blossom appears, but ample fresh air is required, for which the ventilating facilities of the house will be all called into play. A watering with clean water is also needed occasionally. During



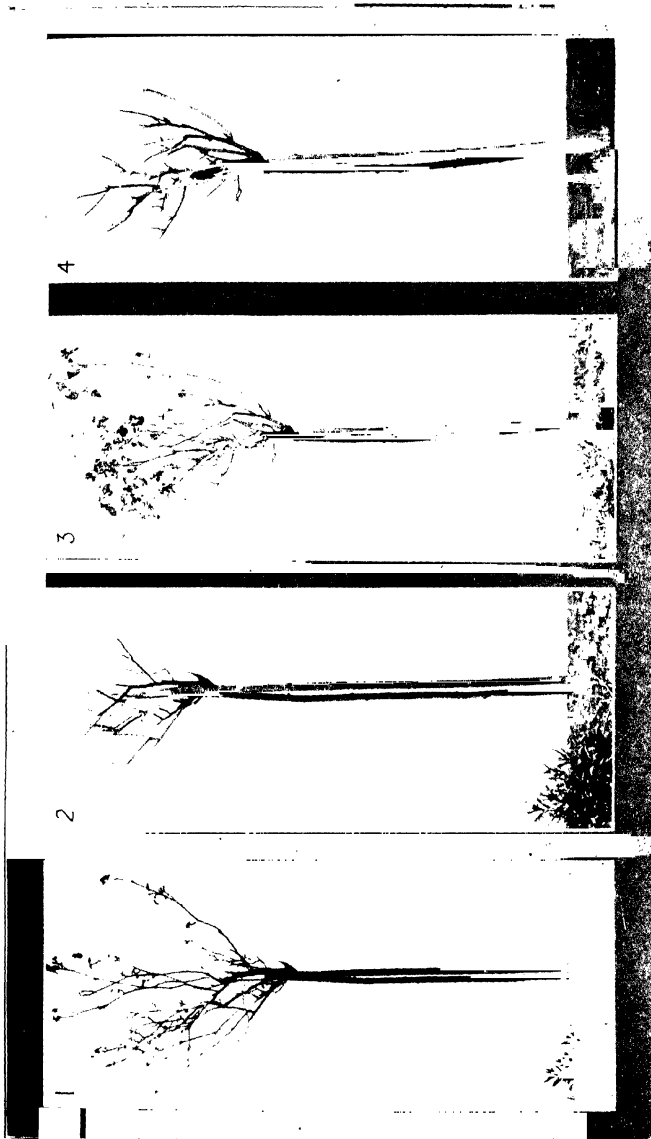
the whole period of the indoor life of the trees, with the exception of the blossoming period and that in which the fruit is colouring, they should be syringed daily in all dull weather; twice daily, night and morning, on fine and sunny days, with rain-water, which latter may every now and then have a little soot stirred into it and allowed to settle.

When the blossoms of the peaches and nectarines in the house are showing pink, which is generally about the middle of March, and just about a couple of days before they open, the pears and plums are moved in. This is a good opportunity to well smoke the house, to destroy any young greenfly that there may be. These are most destructive to the peach blossom. Two successive nights should make the fumigation effective. When the peach blossom is opening it is well to give a little heat at night, but only just sufficient to keep out possible frost. This night heat should be kept up until the fruit is set, or even, should the frosts still be hard at night, longer still. In damp weather, whilst the bloom is out, a very little heat during the day, also, will help to keep the air dry and assist the diffusion of the pollen.

The pollen question is an important one where indoor trees are concerned, owing to their isolation from insects and wind, and where an especially choice specimen or variety is being dealt with it is usually worth while to go round the trees with a small camel's-hair brush and cross-fertilise by hand. Where, however, the blossom is abundant, as it usually is in orchard-houses, the best plan is to go round the house morning and afternoon and give the stem of each tree a sharp, firm blow with the side of the hand. This jerk will set the pollen flying, and is in all ordinary cases enough to secure a good supply of set fruit. Pears which have heavier, stickier pollen, will not fertilise in this simple way, and generally need attention with the camel-hair brush. It is a good plan to put a plant or two of *Cytisus* among the pear-trees to attract bees, which will very materially help in the operation.

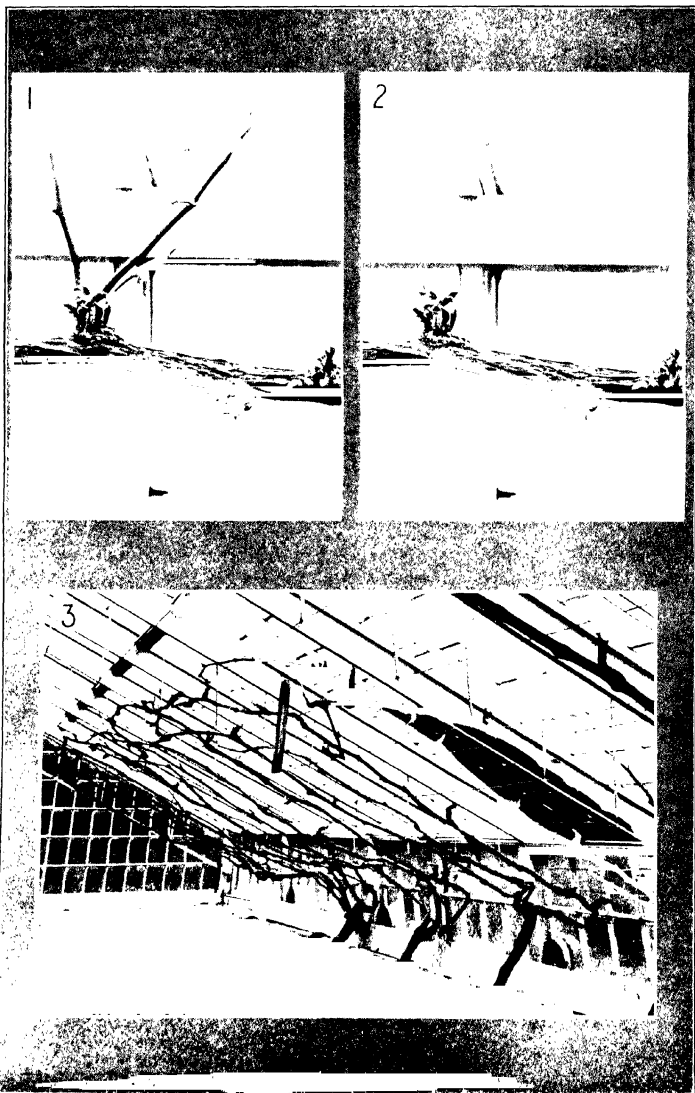
Between the setting of the fruit of the peaches and nectarines and the blossoming of the pears and plums, it is well to again fumigate the house, the operation being of sufficient importance to warrant the removal of any precocious trees which may have broken a few blossoms into a neighbouring shed for the night whilst the smoking is in progress.

The next important step is the thinning, and this must be done with a stern hand, as almost every tree will have set far more fruit than it can possibly carry. The trees should be gone over as soon as the blossom drops, and at least two-thirds of



1. Standard bush, before pruning. 2. The same, after pruning. 3. Hybrid tea standard rose, before pruning. 4. The same, after pruning.

## No. 16. THE GRAPE VINE



1. A vine spur before pruning. 2. After pruning. 3. A vineyard cleared and pruned in readiness for starting, and showing tops of vines bent down to ensure an even flow of sap.

the fruit taken out at once, leaving a final thinning to be done when the fruit has "stoned." This last operation needs firmness again, or too much fruit will be left.

The pruning of the peaches and nectarines is done in April, all unfruitful wood not needed for the extension of the tree being cut out, and each cut as it is made being painted over with shellac dissolved in spirits of wine. This will prevent the wood from bleeding. When the young shoots have put out eight good leaves they should be pinched back to five while the shoot is still soft and immature. This will have the effect of checking the shoot only enough to throw all the buds into flower-buds except the last one, which will again shoot out, and should again be pinched back later on. Plums are pinched back and pruned in much the same way, longer leaders and shorter side-shoots being left.

When the young fruit on the trees is making good progress the trees should be helped by feeding them. A rich compost is prepared, consisting of a couple of barrow loads of turfy loam, one of well-rotted, rather sticky dung, and one of mortar rubbish, pounded fine, the whole enriched with two gallons of bone meal, and two gallons of fertiliser or vine manure. This compost is banked up round the trees to as much as three inches above the rim of the pot, being shaped and moulded with the fingers into a steep rim or dyke, steep on its outer side and sloping more gradually towards the stem, so as to afford a shallow basin or cup for watering. Between setting and stoning each tree is banked in this way with the compost, and as soon as the stoning is over weak liquid manure is used for watering instead of the spring water used before.

In the middle of September all the trees are moved out of the house on to a spare piece of ground where they remain until the repotting again takes place.

In securing a supply of plums, at least three times as many trees are grown as there is accommodation for in the house. One-third are taken in for blooming, while the rest are plunged in a spot sheltered alike from the east wind and the morning sun. When their fruit is three-quarters grown, that of the trees in the house is ripe, and the first lot come out, to give place to a set from outside. In this way three gatherings of plums is obtained, and the season much prolonged.

WALL STREDS.—The small strips of cloth with which trees are usually fastened to the wall when trained are excellent from all points of view except that of the harbouring of insects. These, together with the spores of harmful fungi, are very apt to get

in between the cloth strips and the wall, and insects and eggs are thus given a snug breeding place, secure from any spraying or other processes which may be employed for their destruction. An excellent thing, where time and labour are plentiful, is periodically to remove all trained trees from their walls, renewing all the cloth strips and burning the old ones.

**BRUISES.**—Care should be taken when working with tools among the branches of fruit-trees, that the bark is not bruised or rubbed off by accident. Such bruises and grazes are very apt to give entry to the spores or some one of the wound fungi, and canker may result, or, in the case of peaches, plums, and apricots, gumming may be caused. The effects of a bruise should be suspected when apricot branches die off in the mysterious manner which they sometimes affect.

**Renewing Old Fruit-trees.**—In every village and country district of England may be seen numerous old fruit-trees which, although producing a generous crop of leaves and fresh shoots, yield practically no fruit at all. Many of these might, by a little judicious treatment, be started on a new career of usefulness. In the case of plums, peaches, and all other stone fruit except cherries, nothing much can be done in the way of renovation, seeing that the hard pruning which would be necessary is generally fatal to them. Pears in particular respond to vigorous treatment, as also in a lesser degree do apples. In the case of standard trees in orchards, directly the fruit is gathered the trees should be gone over, all the dead wood removed, together with all boughs that have been bruised, barked, or split or injured in any way. Then mow the grass, thistles, etc., and remove the cuttings from the orchard. Sprinkle salt at the rate of two hundredweight to the acre over the ground, and as soon as new grass appears turn in some sheep, and feed them once daily with cake or corn. Continue this treatment through the winter, and in the spring give a dressing of kainit or soot. In dealing with old pear-trees on walls it is a good plan to cut out every other horizontal branch six inches from the main stem, and as soon as fresh shoots have replaced these, to cut out those previously left, and allow them to be replaced by new shoots in the same way. Another plan is to remove the main stem with all its branches down to the level of the lowest pair of horizontal branches. By this operation the formation of strong new shoots will be stimulated from the lowest tier, which can be encouraged to grow in an upright form at such regular distances as are required. In the case of overgrown

pyramids and bushes of pears and apples, the centre of the tree should be opened up, and crossing branches removed. A trench also should be made round each tree at a distance of three or four feet, and any coarse roots burrowing downwards removed, great care being taken not to injure the horizontal roots and fine rootlets. The following year it will often be well to transplant such trees to a fresh situation.

## CHAPTER V.

### THE ROSE.

**The Rose.**—The Rose has been cultivated as a garden flower in England for many hundreds of years, but it is comparatively recently in its history that it has been raised to the rank that it now holds of queen of garden flowers. This place is undisputed, but judging from the limited number of varieties mentioned in early gardening books, when compared with those of the pinks and carnations, it would seem that the worship of the rose by gardeners is a later development, though the poets have always sung its praises throughout the ages. Gerarde, it is true, speaks of the rose as deserving "the chiefest and most principall place among all floures whatsoever," but comparison of the lists of varieties given by him with a modern list of the varieties ordinarily grown in gardens, will give some idea of the progress of rose culture and the growth of general interest in the rose since his day. The science of hybridisation has done wonders in producing new and lovely kinds, while by this means the good qualities of many roses have been combined and concentrated in one new and beautiful hybrid. The opening up of new countries has enriched us, too, with many fine species, numbers of which grow freely and strongly in our English climate, one species alone, the *Wichuraiana*, having within quite recent years given us an entirely new and beautiful series of roses, with a distinct and lovely habit of growth.

Roses are divisible roughly into several groups or classes. The oldest of these, comprising most of the varieties known to our ancestors of Elizabethan days, is that called "summer flowering." Equal to these in antiquity are some of the climbers. The two largest classes, containing most of the garden and exhibition roses of to-day, are the Hybrid Perpetuals and the Teas. These two groups include sub-divisions; thus the Hybrid Perpetuals are often held to include Hybrid Teas and Perpetual Bourbons, while the Noisettes are classed with the Teas. With

the continual crossing and hybridisation that is going on in modern rose-gardens fresh races and new crosses appear every year, so that the boundaries of these groups are in a state of perpetual motion.

Besides these big groups there are many others less generally known and cultivated which are far too fine in their possibilities to be neglected by the amateur. We have the Austrian briars, with their cousins the Penzance briars, the Bourbons, the Polyantha family, the Provence roses, and the Moss roses. The "Species" roses, too, are full of interesting plants, and have great uses in the garden or wild garden.

These latter are actually wild roses, either native to the British Isles, or imported. They are all grown on their own roots, and are mostly rambling or trailing in habit. The class comprises some very interesting and beautiful roses, our own Dog rose and Field rose being worthy of a place in any garden where beauty and gracefulness of form, both in bloom and general habit, are valued. Several of the wild roses have evergreen or practically evergreen foliage, among them being *Rosa Bracteata*, the Macartney rose, which is a native of China, and *Rosa Microphylla*, another Chinese plant. The Cinnamon rose is a species which has been known in England for several hundred years, being mentioned in gardening books of the sixteenth century, and used also to be known as the May rose. Its blossoms are of a pale carmine, and its perfume, from which it derives its name, is curious and distinctive. It has a variety, once popular but now almost extinct, known as *Rosa du Saint Sacrament*, which has delicate lilac-coloured flowers. Nearly allied to these are *Rosa Lucida*, a shining-leaved plant, with fine bright fruits and rosy blush-coloured flowers, and a bright pink rose, the *Carolina*, which flowers late in the summer or beginning of autumn. *Rosa Kamtschatka* and *Rosa Ferox*—the Hedgehog rose—both come from the Caucasus, and are rather thick and heavy in their growth, making thick-branched low bushes, heavily prickled with strong spines. Their flowers are red. The Burnet-leaved roses are delicate and pretty, with their many leaflets and their dainty fruits, whose sepals remain in place until the fruit is ripe, giving them a very decorative appearance. To this group belongs the parent of our garden Scotch roses, the little white-flowered *Rosa Spinosissima*. Another well-known garden favourite is the Japanese rose, *Rosa Bugosa*, which grows in our gardens into a tall, handsome rambling shrub, very hardy and easy of cultivation, and bearing a profusion of rosy red flowers. It has a white variety, equally hardy and useful, and both bear large



scarlet fruits which make the plant a thing of great beauty in autumn.

The parents of many of our garden roses must be sought for amongst these wild roses of many lands. One of the parent plants of many of our beautiful old garden roses is the White rose (*Rosa Alba*), which numbers among its descendants the favourite old-fashioned Maiden's Blush, Felicité, and Celestial. *Rosa Moschata*, again, is the parent of many famous varieties, besides being itself the Musk rose of our ancestors. It came originally from North Africa, and grows freely here into a stout shrub. It is well defended with spines, and its flowers are white with a fresh musky perfume. It has a part in the parentage of many Noisette roses, while *Madame d'Arblay* and *Garland*, among garden roses, are partly derived from it.

Amongst the field roses we have the English natives, *Rosa Arvensis* and *Rosa Systyla*, with *Sempervirens*, the evergreen rose, *Rosa Setigera*, *Rosa Multiflora*—which crossed with *Sempervirens* produced *Garland* and *Madame d'Arblay*—with its beautiful bright red pear-shaped fruits; and *Moschata* itself.

Yellow species roses are not so common as the reds and whites, but there is a rather tender but beautiful little rose, *Rosa Berberifolia*, which has yellow blossoms, while the Austrian briar is distinguished by the tinge of yellow, brown, and gold which permeates the whole plant. The original species has yellow flowers, borne in June and July, but it is the parent of many garden varieties which have blossoms of every shade between deep copper red and pale pure yellow. In this curious rose the young shoots and leaves are almost chocolate in colour, while the sepals have a strong tinge of brown, as have the stems. Another yellow rose is the *Banksia*, a Chinese species, long grown in England, of which the parent is white-flowered, but another cultivated variety bears yellow flowers.

A species with very beautiful fruit and a pleasant fragrance in leaves and flowers alike is *Rosa Pomifera*, the Apple-fruited Rose. Its flowers are clear crimson and large, and its fruits are bright crimson red. The Ayrshire is, as its name implies, a native, with pretty but scentless pink or white flowers.

Many of the dwarf-growing species roses are excellent for covering rock gardens and sloping banks, and among them we have *Rosa Alpina Pyrenaica*, a crimson-flowered rose, only attaining a height of about two feet. With this may be grown *Rosa Seraphin*, a Corsican native, which is trailing in habit, and only reaches a total height of about ten or eleven inches. It bears bright pink single flowers in June, at the ends of the

shoots. It has an added beauty in its curious fern-like leaves, and altogether the plant—a comparatively recent importation—is a useful addition to the rock-garden. *Rosa Nitida* is another of these dwarf roses with very lovely foliage, in summer being a dark shining green, and changing to purple in the autumn. As its spines are thickly set and of a clear red, and the flowers pink, it makes a fine piece of colour throughout the summer and autumn. It spreads very quickly and strongly by means of underground stems. *Rosa Altaica* and *Rosa Hispida* are much alike, the former bearing very large, faintly yellow-tinted white flowers, those of the latter being of a more distinct yellow. Both have fine black fruits. *Rosa Sericea* is a curious little rose with only four petals arranged in the form of a Maltese cross. Its foliage is very pretty, with many small leaflets lined at the back with down. Another rose with handsome foliage is *Rosa Rubrifolia*, whose red stems and red tinged leaves make a fine note of colour. Its flowers are not very conspicuous, being small and pink, rather resembling those of the blackberry in size and shape. With this for beauty of leaf and stem we may place *Rosa Blanda*, *Rosa Acicularis*, *Rosa Nutkana*, and *Rosa Alpina Pendulina*.

Among the yellows we must include *Rosa Moyesii* and *Rosa Spinossina Lutea*, and these, with the addition of *Rosa Andersonii*, with its bright rose-pink flowers, brings the list of the species roses usually grown to an end. This does not mean that there are not other and equally interesting species, but that these are the kinds easily obtainable and easily grown by the amateur, every one of which has its points of beauty and interest for the rose-lover. The species roses are particularly suited to the wild or semi-wild garden, where they may be planted with the native kinds and left to grow freely as they will. Sheltered places must be found for some of them, in particular the various Chinese species, which are apt to prove rather tender in an English winter, but the majority of them do well in ordinary conditions, and their varying habits of growth make a most interesting study.

While we are speaking of Chinese roses, mention must be made of a recent addition to our garden ornaments in the shape of *Rosa Wichuraiana*, a native of Japan and China. This rose has become the parent of a very large class of Hybrids of a most valuable and striking kind, all keeping to a greater or less extent the characteristic habit of the parent species. This is a plant whose peculiarity it is to produce very long trailing shoots from its base, of very rapid growth, often making fifteen feet of

wood in one season, which shoots trail on the ground, rooting, like strawberry runners, wherever they lie on the earth. In the parent the leaves are of a glossy light green, and rather small, the flowers being single and white with yellow stamens. It is a late flowerer, bearing a profusion of blossoms in clusters all through August, September, and part of October,—even later in a mild season. This parent plant, valuable in itself, has passed on a number of its most useful points to its many descendants. Its almost evergreen leaves have been perpetuated and improved upon in Edmond Proust and Jersey Beauty, both of them practically evergreen and most valuable for screens and trellises. Its trailing habit is seen in nearly all its descendants, while its hardy character and the almost complete immunity from that curse of rose-growers, mildew, are also passed on through the whole family. Nearly all the Wichuraianas are twice blooming, flowering once in summer and again late in the season, and they flower freely, producing their blooms in trusses of varying density and size. They are nearly all scented, and their blossoms vary through all shades of whites and pinks, through the coppers and oranges to reds and dark purples. Taken together with the ease of their cultivation this list of good points is a heavy one for a single family of Hybrids.

To grow Wichuraiana roses well a deeply-dug and well-enriched soil is necessary, but given this they will grow almost anywhere and with practically no further attention. Plenty of space is needed to show them in full beauty, as they are strong growers, and soon spread. The only pruning needed is the cutting out of the old wood as soon as the second flowering season is over, leaving the vigorous young wood to ripen for the next year's flowers. In pruning it is, however, well to vary the treatment according to the proportion of true Wichuraiana blood in the plant dealt with. Where the Hybrid approaches closely to the type it may be safely left with the simplest pruning, but where it obviously has a good deal of the Tea-rose parent it may be more severely cut back. Where the Tea-rose predominates the plants should have more of the older wood left, as they bloom more on the last season's growth, while the new laterals may be thinned out freely.

The Wichuraiana hybrids may be put to a variety of uses in the garden. They have made possible a form of standard rose, the weeping standard, which has a very decorative effect in the garden, though it is not easy to form in perfection. These hybrids are very effective when allowed to trail in their natural manner over rocks, banks, or stumps, while as pillar roses they

show their full beauty. The pergola is an excellent place for the Wichuraianas, while allowed to ramble in and over hedges they are dainty and decorative.

The Wichuraiana hybrids are now far too numerous for mention to be made of all of them in this place, but a selection of varieties arranged so as to give a show of bloom throughout the season may be of use to the amateur in making his choice. An early pink is Gerbe Rose, flowering in early June, with Rubsamen, a salmon pink, finely scented. Among early yellows are Shower of Gold, a good yellow which keeps its colour well—an advantage in a yellow—Alberic and Gardenia. Later we have Dorothy Perkins, perhaps the best known of the Wichuraianas, of a lovely pure pink; Valentine Beaulieu, rather darker in tint and more tinged with salmon, having almost copper-coloured buds; Leontine Gervais, with flowers and buds of varying shades of apricot, salmon, copper-colour, and pink, and Schneeball, a fine white.

Dorothy Perkins, both white and pink, heads the late varieties, and among these late flowering sorts is Wichuraiana, the parent. A pink, Sweetheart; a darker pink, Lady Gay; and a white, Mrs. L. Dewhurst, complete the list, giving us a selection from which a good show of flowers should be had throughout the summer and early autumn.

From these trailing roses we come by a natural step to the useful class of climbers, which comprises some of the oldest garden favourites. There are few sights more beautiful in a simple way than an old red-brick house, covered from ground to roof and often right up its chimney stacks, with climbing roses in flower. Climbing roses are admirably adapted for such wall covering, but they are equally at home on trellis and pergola, garden screen and summerhouse. The rose-covered porch is almost indissolubly connected in our minds with the real English village, and certainly some fine specimens of climbing roses are to be found in these situations. Where roses are grown on garden walls—a position in which many do excellently—it must be remembered when preparing the soil for their reception that much of the good soil at the base of the wall is likely to have been removed during the building, and that it must be replaced if the plants are to flourish. The same thing will apply in the case of a house wall, particularly if it be newly built. The soil at and around the place selected for the planting should be either deeply dug or bastard trenched, and the lower strata of the soil enriched by the addition of some basic slag. Heavy soil should be drained, but this is seldom necessary. Farmyard manure, mixed with

some broken bone, should be added to the soil, and the whole left for some time to mature. The resulting soil will, other things being favourable, produce fine good coloured flowers and good wood. Nearly all Tea roses and Noisettes grow better against walls than as bushes or standards, the protection being of the best, while a wall, unlike a protecting hedge or shrubbery, robs the soil of none of its nourishment. When growing roses to cover walls a mistake that is frequently made is being in too much of a hurry. The wall must be covered up as soon as possible, and in order to do this roses in pots are purchased with great shoots ten and twelve feet long, planted and trained out at once, with the result that all the new growth is made from the top, and the plant remains unbalanced and straggling, covering one piece of the wall and leaving the rest bare. The best plan is to plant in the autumn, using a bush rose taken from the open bed, or even a half standard. Some people plant a briar in the desired position, either a cutting or a seedling, and when it has well taken hold, bud the desired variety on to it. This is often a most successful method. In the case of delicate Tea roses or Noisettes plants either potted or from the bed, about three feet high, are the most suitable as a general rule, and these need not be pruned for the first year, but allowed to retain their whole year's growth, which is usually strong and vigorous.

When the plants are firmly put in—and firm planting is an absolute necessity—they should be liberally watered, and the soil immediately surrounding the roots covered with a layer of manure. This will serve the double purpose of keeping the soil moist and providing nourishment. Roses against walls suffer a great deal from drought, and should not be stinted of water in the summer. Where choice is possible walls facing south-west and west are best for the tender Teas and Noisettes, but in certain special cases other aspects must be chosen. For instance, it often happens that the beautiful copper William Allan Richardson will not produce its flowers true to type, but bears pale, watery, washed-out looking blooms instead of the real apricot. In such a case success may often be obtained by moving the rose to a wall facing north.

In a recent national competition the results provided us with an interesting and useful list of the best climbing roses, divided into two sections, those flowering in clusters, and those flowering singly, or normally so. Among the cluster-flowering crimsons Turner's Crimson Rambler held the first place, the second going to Gruss an Teplitz, the third being given to Hiawatha. Among the single-flowering section the first crimson

was *Ards Rover*, the two others, bracketed together, being *Reine Olga de Wurtemberg* and *Longworth Rambler*. The cluster pink went to *Dorothy Perkins*, which headed the list by many votes, the next in popular favour being *Blush Rambler*. The third in this section was *Minnehaha*. Single blooming pinks were—first, *Mrs. W. J. Grant*; second, climbing *Caroline Testout*; and third, *Papillon*. In the clustered whites *Aimée Vibert* took the first place, followed by *Félicité Perpetué*, with *Bennett's Seedling* in the third position. In the single flowering section the whites were headed by *Madame Alfred Carrière*—heading the whole competition as far as number of votes went—followed by *Una* and *Macrantha*. Yellows had, in the clustered class, *Alister Stella Gray*; second, *Claire Jacquier*, and third, *Aglaia*; while among the single-flowered roses *William Allan Richardson* headed the list, followed by *Gloire de Dijon* and *Madame Jules Gravereaux*.

As climbing roses are so extensively used for covering walls already existing it will be of considerable assistance to the amateur to know which roses do well in different aspects. The following list, though far from exhaustive, will be some guide to him in selection. For walls facing south *Madame Alfred Carrière*, a beautiful and very vigorous white, is excellent, as is the old favourite *Maréchal Niel*. A very pretty yellow, though it is a summer flowering rose, and therefore its show of blossom is not long, is *Fortune's Yellow*, with *Claire Jacquier*, recommended above. Both these have very decorative foliage, however, which makes a very effective wall covering even when the flowers are gone. Among those of not quite so vigorous a habit, and suited therefore to a smaller space, are *Gruss an Teplitz* and *Longworth Rambler*, both crimson and both perpetual-flowering. Among still less vigorous growers for a southern aspect are *Catherine Mermet*, a good pink; *Niphetos*, a lovely-shaped white; and the *Lyon Rose*, a pink and copper blend. For walls facing west *William Allan Richardson* usually does well, and is a very strong grower. With it are *Gloire de Dijon*, also vigorous; *Madame A. Carrière*; *Dorothy Perkins*, a summer-flowering kind; *Céline Forestier*, a yellow *Noisette*; and *Edmond Proust*, this latter having practically evergreen foliage. Less vigorous kinds are *La France* and *Alister Stella Gray*, the latter a good yellow; while suited for a still smaller wall space are *Maman Cochet*, a lovely pale pink, with its white variety; *Safrano*, an apricot, rather like *W. A. Richardson*, and *Marie van Houtte*.

For the wall facing east we have climbing *Caroline Testout*,

pink ; climbing Captain Christy, pink also ; *Gardenia*, a summer-flowering yellow with fine foliage ; and *Reine Olga de Wurtemberg*, crimson. The common monthly rose also does well on an east wall. Less vigorous kinds for this wall are *Zephirin Drouchin*, a bright red ; *Aimée Vibert*, a white ; *Pink Rover*, and *Gloire Lyonnaise*, a creamy white. The wall with a north aspect may be clothed with the old *Gloire de Dijon*, *Bennett's Seedling*, a white ; *Cheshunt Hybrid*, a red, sweetly scented ; and *Félicité Perpetué*, a white. All these are vigorous and suited to a large space. Less vigorous are *Ards Rover*, crimson ; *Robusta*, and *Bouquet d'Or*, while smaller still are *La France* ; *Augustine Guinoisseau*, white, flushed with pink ; *Caroline Testout*, and *Frau Karl Druschki*.

Climbing roses look very well grown over a pergola, but it must always be remembered that the simpler the supporting structure, so long as it is strong and firm enough to bear the weight of the roses, the better. The simplest kind of pergola is made by planting wooden uprights at the back of a border, and connecting them by either branches or smaller wooden rods. It must always be borne in mind that the object of the pergola is to show off the roses, not to be seen itself. A suitably planted pergola should show blossom throughout the flowering season, and the varieties grown should be carefully selected to this end. The Teas, the Ramblers, the Hybrid Teas and the Noisettes may all be drawn upon for this purpose, and many of the *Wichuraianas* are quite suitable.

Speaking of " Rambler " roses brings us to that class, which is really an offshoot of climbing roses, as usually understood. Rambler roses are really distinct from these ordinary climbing varieties, in that their habit is far more vigorous, and their particular points include very rapid growth, with a tendency to throw out strong and long branches in all directions, and to clothe themselves fully all over with good foliage. These qualities make them of great use in gardening. A few of the roses now classed among the Ramblers, those few including some of the best, are old varieties, and it is curious that nearly all the Ramblers surviving from these are whites or whites with a faint touch of pink. Among these old sorts are *Félicité Perpetué*, which was introduced as long ago as 1828 ; *Aimée Vibert*, introduced in the early forties ; *Bennett's Seedling* ; *Flora* ; *Madame d'Arblay* ; the *Garland*, and *Splendens*. *Félicité Perpetué*, the earliest of them all, is traced to a hybrid from *Rosa Sempervirens*, a wild Italian briar, whilst others like *Dundee Rambler*, *Ruga*, and *Splendens* are hybrids from the wild

white Ayrshire of Scotland. The ordinary English Dog Rose, although its habit of growth is so beautiful and distinct, has been used curiously little for purposes of hybridisation. The only hybrid from it which is of general merit is Una, a hybrid between the Dog Rose and Gloire de Dijon. The Boursault roses, of which not many now survive, were hybrids from Rosa Alpina, while a few hybrids were also raised from Rosa Multiflora, some of which are still used as stocks for budding. Rosa Setigera, the American prairie rose, has produced some valuable hybrids, amongst them Reine Olga de Wurtemberg. Since these times, however, until quite recently this Rambler class received but few additions, until the Crimson Rambler, perhaps the best known and most popular of all Ramblers, was introduced in 1893. The success of this at once drew attention to the possibilities of this class of rose, and new hybrids have since been brought out each year, many of them of great beauty and value. The re-introduction of the Wichuraiana strain brought in new and most valuable qualities, and resulted in the production of the whole race of Wichuraiana hybrids, which, again crossed with the Multifloras, gave us such varieties as Hiawatha and Lady Gay, both deservedly popular. The Wichuraianas crossed with the Teas give us yet another class full of lovely varieties, such as Jersey Beauty. The aim of the modern hybridist in this field is the production of a perpetual-blooming Rambler, nearly all the real Ramblers at present in use being summer flowering only. The difficulty in the way of attaining this result lies in the fact that where the hybrid contains too little of the blood of the parent Rambler, that is to say where a hybrid is crossed back too frequently with a Tea strain, the resulting seedling may be perpetual flowering, but is likely to have lost the true rambling habit of growth. The best perpetual Ramblers produced up to the present are the offspring of Musks and Noisettes.

The oldest of our garden roses are, as I have said, what are known as "summer bloomers," but the great majority of the roses which are now grown as garden flowers, for forcing and for exhibition, are what are called "perpetual-bloomers," that is to say, they continue their flowering season right through the summer months into the autumn, and, in wild seasons, and sheltered spots, even into winter itself. The three principal classes of these roses are the Hybrid Perpetuals, the Tea Roses and the Hybrid Teas. All of these but the Teas are, as their name implies, hybrids of many varieties, beginning with various crosses of Damasks, Bourbons, and Chinas, since



complicated by many other strains, but the Teas are practically all descended from the old Blush Tea Rose, and its yellow variety, both introduced from China early in the nineteenth century. These roses are the most delicate of the autumn-blooming sorts, and their flowers are proportionately delicate and daintily scented. They will not stand the neighbourhood of town smoke and dirt, but in good air, and given suitable surroundings and soil, they are hardly less easy of cultivation than the Hybrid Perpetuals. They enjoy a light, rich, well-drained soil, and in cold parts of the country, or where they are much exposed they do certainly require some little protection in the winter. This need only be of the slightest kind, however, and of a nature obtainable by anyone. Litter, straw, a few branches, or a bunch or two of bracken will preserve quite delicate plants through frost.

Among the Teas we find our old friend Marechal Niel, one of the best of the yellows, richly coloured and well-shaped; Anna Olivier, a pretty flower of rose and buff, very sweetly scented; Madame Hoste, a fine lemon yellow, of vigorous habit and very fragrant; G. Nabonnand, a fine pale, flesh colour and pink rose, which is at its best in autumn; Madame Falcot, an apricot, a good strong grower, and an excellent rose for button-holes and for cutting; Marie van Houtte, perhaps the best of all the Teas for general purposes, with flowers of a delicate lemon yellow, edged with rose colour, and sweetly scented; and Madame Lambard, a pink-shaded flower, which is good late in the season but apt to vary in colour. This is a good, vigorous rose. With these we may place Princesse de Sagan, one of the best of the dark Tea roses, with flowers of a good dark crimson scarlet. This rose is not quite such a vigorous grower as those mentioned above. Edith Gifford is a good hardy rose, with fine white flowers tinged with flesh colour. These are a good selection of Tea roses for the small garden, but there are many others for the grower to select from if he wishes. Among the best known are Catherine Mermet, Niphetos, Safreno, Gloire de Dijon, Perle des Jardins, Bridesmaid, Irish Pride, Maman Cochet, and Molly Sharman-Crawford. The National Rose Society gives a list of about a hundred distinct varieties, so that there is plenty of choice.

Hybrid Perpetuals are a vigorous and hardy class, containing some of our most fragrant sorts. They were originally, as stated above, a mixed race, but they have come to possess certain definite characteristics. The class contains many of the roses usually grown for exhibition, as well as a great many on which

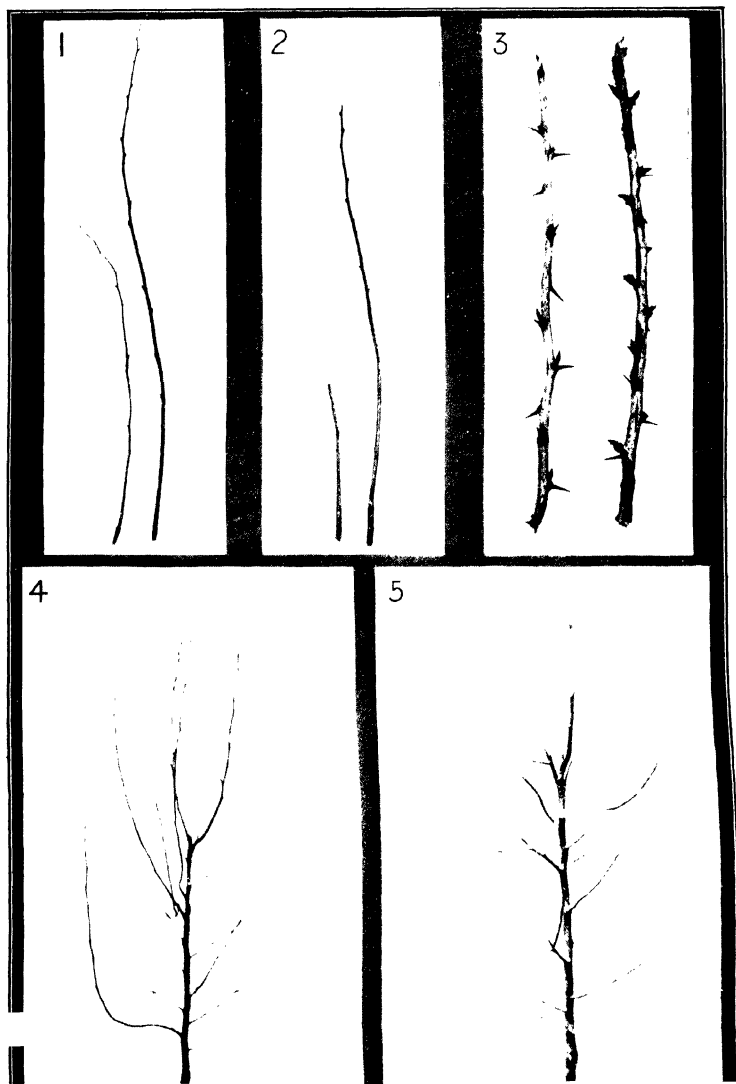
we rely for our garden flowers. No garden which contains roses at all should be without, for instance, General Jacqueminot, which for colour and scent is not easy to beat. It is a bright scarlet crimson rose, which is not only a vigorous grower, but a most prolific flowerer. It is useful for almost all purposes, for general garden culture, for growing as a pot rose, or for exhibition. Prince Camille de Rohan, too, is a favourite in all gardens, with its very dark crimson flowers, sweetly scented. Frau Karl Druschki is a disappointing rose. Although almost the most perfect of the Hybrid Perpetuals in shape and purity of colour, and therefore not to be denied entrance into our rose-gardens, this white and lovely flower is absolutely scentless, a fault almost unpardonable in a rose. No such fault can be found with Mrs. John Laing, a lovely fragrant pink rose, one of the most useful of the Hybrid Perpetuals, as not only is it suitable for all purposes of pot culture, exhibition, forcing, bedding, standards, and garden purposes generally, but it will stand town conditions, and flourish in surroundings which the rose will not usually tolerate. Mrs. Sharman-Crawford is another good pink rose, a vigorous grower and useful for most purposes. Duke of Connaught is a good rose for the garden, being another of the very fragrant kinds and of a good deep crimson. It is not, however, of a very vigorous habit. Charles Lefevre is a good crimson, having all the good qualities of the previous one, while possessing a more vigorous habit. It also is very sweetly scented. Dupuy Jamain is a nice bright red rose, very fragrant and a very vigorous grower, and if we add to these Hugh Dickson, a crimson, which is well suited to all purposes and does well in towns as well as being sweetly scented, and Ulrich Brunner, another sweet red rose, we have a good useful list for the amateur.

The Hybrid Tea Rose class is a comparatively new one, none being recognised by the National Rose Society in the year 1882. In the 1884 catalogue only three varieties are mentioned, these being Cheshunt Hybrid, Reine Marie Henriette, and Longworth Rambler. Over 170 varieties are now grown, so that a considerable amount of attention has been given to the class. And it must be said that it fully deserves attention. Among the Hybrid Teas are to be found many of the very best of our garden roses. The class, as a whole, is as hardy as the hardiest of the Hybrid Perpetuals, whilst retaining the free-flowering habit of the Teas. Judgment is called for in the matter of their cultivation, and especially in the matter of pruning, the treatment varying according as the hybrid shows more of the characteristics of either parent. Hybrid Teas as a class

require less pruning than Hybrid Perpetuals. For general garden purposes good Hybrid Teas are Viscountess Folkestone, a very sweetly-scented creamy-white rose, shaded lightly with flesh colour, good for all kinds of cultivation, and vigorous in habit ; Madame Cadeau Ramey, another good creamy rose ; Irish Beauty, a single white rose ; Gloire Lyonnaise, white with a shade of lemon at the bases of the petals ; Irish Glory, a fine pale pink single rose ; Kaiserin Augusta Victoria, another of the lemon-shaded whites ; Caroline Testout, one of the very best Hybrid Teas for all purposes, a strong grower and hardy in towns, with blossoms of a bright true pink ; Augustine Guinoisseau, a blush-tinted white, very sweetly scented and free flowering ; Madame Pernet-Ducher, a good true canary yellow, and excellent for cutting and button-holes ; Gruss an Teplitz, an old favourite, very fragrant and a very vigorous grower, free flowering, with blossoms of bright crimson and good for all garden purposes ; La France, with its delicate and distinctive perfume, unlike that of any other rose, an excellent all-round variety with silvery rose-coloured flowers ; Marquise Litta, a good fragrant red rose ; and Lady Battersea, a good bright crimson, with orange shading. This list is a useful one for a small selection. Should exhibition roses be required a good selection of Hybrid Teas for the purpose will be, for reds, Exquisite, Marquise Litta and Mrs. W. J. Grant ; among whites, Kaiserin Augusta Victoria ; Bessie Brown, a good creamy white ; Mildred Grant, a white, tinted with peach pink ; and White Lady, an early flowering white rose. In the blush and pink sections we have Killarney, a good blush pink ; Antoine Rivoire, a good exhibition as well as garden rose, creamy white in colour, tinged with blush ; and Souvenir de President Carnot, another white with blush shading. Pinks give us Caroline Testout ; Captain Christy, a salmon-tinted pink ; La France ; and Mamie, a deep pink, and sweetly scented. There is a recent introduction to this class of Hybrid Teas, in the shape of a new group of fine single-flowered varieties, of which Irish Brightness, Irish Elegance, Beauty, Irish Glory, Irish Harmony, and Irish Modesty, are the best known members. These single-flowered roses bloom freely for a very long time, and if left almost unpruned will give a show of blossom almost from June to October.

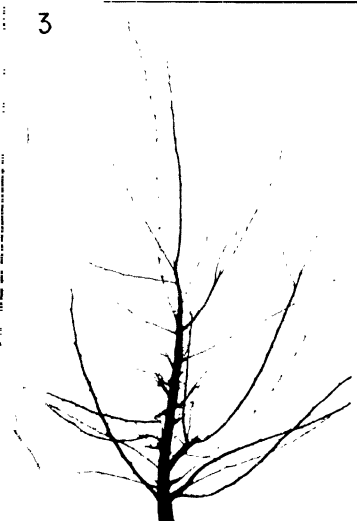
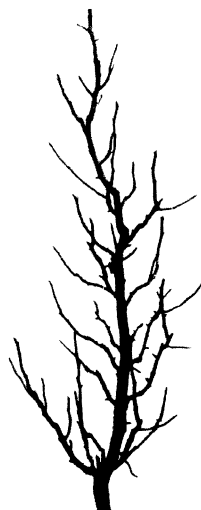
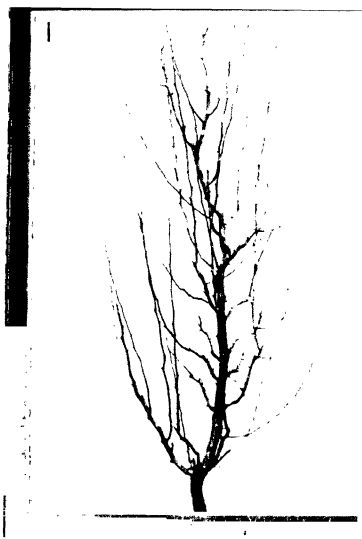
The National Rose Society gives a list of twenty-four of the best roses for general garden cultivation, all but two of them coming from the Hybrid Tea and Hybrid Perpetual classes. The list is as follows :—Hybrid Teas, Antoine Rivoire, Caroline Testout, Earl of Warwick, Grand Duc A. de Luxembourg,

## No. 17. PRUNING



1. Strong and weak raspberry canes, before pruning. 2. The same, showing the weak cane put back a foot from the ground and the strong with the top only removed. 3. Gooseberry shoots: on the left a one year old, and on the right a two-year old. 4. Pyramid apple before pruning. 5. The same, after pruning.

No. 18. PYRAMID PLUM AND PYRAMID PEAR



1 Plum, before pruning.  
3. The same, before pruning.

2. The same, after pruning.  
4. The same, after pruning.

Gustav Grünerwald, Joseph Hill, La France, Lady Ashton, Madame Abel Chatenay, Madame Jules Grolez, Madame Melanie Soupert, Madame Ravary, Pharisiær, Prince de Bulgarie, Richmond, and Viscountess Folkestone. In the Hybrid Perpetual class we have Commandant Felix Faure, Frau Karl Druschki, Hugh Dickson, Mrs. John Laing, Mrs. R. G. Sharman-Crawford, and Ulrich Brunner. The two remaining of the twenty-four are both Teas, G. Nabonnand and White Maman Cochet. The Society also gives a useful selection of roses for standard trees, comprising twelve large-flowered and twelve small-flowered varieties. The latter class includes Corallina, G. Nabonnand, Peace, Madame Antoine Mari, Madame Jean Dupuy, Madame Chédane Guinoisseau, and Madame Pierre Cochet, all Teas; Madame Abel Chatenay, Madame Ravary, Marquise de Salisbury, and Prince de Bulgarie, Hybrid Teas; and William Allan Richardson, a Noisette. The twelve large-flowered varieties include only one Tea, White Maman Cochet; five Hybrid Perpetuals, Captain Hayward, Fisher Holmes, Frau Karl Druschki, Hugh Dickson, and Mrs. John Laing; and six Hybrid Teas, Caroline Testout, Frau Lilla Rautenstrauch, Gustav Grünerwald, La France, La Tosca, and Marquise Litta.

The China Roses are an interesting class, the best known of which is the old-fashioned Monthly Rose, well known in cottage gardens. This class is really the most worthy of the name of perpetual, being in flower practically the whole of the summer. As a class these roses are not very vigorous, and as separate blossoms usually not good, the flowers being somewhat straggling and inclined to weakness, but they are well worth growing for the sake of their perpetual show of bloom. They should be grown on their own roots, and like a warm, good soil. They need little or no pruning. The two parents of the race are the old Monthly Rose, a pink, and the Crimson, but besides these there are now quite a number of varieties. An early and good kind is Mrs. Bosanquet, a good ivory tint; and a very well-known sort—Laurette Messimy—has been popular since its introduction in 1887. Queen Mab is another good China, of a nice apricot yellow, shaded with orange, much resembling another apricot, Arethusa. Chin Chin is a bright sulphur yellow, and Ducher is a good white. White Pet is a nice little dwarf China, and in this class we have the very curious Viridiflora, with green flowers, a most interesting and freakish flower.

The old-fashioned roses of our country-cottage gardens are mostly members of the Provence and Damask families; the former of these, *Rosa Centifolia*, is of very old cultivation in England,

having been introduced into this country at the end of the sixteenth century, since when it has been a general favourite. It is the "cabbage rose" of the country bouquet, and is well worth growing even beside our modern improved varieties, if not for its colour and scent alone, at least for its many associations with old English life and literature. It belongs to the summer-flowering class, and all these roses flourish best when planted in a rich, almost gross soil, deeply dug and well enriched. It should be grown on its own roots, and to get good results should be severely pruned, to an extent almost alarming to the beginner. Every shoot should be well shortened, leaving only three or four buds, and the gardener who has strength of mind enough to do this will be well rewarded by the strong vigorous growth of flowering wood made in the following season. The miniature varieties of the Provence rose are very early flowering, but are soon over, the two most generally known being De Meaux and Spong's rose. The Provence and the Moss roses are closely allied, the latter being supposed to be a descendant of the former, the Crested Provence and the Crested Moss being practically identical. The White Provence is a good paper white, and Tuscany is a very dark violet purple, almost black and very fragrant. The Damasks include, as well as the old Red Damask, a Crimson Damask; the York and Lancaster, a curious red and white striped rose; Lady Curzon, a pale pink hybrid; Lady Sarah Wilson, a good creamy blush rose, and Mrs. O. G. Orpen, a blush pink, which is of a semi-climbing habit. The Moss rose has flowers of much the same character as the Provence, but is distinguished by the thick growth of mossy material which covers the stems and sepals, having a pleasant aromatic scent, quite different from that of the flower. The Common and the Crested Moss roses are pink, and there are some very pretty white kinds, the best of which is perhaps Blanche Moreau and the White Bath. The Perpetual White Moss rose departs from the habit of the family in blooming in autumn as well as summer. The Old Black Moss is a good dark crimson-flowered kind, while Moussue-presque-partoot is one of the mossiest of the whole race. James Veitch is one of the best of the Crimson Moss roses, being of a rich dark colour, inclining rather to violet. The Moss rose, like the Provence and Damasks, likes to grow on its own roots, and needs a rich, light, well-dug soil. Moss roses do well pegged down, when fine masses of flowers and foliage may be secured. They should be layered like carnations, and will shoot out well from the point at which they touch earth. They require severe pruning, but flower for

a longer time if a succession of flowers is arranged for by pruning in two sections. Thus half the shoots should be pruned in early autumn, say about October, and the rest left till May, pruning closely at each time. A dressing of manure in the autumn should always be given, and the surface kept lightly broken up. Moss roses should not be allowed to grow too tall, or they will get top-heavy. The Maiden's Blush, without which no old-fashioned garden could be complete, is one of the species, *Rosa Alba* having been introduced into England as long ago as the fourteenth century. The Maiden's Blush is certainly one of the most lovely of our old roses, the flowers being of a clear, rosy white, shaded to almost a salmon pink at the heart of the petals. The flower is sweetly scented. There are two other varieties of *Rosa Alba* in cultivation in modern gardens, both of them blush pink, one of them light, *Rosa Celeste*, and the other a true blush pink, *Celestial*. Both of these have shining foliage, and both are vigorous growers.

The Noisette roses are of American origin, and are supposed to be descended from a cross between Musk and China specimens, the China blood having been strengthened in the strain by much subsequent crossing with the earlier Tea roses, then known as the Tea-scented Chinas. The Noisettes need careful pruning, as they bloom best on the long secondary shoots of the previous year's wood, and for success the best ripened of this should be selected and left nearly its full length. Noisettes are early bloomers, as a rule, and most of them are hardy, though *Maréchal Niel*, one of the favourites, needs protection from frosts and a warm situation if good results are to be attained. *Rêve d'Or* is one of the best of the Noisettes for climbing, as it has one good quality not shared by most of its relatives—that of covering itself well with foliage right to the bottom of the stem. Many of the Noisettes, though desirable in other ways, have a trick of becoming bare and unsightly at the base of the branches. *Rêve d'Or* is a good, free-flowering rose, and its flowering season is a long one. Another very well-known Noisette is *William Allan Richardson*, a strong orange in colour, but often very disappointing owing to its habit of variation in shade. The buds are generally a good clear orange colour, but as they expand the flowers often turn quite white, or to a washed-out light yellow shade, and sometimes even the buds are tipped with it or even completely white. It does well in a good soil, but in very severe weather requires protection. The Noisette class likes a warm, light, well-drained soil, and does best in a fairly warm climate. The somewhat heavy rich soil loved by Hybrid Perpetuals is not so successful



with the Noisettes, nor indeed with the Teas, as that which is porous and at the same time rich. Besides the varieties named, good Noisettes include Céline Forestier, a plant fairly vigorous in habit, but not sufficiently strong to make a good climber. It has very handsome evergreen and shining leaves, but though it flowers freely and makes a good show in the garden its individual blooms are not good in shape. This rose does not stand frost well; but, on the other hand, it does not require a particularly rich soil, doing well in poor land. Alister Stella Gray, a good yellow Noisette, is a useful rose, for many purposes. It is one of the best for the pergola, and excellent for tall pillars, say over eight feet in height; it also makes a good standard. Caroline Kuster is a Tea-Noisette cross, and partakes very largely of Tea-rose characteristics. It is so much like the Teas that it does best if treated as one, and will produce good show blooms if closely pruned, treatment which is harmful in the case of true Noisettes. It also has no tendency to climb. It is a good rose for cutting for general purposes, and flowers well in this way if slightly pruned, the bush being left unthinned. Climbing Aimée Vibert is a most useful rose, pure white in colour and vigorous in habit, with almost evergreen leaves. It is also a good autumn flowerer, keeping its blossoms till the season is well advanced. This is a good rose for pillars and pergolas. Fortune's Yellow, also known as Beauty of Glazenwood, is a good and vigorous rose, but is rather delicate, liking a wall facing south or south-west, and, failing this, needing glass to get good results. It is of a fine orange yellow, flaked and shaded with red. This is a very early rose, and on a warm wall is almost always in flower by the middle of May. Lamarque is a rose which flowers well during the earlier part of the season, but shows great falling off later. It has small shining foliage, and is a vigorous cover for a wall with a southern aspect. It is extremely sweetly scented, having a distinctive violet perfume. It is one of the ancestors of Maréchal Niel. Its usefulness is diminished by its rather delicate constitution, being unable to withstand frost, though usually safe enough on a south wall. Ophirie is a "Nankeen" and copper rose, too tender for general garden cultivation. L'Idéal is what is known as a good "button-hole" rose, having very beautifully-shaped buds, which open out into a disappointing-shaped flower, loose and straggling. Its colour is hard to describe, as it is noted for its varying tints, all shades of red and yellow being found among buds and flowers on the same plant. It is too tender for anything but wall cultivation. The class of Hybrid Noisettes includes Madame Alfred Carrière, almost the best white hardy

climbing rose, with very sweetly-scented flowers, and *Boule de Neige*, a good white for garden, standard or hedge.

The Bourbon roses provide a good deal of the blood which gives to our Hybrid Perpetuals their autumnal flowering qualities. The race is noted for its late flowering and its sweet scent, and some years ago was a very large class. Only a few of these old varieties now survive, however, having passed on their good qualities to Hybrid descendants. They were introduced from the Isle of Bourbon in 1825, and Mr. William Paul, in his celebrated "Rose Garden," gives a list of forty-six varieties. Against this list only four are now quoted in the National Rose Society's list—*Souvenir de la Malmaison* is one of the oldest of these, and is still an excellent garden rose, beginning its flowering season very early, and flowering well on into the autumn. It is a blush white, and very fragrant, and makes a good garden standard; *Madame Isaac Pereire* is another of this class of a very useful type, having the rare quality in a rose of doing well in town surroundings. It is of a light rosy carmine in colour and is good for every garden purpose, making a good standard, doing well as a bush or as a pillar rose, and useful for pegging down. *Mrs. Paul* is another good Bourbon, again a good town dweller, with blush-white flowers shaded with peach colour and having a pretty camellia-like appearance. It is a very vigorous grower and makes a good bush or standard. *Setina*, a pink Bourbon, is a strong grower and a good pillar rose. Bourbon roses are heavy feeders, and when grown as standards should have an annual barrow-load of manure placed on the surface of the soil surrounding them in the autumn, this dressing being lightly forked into the ground in March, and a fresh mulching added to keep the roots moist and protected in summer. When growing Bourbons on their own roots, a method of culture recommended for poor and dry soils, a good bed should be prepared, by removing all soil to a depth of nine inches or a foot, and turning the sub-soil for about the same depth. Fill up the space with half-rotted good stable manure, and well tread it down, covering it with a couple of inches of a light sandy loam, or light garden mould. The roses are then planted firmly in the usual way, and good results should follow. Bourbons do very well on most soils. Amongst Hybrid Bourbons the best is, perhaps, *Zephirin Drouhin*, a thornless rose, very vigorous, very fragrant, a good clear pink in colour, and doing well on walls or as a hedge. *Purity* is another of this class, white with a faint rosy flush at the heart, and *Gloire des Rosemanes*, a light semi-double crimson rose of vigorous habit, suited for growing as a pillar or bush,

completes the list of these Hybrids in general use. An old-fashioned class, some members of which are still grown in gardens, is the French rose, *Rosa Gallica*, the best known of which race is *Rosa Mundi*. This rose is often sold as the York and Lancaster, being, like the latter, striped with red and white, but the real York and Lancaster is a damask. *Rosa Mundi* is a very fragrant rose, and if well manured is a vigorous grower. With it comes Village Maid, a single-flowered red and white striped rose, also of vigorous habit and a nice rose for bushes. Where many of the French roses are grown it is a good plan to prune them at different times, by which means a succession of flowers can be obtained for a much longer period. Some of the plants should be pruned in October and others in May, the winter pruning being a severe one, all the strong shoots being cut down to within six or eight buds of the bottom, and all the weakly ones to two or three.

The Sweet Briar family has been much enriched of recent years by the addition of a whole race of Hybrids raised by Lord Penzance, and named from him the Penzance Briars. This race contains very many beautiful single and semi-single flowered roses, with sweetly-scented foliage and very graceful vigorous growth, which make exquisite garden ornaments. Taking these alphabetically we have first, Amy Robsart, a deep red flower of vigorous habit, good for the hedge or among the shrubs. Anne of Geierstein is a deep red, while Edith Bellenden is a pale pink. Flora McIvor is a white, tinted with a faint pink, Jeanie Deans a rosy crimson; Julia Mannering a clear pearly pink, and Lady Penzance, the most distinct of the Penzance briars, has flowers of a coppery-yellow. Lord Penzance is a duller yellow, described as "fawn." Lucy Bertram is a good crimson with a white centre, while Meg Merrilees—one of the best of this class—is bright crimson. With the Hybrid Briars, though not of the Penzance strain, we have Hebe's Lip, a very pretty and dainty little rose, single or nearly so, with white flowers with a picotee edge of reddish purple. Rose Bradwardine is a good true pink, and Janet's Pride is a white, with crimson tips and shadings. While dealing with this family, we must not forget the parent, the common Sweet Briar, which deserves a place in every garden hedge and shrubbery, nor should we forget to warn the amateur that all these Hybrids are such vigorous and rapid growers that they must only be planted in a position in which they can have almost unlimited room. Pruning is hardly needed for any of them, except in the case of Lord and Lady Penzance, which are not such sturdy growers as the others and

should have their shoots shortened to a length not exceeding six feet. Cutting should only be employed for the purpose of keeping the plants within bounds. The old Sweet Briars, on the other hand, are apt to become thin and straggling, and should be gone over carefully, cutting away all bare and weakly shoots, and leaving the plant not more than four or at the most five feet high.

The Austrian Briar has long been grown in our gardens, and is a native of the mountains of North Italy. Its flowers vary in different varieties between yellow, copper, and red. It is useless to try to grow these roses near a town or in a smoky atmosphere. They resolutely refuse to flower. Where they do well they are most decorative, the Austrian Copper being a curious flower—grown in England as long ago as 1596—with petals which are sulphur yellow outside and within of a bright copper red. It is an early flowering kind, and vigorous in habit. The Austrian yellow is as old in England as the former rose, and is of a bright yellow, while another sort almost exactly resembling this latter in habit is the Persian Yellow, though the latter is distinguished by its double flowers. The Persian Yellow should hardly be pruned at all, it merely needs to have the tips of the shoots cut back. Gottfried Keller is a Hybrid Austrian Briar, with nearly single flowers which it bears throughout a long season. It is a very lovely rose, dark yellow in colour, with a flush of terra-cotta. Harrisonii is another yellow, while Soleil d'Or varies from orange yellow to a reddish gold colour. The Austrian Briars demand for successful cultivation a moist soil and, above all, pure air. They need but little manuring, any good moist garden soil suiting them well, nor do they ask for much care in pruning. The strongest shoots should be shortened, and as the flowers are largely produced on the twigs, as many of those as possible should be left.

From the Austrian Briars we pass naturally to a native race, the Ayrshires, found throughout Europe. They have a peculiar slender and rapid growth, and from this habit they are sometimes called running roses. These were much used for weeping standards before the introduction of the Wichuraiana group, as their trailing habit fitted them well for that form of plant. Their hardiness and vigorous habits of growth fit them well for covering walls and fences—in fact any unsightly thing in the garden, all the Ayrshires being most decorative and showing their characteristics to best advantage when allowed to ramble at will without training or pruning. Some of the sorts now grown show marks of hybridisation, as the true Ayrshire type

bears its flowers singly, not in clusters. Among the best known are Dundee Rambler, a white with pink edges; Bennett's Seedling or Thoresbyana, a very freely-flowering fragrant white rose; and Splendens, or Myrrh-scented, white with a touch of flesh pink, with the curious scent to which it owes its name. The Dundee Rambler is one of the hardiest of roses and is recommended for use in towns or in extremely exposed situations, as well as for ordinary garden purposes.

The Boursault Rose (*Rosa Alpina*) is the type of a group of climbing roses with smooth wood. They are hardy roses, a little stiffer in growth than the Ayrshires, and all bearing flowers of shades of red and crimson. One of the best grown at present is *Inermis Morletii*, of a light rosy pink, and flowering very early. A number of varieties of the Boursault rose used to be grown, but they have one by one dropped out of cultivation to make room for new Hybrids, though they added to the interest and variety of our gardens. Another favourite rose of our grandmothers was the Banksian Rose, a native of China, and, like most Chinese natives, not really hardy, though a strong and vigorous grower. These like a wall, and a sheltered wall, if possible, partly on account of their tenderness and partly on account of their very early flowering season, as the spring frosts are apt to get at the buds and destroy them. They like a dry soil, and require careful pruning with the object of retaining as many as possible of the small twiggy branches. A good way is to confine the pruning to summer operations, shortening the shoots that have already bloomed and cutting out gross and sappy wood where it is unnecessary. The small twiggy branches will bear the greatest profusion of flowers in the following season. The fat, soft shoots which Banksian roses are apt to throw up late in the summer should always be removed unless actually wanted to extend the plant. Banksian roses are shy bloomers till well established, when they make a fine display, and are valuable from the earliness of their flowering season. The two most grown at present are *Banksia Alba*, with small double very sweet-scented white flowers; and *Banksia Lutea*, like the foregoing, but with yellow flowers. These are both vigorous growers.

*Sempervirens*, or the Evergreen Rose, is not, strictly speaking, an evergreen, though it retains in mild winters a good deal of its foliage. Two or three varieties are grown besides the type, all of them bearing very large clusters of white or light pink flowers. These roses are useful in the garden, largely on account of this evergreen tendency, and one of the prettiest ways of

growing them is to plant them beside a tree with a good length of bare stem, letting the roses climb up it, supported by rings of strong copper wire. They can be made to produce very vigorous growth by liberal manuring, but they require care in pruning, as if cut back they will produce nothing in the following year but enormously long shoots, quite flowerless. Much can be done by cutting branches completely out, but the trainer must rely more on his skill in twisting and disposing of the very flexible branches. The plants are as hardy as the Ayrshires, and do well covering banks and slopes, being allowed to trail like the Wichuraianas. *Félicité Perpetué*, one of the best of the white climbing roses, is a *Sempervirens*, with single flowers of creamy white. Another good one is *Flora*, a pale rose pink, and with it *Leopoldine d'Orleans*, white with red-tipped petals.

The section, of which the type is *Rosa Multiflora*, is now a very extensive one, including a large number of what are now known as Rambler roses. The type is a native of Japan, and the old Seven Sisters rose was an early *Multiflora Hybrid*. The class we call Rambler is new, *Turner's Crimson Rambler* being the first of its kind to create a sensation. Taking the *Multiflora* class in order, we have first of all *Aglaia*, a very vigorous climber, but one which takes its time before showing its full beauties. It has to be well established before much can be expected from it. It is a pale yellow, and a good pillar rose. Next the *American Pillar*, a deep pink rose; then *Blush Rambler*, one of the best climbing roses, blush coloured, as its name implies. After this a very pretty semi-climber, *Buttercup*, with flowers of a deep yellow in bud, and white with a lemon tinge when open. Then *Claire Jacquier*, a rather tender sort, with nankeen-coloured flowers; and the favourite of all, *Crimson Rambler*, flowering till late in the season. I have picked good flowers of *Crimson Rambler* in Hampshire in the second week in December. *Electra* is a nice pale yellow, while *Goldfinch* is deep yellow in bud, opening into a creamy flower. *Gruss an Zabern* is a white, good, like all this class, for pergola, arch or pillar; *Helene* is a curious colour, pale flesh pink, with a tinge of violet crimson. *Hiawatha* is a favourite rose, single-flowered, and bearing its blossoms until the autumn is well advanced. It is exceptionally vigorous and makes a good cover for a screen. Its flowers are deep rich crimson with a white eye. *Leuchtstern* is of much the same colour as the foregoing, with single flowers borne in good graceful clusters. *Mrs. F. W. Flight* is bright pink, while *Philadelphia Rambler* is very like *Crimson Rambler*, but of a deeper colour. *Psyche* is a pretty rose, of a rosy flesh colour, single-flowered,

while Rubin is deep crimson. Tausendschön is a pink rose, the flowers and buds shaded with carmine. It is a semi-climber, and makes a good weeping standard. Of Thalia there are two kinds, one perpetual flowering and the other not ; both are pure white, the summer flowering sort being a vigorous climber, while the perpetual is only semi-climbing at most. An early flowering kind is the Dawson Rose, pale pink. The Lion is a good deep red, and the Wallflower rosy-crimson and semi-climbing. Trier is a rose which everyone should grow. It flowers a second time in the autumn, bearing very good creamy white flowers. It is, however, only semi-climbing. With Waltham Rambler we end this class, it being a good pale rose-pink flower, and a vigorous climber.

The Polyantha roses are nearly allied to the Multifloras of which we have been speaking, being another branch of the same family. They have been developed into the group of Pompon roses, largely used in gardening as edgings and for massing. Many of them are very dainty and beautiful, producing large clusters and masses of tiny flowers, excellent for cutting. Gloire des Polyantha is a good kind, deep rose in colour with a white spot at the base of the petals, and gives a good continuous show of bloom. Perle d'Or is a good yellow, having the orange tint which we associate with W. A. Richardson, and is one of the best of this section. Anna Marie de Montravel is a nice white, but the best white in this class is undoubtedly Katherine Zaimet. Aschenbrodel is a pale peach colour, shaded with a deeper colour ; Cécile Brunner is the best blush white, with a tinge of pale pink ; and Eugenie Lamesch has flowers of a clear yellow, with red edges, very sweetly scented with a distinct perfume of violets. Frau Cecile Walter is another good yellow, its buds deep in colour, paling into light creamy yellow as they open. Georges Pernet is a yellow-shaded pink ; Kleiner Alfred, on the contrary, is red shaded with yellow, giving it a distinct appearance. Leonie Lamesch is a copper red with a yellow centre, while Jessie is clear bright crimson. A pretty polyantha is Madame E. A. Nolte, with flowers of Nankeen yellow, paling to white as they age ; Madame N. Levasseur is a nice crimson, and Maman Levasseur—known also as Baby Dorothy—is rose pink. Ma Paquerette is a pretty little white rose. Good pinks are Marie Pavie, pale tinted with a deep rose, and Mignonette, a true clear rosy pink ; Mrs. W. H. Cutbush, bright pink shaded with a deeper tint ; Petit-Constant, a very sweet-scented rose, with salmon pink flowers and orange buds—a very pretty little rose—and Philippine Lambert, a silvery pale

pink. *Perle des Rouges* is a gay little rose, with flowers of bright cherry-red, and *Schneewittchen* is an ivory white. The *Polyanthas* need little pruning, and are always in bloom.

A rose which stands by itself in a class apart is the Scotch Perpetual, or Stanwell Perpetual, a descendant of the little wild Scotch Rose (*Rosa Spinossima*). These Scotch roses are extremely hardy, being natives of a naturally cold climate, and do not demand a very good soil in which to flourish. They require very little pruning, the necessary cutting out of dead wood required to keep the tree tidy and shapely providing all that is necessary. The Stanwell Perpetual is a very sweet white rose, and has a very long flowering season, beginning in May and blooming right on until November. Its flowers are tinged with blush pink, and altogether it is a most useful rose.

The last class with which we have to deal is that of the *Rugosas*, the Japanese roses. These roses are very different in character from the ordinary garden rose, the stems and leaves being exceptionally firm and vigorous, the stems covered thickly with strong spines, and the finely-coloured fruit forming a most attractive feature in autumn. The original varieties were a red and a white, but the class has, owing to its many good points, not the least of which is its tolerance of towns, received a good deal of attention, with the result that many pretty varieties are now grown. The first two parents were single-flowered, but with cultivation some varieties are more or less double, though this feature is always rather uncertain. Besides the white and red we now have *Atropurpurea*, a very deep dark crimson, the richest in colour of all the *Rugosas*; *R. Repens Alba*, a creeping white form, good for weeping standards; *Rugosa Rubra*, a deep rose colour with shadings of violet, an importation from Japan, and a good town rose; *Blanc Double de Coubert*, a sweet-scented white double form, also good for town growing; *Delicata*, a nice soft rose colour, a good sort for growing as an isolated bush; *Fimbriata*, a very dainty white, tinged with pink, with petals fringed at the edges, and fragrant; and *Madame Georges Bruant*, a good white semi-double.

The *Rugosas* should be pruned very severely in February, and a good method of doing this is to cut the whole plant nearly down to the ground each year, giving a fine show of rather late blooms. Where this is too heroic, the strongest of the good young shoots from the base should be selected and cut back to about four feet, which shoots will the following season break freely from the heads. These roses are for ever sending out new growths from the base, so that the bushes seldom get straggly and naked.



**LAYING OUT THE ROSE GARDEN.**—When we speak of laying out the rose garden it must not be imagined that the chapter is one for the owner of the large garden alone. A rose garden, with all the characteristic beauties of a rose garden, is within the reach of almost all garden owners, except perhaps those unlucky ones who have to “make do” with the environment of a town. Even these may have some hope, for though a rose garden, properly speaking, is almost impossible in town conditions, yet there are many varieties of the rose which, with reasonable care, will tolerate towns, and will live and flourish well. Still, the real rose garden is only possible in pure air, where with sunshine, care and love, most roses may be made to flourish almost anywhere.

Soil and situation are two things which must be studied in growing good roses. Many amateurs are much discouraged by the old theory, often dogmatically stated, that roses will only grow in a heavy rich clay soil. This is a mistake. Roses may be made to grow on a variety of soils, perhaps the only one in which the attempt is doomed to failure being pure sand, or nearly so; such soil as is found in some parts of the East Coast, where shelter belts of firs and other trees have to be planted in order to keep the very soil itself from blowing away. Where the only available spot is situated on such soil as this the gardener had better, as one eminent rose-grower remarks, “stifle his impulses, change his object of worship, and devote himself, according to the extent of his holding, to hyacinths or partridges.”

The very best of all soil for roses is a deep stiff loam, and soil is better or worse for most roses according to the proportion of such loam that they contain. The worst soil for roses, after the afore-mentioned sand, is the black soil of the town garden, very porous, and over-full of organic matter. Peaty soils, if rich in character, are quite good for roses, a general rule being that the more gravelly or sandy a soil the less favourable for the rose. An essential for good rose soil is that it should be well drained, and this means a substratum of porous material, chalk or gravel, not many feet below the surface. Good wheat-growing soil is good rose-growing soil.

Real clay land differs very much in its fertility, and the mere fact that land is clayey does not necessarily mean that it is land suitable for rose-growing. The celebrated roses of Colchester are grown in a rich and buttery yellow clay differing widely from the poor blue shaley clay of parts of Sussex. The chief disadvantage of even the best clay soil is the difficulty of working it, as in wet weather practically nothing can be done

with it, harm being done by merely walking on the surface. Where the unlucky rose-grower is faced with the problem of planting in such a soil, in a time of year when wet weather is almost certain, he has a bad time in trying to carry out the directions of the expert in rose-planting. How is he to provide that powdery soil with which he should theoretically cover the fine rootlets and fibres of his roses, when his land is all in much the condition of potter's clay ready for working? Drainage in such a soil is a matter of continual worry and expense, and the task of keeping the surface well broken up with the hoe, one of the most important of the points in rose-growing, is impossible through half the year. The first thing to do when such a soil is to be dealt with is to lighten it in some way, and thus to make it more tractable. A mechanical alteration of the texture of the clay should be aimed at, and such things as leaf-mould, vegetable refuse, long manure, sand and grit should all be added in quantity, while an excellent addition is the clay itself, burnt and broken up. Mr. Foster-Melliar describes this process in detail, and his method should be carefully followed. A large collection should be made of all rubbish that will burn slowly—vegetable refuse, weeds, rotten wood, old stumps, rose clippings, and so on—but nothing, except just the kindling required to start the fire, that will burn quickly. Two or three large old roots that will burn a long time should be placed in the middle, and the heap arranged with a mixture of fairly inflammable and damp materials, that the fire may smoulder without going out or breaking into bright flame. In and upon and around this heap, when it is once well alight, should be placed the clay. This clay will need constant replacing and removal, and the fire must be well watched to see that it keeps its right strength and dull heat. The object is to burn the clay black, not to burn it red like pottery, as although the red brick-like clay has its good points as a mere disintegrator, the black, charred stuff has also a great manurial value, while its value as an alterator of texture is just as high. This burned, or rather charred, clay is broken up and dug into the heavy land, and if thoroughly done will greatly improve it. The effect of a clay soil on roses is to cause them to grow good strong long roots, but to make little fibrous root, the latter being the most useful from the point of view of the grower. It is, therefore, a good plan, when putting roses into this heavy soil, to keep a little good soil of a lighter character, such as the top soil of an old garden or a mixture containing a good proportion of leaf-mould, to place in contact with the roots when planting, and at the same time to choose plants which have been grown in a light soil, and which

are therefore likely to have made already a good mass of fibrous root. Roses for this class of soil should be of the Dog-rose stock.

Good clayey loam, with a tendency to adhesiveness, is perhaps the ideal soil for roses, but it must be thoroughly drained. A sub-soil of stones, chalk or gravel will do this effectively, but if these are not present artificial drainage must be resorted to. Roses will never do in a water-logged soil. Such a loamy soil ought to be good for at least two feet down, and should of course be thoroughly well prepared before planting.

Gravel has had a bad reputation for roses, but it is not altogether deserved. It is usually considered too dry and hot for roses to thrive in, but really, if a little care is taken to improve it, it will grow very good roses. Tea roses, for example, bloom in perfection on a gravel soil, and many of the briars and the newer hybrids enjoy just such a light dryish medium. Above the gravel in most gardens there is a layer, more or less deep, of fairly fertile soil, generally a good spade's depth, and in preparing the soil for roses this should be lifted and heaped aside, for it is very good for encouraging the formation of fibrous roots, and should be used in planting to come into actual contact with the plants. The gravelly sub-soil should then be clean removed for about a couple of feet from the surface, and its place filled with a good fibrous loam. Although this seems a heavy undertaking, it is practically done once and for ever, for with proper attention and manuring it should not need replacing. Some of the original surface soil should be mixed with the upper layer of this new loam. When this process is completed and the new soil well mixed and enriched, a rose bed so constructed can hardly be beaten, as it is not only well drained at the bottom but also at the sides. Such elaborate preparation as this is only necessary where Hybrid Perpetuals and perhaps the old Damasks and summer-flowering roses are to be grown. Where Tea roses are the aim of the grower far less trouble is called for. Tea roses do not mind a lightish soil, and they rather enjoy an admixture of fine stones and grit. In such a case the gravel soil at the bottom of the bed should be replaced by a good rich manure, and round the plants the poorest gravel should be removed and manure well and liberally incorporated with what remains. A little heavy loam may be added if obtainable, though it is not really essential. In such a soil excellent Tea roses may be grown; in fact Mr. Foster-Melliard says that a certain bloom of Tea rose, *Madame Cusin*, with which he gained the Crystal Palace medal in 1893, was grown in a disused gravel pit, where stones had been removed for the high road. The pit was refilled with the siftings, and levelled; and in this

soil, unaltered save by cultivation and manure, the above bloom and many other excellent Tea roses were grown. The dryness of gravel soils is best dealt with by additions of leaf-mould, while during the summer and all hot weather the surface should be kept well mulched with manure to check the naturally excessive evaporation.

Chalk, providing that it is deep enough below the surface, and that there is a good depth of soil on top, is not a bad sub-soil. It is well drained, and not too dry in hot weather. Where it is very close to the surface it is bad, and needs a lot of work and preparation if it is going to grow good roses. Eighteen inches of decent loam is the minimum for roses on chalk, and where the loam is shallower than this special places must be prepared for the plants and extra soil supplied. The treatment of the existing soil depends on its nature—gravel, sand, clay, or loam. It may be any of these. Where roses are to be planted in a shallow soil over chalk, holes should be dug a couple of feet deep and of a good width, and the chalk broken up well with a mattock at the bottom of the pit. This latter should then be filled in with compost of meadow loam, leaf-mould, and farmyard manure. The surface soil should be used round the rose roots, mixed with some loam if it is poor or sandy. Sand is, as I have said, impossible unless it is naturally mixed with a good proportion of loam. Where this is the case, and where labour and manure are plentiful, something may be done, at least in the growing of Teas and other sorts which tolerate rather dry, hot soils. In all light, dry soils the use and value of top dressings of manure can hardly be too strongly insisted upon.

The question of soil having been discussed, that of situation becomes the next pressing problem. Roses like shelter, and they like an open situation, and the problem is how to provide both. Roses dislike wind, although they like fresh air, and hate to be shut in by big trees. The spot to look for, then, is one sheltered from frosts and violent winds, and not close to high hedges or trees. Where the hardier kinds of rose, the Briars and their many Hybrids, are concerned, the question of exposure is not so important, but it is essential in the case of the Hybrid Perpetual and Teas. Shelter is desirable from north and east winds, and if there is room for choice, the rose garden should be on the highest part of the available land, other conditions of soil and shelter being equal. "Frost falls," as the country people say, and where the roses are planted on a slope let the more delicate kinds be at the top. Wind is very damaging to roses, not only in the matter of spoiling blooms—that is, except to the exhibitor,

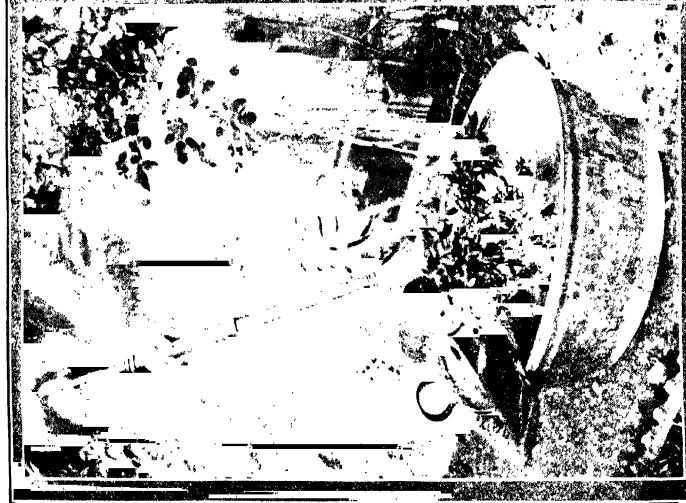
a comparative trifle—but unless great care is taken the operation of budding is a risky one in an exposed garden, as when the young head of foliage gets fairly strong and heavy it is often blown clean out of the stock by a sudden gale of wind. It takes a full year for a budded rose to be safe on its stock, and until it has been pruned in the spring following the budding it must be kept carefully tied to a strong, firmly-planted stake to prevent ruin to the young plant.

A situation sheltered by fairly thick and high hedges from south-westerly gales should be chosen if possible, though these hedges should be at a safe distance from the rose beds, as their roots must not be able to steal nourishment from the rose plants, nor must they themselves be able to shadow the beds. All walls should be taken advantage of; though, except in cold districts, walls facing due south are rather too hot for most climbing roses. They act as a forcing medium, and exhaust the rose so much by a rush of flowers for a short period that it is left too weak to do much at the time of autumn bloom. When planting near trees a rough guide to a safe distance for the rose trees, to be out of reach of robber roots, is a radius from the trunk of the tree equal to the tree's height. A little more than this should, if possible, be allowed in the case of some trees, elms in particular.

Having chosen our site and dealt roughly with our soil in preparation for the rose plants, the next step is the actual planting. Early November is the best time of all for this operation, though it may be done right through the winter—should conditions be favourable—until the end of March. Roses should be ordered from the nurseries in September or October, so that the purchaser may have a reasonable chance of a good selection. If ordering is left too late the nurseryman is often unable—even with the best will in the world—to supply first-class specimens, as these will all have gone off in early orders. The rose bed should be prepared well in advance of the arrival of the plants, so that they may be got in with the least delay possible. This preparation is most important, as without it it is impossible to grow good roses.

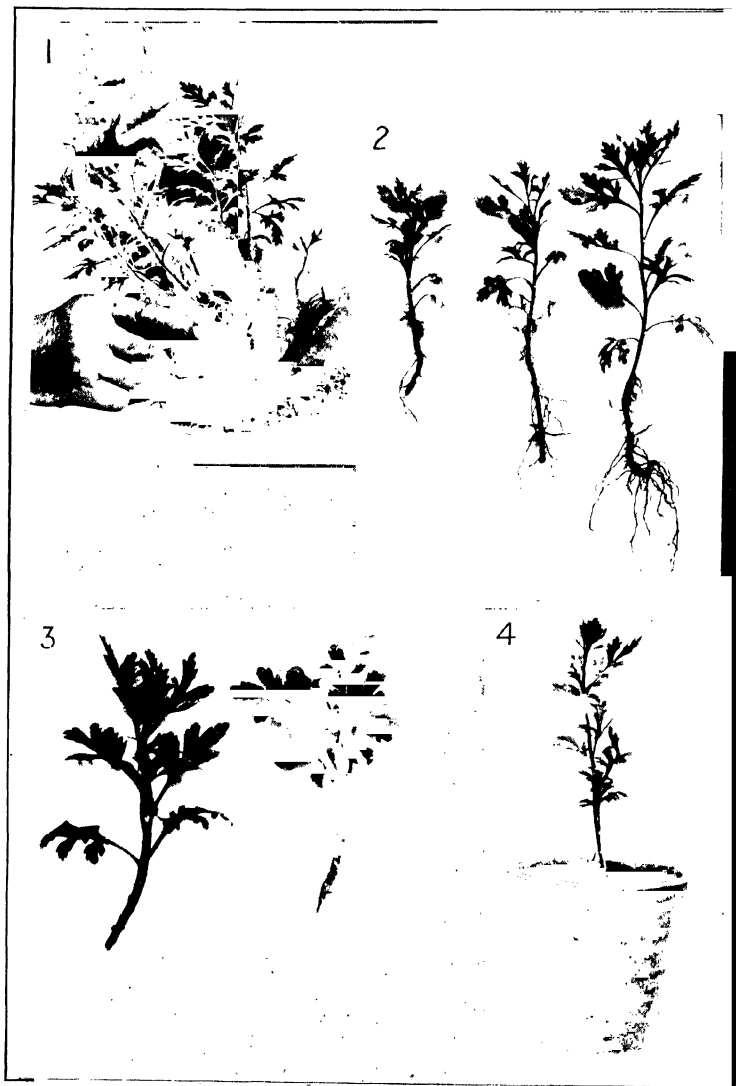
First, the soil must be thoroughly broken up to a depth of at least two or three feet. Next, the soil must be thoroughly well drained. Without this precaution no care is of any use. Before the roses arrive the soil should be re-turned to a depth of about eighteen inches, and a good allowance of manure incorporated with it. The lowest layer of soil in the bed should consist of rich, fairly retentive soil, which will hold a certain

No. 19. WATERING



1. Syringing a pot plant. 2. Syringing a rose tree, showing joint on syringe spraying under tree.

No. 20. CHRYSANTHEMUMS



1. Breaking off shoots from the root. 2. Specimen shoots, broken off.  
3. Specimen shoots, cut away. 4. Shoot planted for forcing.

amount of water, while the upper layers should be lighter and more friable, to encourage the plants to produce plenty of good fibrous roots. A week or two should elapse between this final digging and the planting, that the soil may settle together. The rose-grower will hope that his plants may arrive during a spell of good open weather in the early part of November. He has then ideal conditions for planting, and should lose no time in getting the roses in. If, however, he has not this good fortune, and the plants arrive in a spell of frost, he must see to their welfare until such time as conditions favour him. In such a case the roses should not be unpacked, but should be placed, wrapped as they should be in straw and sacking, in a cellar or some building where they will be cold but yet protected from frost. A heated place will not do. At the first break in the frosty weather, just so many as can be dealt with at one time should be unpacked and planted, or at least "heeled in." The National Rose Society gives some useful hints as to the treatment of freshly-arrived roses. The plants on their first reception should be unpacked with care, so that in separating the roots none of them or of the shoots may be broken off or injured. Any that are found so injured or are injured during the process should be cut clean off. A shallow trench should be dug for their reception in any convenient spot, and the roots at once placed in at right angles to the line of the trench, keeping as far as possible the different varieties distinct, so that when wanted any plant may be found without disturbing the others. The roots, as well as the lower parts of the stems, should then be covered with soil. It will be found a good plan to pour some water over the roots, and also to sprinkle some over the shoots before filling in the trench. If, owing to delay in transit or any other cause, the bark on the shoots presents a shrivelled appearance, a deeper and wider trench than that required for "heeling in" the roses should be opened, and the entire plants placed lengthways in the trench. They should receive a good soaking with water, and be covered completely with soil. After being left for three days the shrivelled look will have disappeared and they should then be planted.

During the actual process of planting it is important that the roots should not be allowed to get dry, and to this end they must not be exposed to sun or wind. Just as many as are needed at the moment should be taken from the trench and brought to the place of planting. They should then be covered with a piece of matting, from which they can be taken as required. The holes should have been already dug, from a foot to eighteen



inches square and deep enough where bush roses or dwarfs are to be planted, for the point of junction of the scion and the stock to be covered when planted to a depth of about an inch. Where standard roses are being planted the holes should be about six inches deep. The selected plant should be taken from under the protecting matting and either dipped bodily in a pail of water or liberally sprinkled. It should then be held upright in the hole with the left hand, while the right separates and spreads out with great care the roots and rootlets at the bottom of the hole. This part of the process is of an importance quite disproportionate to its apparent use. Where any bruised roots are found at this stage they should be cut away with a sharp knife. When the rootlets are disposed evenly a layer of finely-sifted soil is sprinkled over them so as just to cover them and keep them in place, and over this again is laid about three or four inches of good friable soil, which should be trodden firmly down. The hole is then filled in and well trodden once more. This matter of treading-in is one in which judgment must be used, in order to get the roses firmly planted without, in the case of heavy, sticky soils, kneading it into hard clods. Where the natural soil is of such a sticky nature some light soil containing plenty of grit should be used under and above the roots. It is good for root formation, while it will help to prevent caking. As rose after rose is planted the soil which has been trodden in during the process should be very lightly forked over on the surface, so that the top soil may be left porous and open.

Roses of very vigorous growth—Climbing and Pillar roses, Wichuraianas and Ramblers—require more room for root formation than do the kinds which are pruned back each year. If they are cramped for root space they will not have that healthy vigour which should be their characteristic. They will need holes of at least two feet square and two feet deep, and do well in soil thoroughly enriched with manure.

All roses should be staked at the time of planting, and in doing this risk of injury to the roots must be guarded against. This is best done by driving the stake firmly into the middle of the hole before the rose is planted, the earth being filled round roots and stake together. In this way the stake is made still firmer, and it cannot harm the rootlets. The roses should be tied firmly to the stakes with soft string or raffia. Bush roses will not need staking. It is well to go round the rose garden at once after heavy wind, re-tying all roses that have broken away and keeping a careful look-out for broken stakes. If any are snapped off it will probably be close to the ground, and the weight

of the stake will be supported by the rose instead of *vice versa*. It is essential when this has happened that the old stake should be removed entirely, as well as a new one substituted. If the end of the old wood is left in the ground it will often serve as the starting point of fungoid growths which are extremely injurious to the rose. On the other hand, the disturbance to the roots caused by the removal of the stump from the very middle of the delicate rootlets seems as if it would be still more harmful. The best way to remove the stake with the least injury to the plant is to grip the end of it projecting above the soil with the tips of a pair of garden shears, preferably not very sharp ones, and to lever out the stub with a steady pull, as one would draw a tooth. This accident may be prevented to a great extent if proper care is taken at pruning time every year to see that the stakes are in good condition. They could be cut loose from the rose-tree and pulled straight out of the ground; held by their tops and smartly struck on the ground to see whether they break off. If they stand this test they will do for another year, but the decayed ones will break off at the spot level with the surface of the soil. The best stakes for roses are stout bamboos; they do not rot nearly so quickly as other forms of stake, and their smooth surfaces give no harbourage to insects or fungi.

Labelling should be done at the time of planting, though it is sometimes necessary to label temporarily at that time, leaving the permanent labelling to a less busy moment. For this temporary labelling the little white wooden painted labels used for pot plants are good enough, but they are useless as permanent marks. Those labels are best which are not actually attached to the plant, but stand independently of it, and a good form is a permanent metal label attached to a galvanised wire support about a foot long. The embossed metal labels which can now be bought are very lasting and are always legible. Naturally, where several plants of the same variety are placed together, one only among them needs labelling.

PROTECTION OF ROSES DURING WINTER.—Some of the more delicate roses will need a certain amount of protection through the hardest part of the winter, although they may do very well out of doors on the whole. Some roses, too, need protection when grown as a bush or standard, while they will look after themselves very well on a wall. Certain kinds, too, such as the Teas and the Noisettes, will need protection for the first winter after planting, if only to avoid injury during actual frost. Where the plants are dwarfs all the protection needed will be a little soil drawn over the centre of the plant to a depth of four or five inches,

this being enough to save the important parts of the plant, though the latter may be a little set back through damage to the ends of the shoots. Dry bracken and straw are useful to place among the branches for protection also. Standard roses of delicate sorts are best protected by tying straw or bracken sprays in among the heads, the protecting material of whatever sort being attached firmly to the stake, not to the rose-tree. Another method is to tie all the shoots firmly to a central stake, and to thatch the whole head with straw or bracken.

**PRUNING ROSES AFTER PLANTING.**—When roses are planted during the autumn and winter months their first pruning should be left until the spring, but when spring-planted it should be done at the time of putting in. The trees should be gone over carefully and all dead wood cut clean out, together with weak and sappy, unripened wood, and any shoots which have received injury. Standards should then be cut back to within about four inches of their union with the stock, bush trees being dealt with a little less severely, having about six inches of every shoot left above the ground. This, to the beginner, will seem severe enough, but he will be rewarded by strong growth later on. This pruning is only meant to be carried out the first time after planting. The subsequent treatment varies with the variety.

**PRUNING ROSES.**—The rose is a plant which makes new wood each year from buds distributed nearly all over the plant, not, as is the case with certain trees, at the ends of the twigs only, but all down the branches and even right to the base of the main stem itself. These new buds and the young vigorous shoots which grow from them, deflect the sap and nourishment from the wood above them. This latter consequently becoming weaker and weaker, bears fewer flowers each season, and eventually dies. The process may be seen going on in all its stages in a well-grown wild-rose bush, in which nature has been left to her own course. The object of the pruner, therefore, is to remove each year such of the old wood as is worn out and valueless, while leaving selected young wood to bear the blooms. It is in the selection of this young wood that the art of the pruner lies. It is obvious that the amount of wood removed must vary both with the variety of rose dealt with and with the result required from the plant. Where a rose is required to cover a wall, trellis, or pergola, it is clear that the less of the tree removed by the pruner the better, and the better will the rose cover the surface. On the other hand, roses are often grown as standards and bushes, or even on small walls, and in these cases the young

wood as well as the old will require keeping in check if the shape and size of the plant are to be preserved. Rose trees, again, will sometimes become so profuse in their production of young wood that the whole plant becomes choked, and the wood and leaves have an insufficient supply of light and air. In all these cases the pruner must exercise his judgment in the removal of both old and young wood, always keeping in his mind the result that he wishes to produce. Where his object in cutting away young wood is to let light and air into his bush he must cut away shoots which rub against each other and crowd each other, and should select this young wood with an eye to free circulation of air and sunlight. Where he is pruning largely to keep his bush in shape, he must consider the direction, not only of the existing wood, but of the shoots which will spring from that wood, and must cut back his branches to a bud which points in the direction in which he desires the young shoot to grow. Properly speaking, there are two sections in the operation of pruning; pruning proper, which means the dealing with the shoots selected as the bearers of next year's flowers, and thinning, which includes all the removal of dead wood, weakly growths, and straggling branches. In pruning proper the grower must decide before beginning his task exactly what he is aiming at. If he wishes to grow exhibition blooms he must be severe to an heroic extreme. There are few beginners who would not feel a qualm when they first cut down their most valued and cherished roses almost to the ground level. Yet this must be done if really fine blooms are to be produced, for the more the plants are cut back in the spring the better and more vigorous will be their summer growths. This maxim is not, of course, any more than others, of universal application. There are some varieties of the rose which require less shortening than others, but the amateur who is going in for rose growing for exhibition will have to make a thorough study of the sorts which he elects to grow, their likes and dislikes. Where it is only desired to grow ordinarily good roses for garden decoration and cutting, the plants do not need such severe pruning. Most of them need thinning out of the crowded shoots and the removal of dead wood, with young wood left as far as may be without spoiling the shape of the tree. Climbing roses, in particular, may be left to take care of themselves to a great extent.

A distinction must be made between "cutting back" and "cutting out." The former operation means the cutting of the shoot operated upon back as far as a previously selected bud, from which it is desired that a shoot shall spring in the next

season to renew the tree. This bud is selected because it points in such a direction that it will fill, as it shoots, a space in the tree for which it is designed by the pruner. Cutting out means the complete removal of a shoot or branch, and must be done by removing the desired wood right from its starting point on the stem or main branch. No bud must be left, or it will shoot. It is during the first few years of the life of the rose-tree that its main shape is decided, so that care is needed in the selection of shoots, or the shape of the bush may be permanently spoiled.

The first pruning, as has been said in the section devoted to planting, must be severe, and at this time even climbing roses, which later on need no cutting back at all, must be pruned nearly down to the ground.

Although the pruning of the various varieties of rose differs with the habits of the individual variety, there are certain rough rules which apply to all. Dead shoots and dead wood should always be removed clean from the base, together with very soft sappy wood which has not ripened properly during the previous year. The shoots designed to bear the summer crop should be cut back to an outward pointing bud. The summer-flowering roses, which bloom only once in the year, need to have their shoots shortened according to their age, the young wood being almost untouched, the two-year-old wood being slightly shortened, and the three-year and older wood being sternly cut back or even cut right out. This rule applies to almost all the "old-fashioned" garden roses, the Damasks, the Provence roses, and the Moss roses. Perpetual flowering roses will bear hardier pruning than the summer-flowering kinds, and over-pruning will do them no worse harm than putting back the flowering season.

The time of pruning roses differs with the variety. Hybrid Perpetuals, both dwarf or bush, as well as standards and Hybrid Teas, are pruned during March, bush and standard Teas and Noisettes during April, while the climbing roses, Hybrid Perpetuals, Hybrid Teas, Teas, and Noisettes should be looked over twice in the year, being well thinned as soon as they have flowered in the summer and pruned properly in March.

The roses under general cultivation may be roughly divided into classes for purposes of pruning, and they will be dealt with in these classes hereunder. The first with which we are concerned is that of the Hybrid Perpetuals, Hybrid Teas, Teas, and Noisettes, which require hard pruning. For exhibition purposes these roses, which are weak growers, should be cut well back when pruned; all dead, unripe, and weak shoots being cut clean out, and the centre of the plant thinned well to allow good room

for new growth. The strong, well-ripened last year's shoots which are left after the completion of this process should be cut back to not more than four buds from their bases. The plants will need going over in May or thereabouts as soon as flower-buds show; when any surplus shoots, especially those which have come "blind" and flowerless, should be removed, either with a sharp knife or the fingers. For general garden purposes, where blooms are not required to be so perfect as for exhibition, the process is a little different. The first processes are the same, the plant being thoroughly cleansed from dead and weakly wood, but the subsequent shortening of the selected shoots should be less severe, from four to six or even more buds being left, and more of the basal roots being allowed to remain than when pruning for exhibition. The shape of the plant is of more importance when the rose is grown for general decoration, and this should be borne in mind. The roses for which this treatment is suitable are Adam, Alice Furon, Baldwin, Beryl, Bruce Findlay, Beauté Lyonnaise, Belle Siebrecht, Black Prince, Boadicea, Cheshunt Scarlet, Charlotte Guillenot, Cleopatra, Comtesse de Paris, Comtesse de Saxe, Countess Annesley, Corinna Countess of Derby, David Harum, Devoniensis, Duke of Albany, Duke of Fife, Edith d'Ombraïn, Elaine Greffelhe, Ernest Metz, Ethel Brownlow, Ethel Richardson, E. Y. Teas, Farben Koenigin, Ferdinand Jamain, Franz Deegen, Georges Schwartz, Golden Gate, Goldquelle, Gustave Piganeau, Harrison Weir, Helen Keller, Helene Welter, Horace Vernet, Instituteur Sirdey, Ivory, La Faricheur, Lady Battersea, Lady Faire, Lady Helen Vincent, Lady Mary Fitzwilliam, Lady Rossmore, Le Havre, Le Progres, Lena, Luciole, Ma Capucine, Madame Constant Soupert, Madame Leon Pain, Madame Philippe Rivoire, Madame René Gerarde, Maid of Honour, Marchioness of Downshire, Marchioness of Dufferin, Marie Isakoff, Marie Verdier, Marquise de Sinety, Marquise Litta, Meta, Mildred Grant, Miss Ethel Richardson, Monsieur Furtado, Monsieur Noman, Mrs. Conway Jones, Mrs. David McKee, Mrs. Harry Turner, Mrs. W. J. Grant, Muriel Grahame, Nellie Johnstone, Niphetos, Oberhofgartner Terks, Papa Lambert, Princess Beatrice, Queen of Queens, Renée Wilmart-Urban, Reynolds Hole, Richmond, Robert Scott, Rose d'Herbeys, Safrano, Salamander, Souvenir d'Elise Vardon, Souvenir d'Hélène, Souvenir de J. B. Guillot, Souvenir of Stella Gray, Sultan of Zanzibar, Sunrise, T. B. Haywood, Tennyson, Ulster, Victor Hugo, Victor Verdier, White Lady, Xavier Olibo.

The Hybrid Perpetuals, Hybrid Teas, Teas, and Noisettes,

which require moderate pruning, are the next class. These should have the dead unripe and weak shoots cut clean away, as in the last instance, both for general and exhibition purposes. For both purposes, also, the shoots which cross or may cross when full grown, should be cut out, the plant never being allowed to get crowded in the middle. The strong, well-ripened last year shoots which are left should be cut back, if for exhibition blooms, to from four to five eyes, if for garden decoration to from six to eight. Exhibition plants will again need attention in May, as in the last class. This class includes Abbé Gorsute, Admiral Dewey, Aimée Cochet, Alba Rosea, Albert Stopford, Alfred Colomb, Alfred K. Williams, Alice Grahame, Alice Lindsell, Alliance Franco-Russe, Alphonse Soupert, Amateur Teyssier, Amazone, Angela Welter, Anna Jung, Anna Olivier, Anne-Marie Soupert, Antoine Rivoire, Apotheker G. Hofer, Auguste Rigotard, Aurora, Bacchus, Baron de Bonstetten, Baron de Hoffman, Baroness Rothschild, Baronne Ada, Barthélemy Joubert, Beatrix Comtesse de Buisseret, Beauté Inconstante, Beauty of Waltham, Belle Capricieuse, Ben Cant, Betty, Betty Berkeley, Bladud, Bob Davidson, Bridesmaid, Camille Bernadin, Camoens, Captain Christy, Captain Philip Green, Caroline Kuster, Catherine Mermet, Celia, Chameleon, Charles Darwin, Charles Gater, Chateau de Fléchères, Cherry Ripe, Christine de Noue, Clara Watson, Comte de Wallis, Comtesse de Dardi, Comtesse de Ludre, Comtesse de Nadaillac, Comtesse d'Oxford, Comtesse Festetics, Hamilton, Comtesse Riza du Parc, Conrad Strassheim, Cooling's Crimson bedder, Corallina, Corona Countess of Gosford, Countess of Pembroke, Crown Prince, Dainty, Daisy, Danmark, Dean Hole, Domkapitular Dr. Layer, Dorothy Page-Roberts, Dr. Andry, Dr. Felix Guyon, Dr. Grill, Dr. J. Campbell Hall, Dr. Sewell, Dr. William Gordon, Duc de Rohan, Duchess of Bedford, Duchess of Edinburgh, Duchess of York, Duchesse de Morny, Duchesse de Vallombrosa, Duke of Connaught, Duke of Wellington, Earl of Dufferin, Earl of Pembroke, Earl of Warwick, Edith Turner, Edmée et Roger, Edmond Deshayes, Edu Meyer, Elise Fugier, Elizabeth Barnes, Elizabeth Kitto, Ella Gordon, Ellen Drew, Emilie Gonin, Empress Alexandra of Russia, Enchantress, E. T. Cook, Etienne Levet, Etoile de France, Etoile de Lyon, Eugene Appert, Eugene Furst, Eugenie Verdier, Exposition de Brie, Exquisite, Fairy Queen, Ferdinand Bate, Ferdinand de Lesseps, Fisher Holmes, Florence Tron, Fortuna, Francisca Kruger, François Dubreuil, François Louvat, François Michelon, Frau Geheimrath von Boch, Frau Lilla Rautenstrauch, Frau Peter Lambert, Friederich Harms, Friquet, Fusion, Gabrielle,



ROSE (RAYON D'OR).





General Gallieni, General Jacqueminot, General McArthur, George Laing Paul, Gertrude, Gloire Lonnaise, Goldense, Gottfried Keller, Grand Duc A. de Luxembourg, Grand Duchess Victoria Melita, Gustave Sorby, Haileybury, H. Armytage Moore, Harry Kirk, Heinrich Schulteis, Helena Cambier, Helene Guillot, Hon. Edith Gifford, Hon. Ina Bingham, Hugh Watson, Innocent Pirola, Irene, Irish Beauty, Irish Elegance, Irish Engineer, Irish Glory, Irish Harmony, Irish Modesty, Irish Pride, Irish Star, Isabella Sprunt, Jacques Fould, Jacob's Perle, Janet Lord, J. D. Pawle, Jean Ducher, Jean Soupert, Jeanne Buatois, Jeanne Phillipe, Jeannie Dickson, John Stuart Mill, Joseph Hill, Josephine Malton, Jubilee, Kaiserin Augusta Victoria, Kathleen, Killarney, Koenigin Carola, La Rosière, Lady Arthur Hill, Lady Ashtown, Lady Clanmorris, Lady Mary Corry, Lady Moyra Beauclerc, Lady Quartus Ewart, Lady Roberts, Lady Wenlock, Laure Wattinne, Laurence Allen, Laurent Carle, Liberty, Ligne Arenberg, Lina Curtis, L'Innocence, Louis van Houtte, Louise Müller, Lucie Faure, Lucy Carnegie, Lyon Rose, Mabel Morrison, Madame Abel Chatenay, Madame Ada Carmody, Madame A. Hewetson, Madame Alfred Sabatier, Madame Badin, Madame Berkeley, Madame Berthe de Bary Zahony, Madame Bravy, Madame Cadeau Ramy, Madame Charles, Madame Charles Crapelet, Madame Charles de Luze, Madame Chedane Guinoisseau, Madame C. P. Strassheim, Madame Curin, Madame Derepas-Matrat, Madame de Sertot, Madame de Wattville, Madame Durand, Madame Edmée Metz, Madame Eugenie Verdier, Madame Eugenie Bouillet, Madame Falcot, Madame Felix Faure, Madame George Paul, Madame Haussmann, Madame Hippolyte Jamain, Madame Hoste, Madame Jenny Guillemot, Madame Jules Grolez, Madame Lambard, Madame Louis Poncet, Madame Margottin, Madame Melanie Soupert, Madame Paul Olivier, Madame Pernet-Ducher, Madame Ravary, Madame Renée de St. Marceau, Madame Roudillon, Madame Steffin, Madame Vermorel, Madame Viger, Madame Willermoz, Mdlle. Simone Beaumez, Mdlle. Yvonne Gravier, Mdlle. Pauline Bersez, Mamie, Marchioness of Londonderry, Marchioness of Lorne, Margherita di Simone, Marguerite Guillot, Marguerite Poiret, Marie Baumann, Marie Christina, Reine d'Espagne, Marie Corelli, Marie Croibier, Marie Finger, Marie Louise Poiret, Marjorie, Mark Twain, Marquise de Castellane, Marquise de Vivens, Marquise Jeanne de la Chataigneraye, Ma Tulipe, Maurice Barnadin, Medea, Merrie England, Merveille de Lyon, M. H. Walsh, Milton, Miss Willmott, Monsieur Boncenne, Monsieur Bunel, Monsieur Paul Lédé, Morning Glow, Mrs. Aaron Ward, Mrs. A. Byass, Mrs. A. Hewetson, Mrs. Cocker,

Mrs. Edward Mawley, Mrs. E. G. Hill, Mrs. Frank Cant, Mrs. F. W. Sanford, Mrs. Harvey Thomas, Mrs. James Wilson, Mrs. John Laing, Mrs. Jowitt, Mrs. Myles Kennedy, Mrs. Oliver Ames, Mrs. Peter Blair, Mrs. R. G. Sharman-Crawford, Mrs. S. Treseder, Mrs. Theodore Roosevelt, Muriel, Narcisse, Nelly Briand, Oberhofgartner A. Singer, Olympiada, Oscar Cordel, Papa Gontier, Papa Reiter, Paul Neyron, Paul's Early Blush, Paul's Royal Scarlet, Perle des Jardins, Perle des Jaunes, Perle von Godesberg, Pharisaer, Pie X, Pierre Notting, Pierre Wattinne, Pride of Waltham, Prince Arthur, Prince Camille de Rohan, Prince de Bulgarie, Prince Theodore Galitzine, Princess Bonnie, Princess Charles de Ligne, Princess of Wales, Princesse Sagan, Princesse Marie Mertchersky, Queen of Spain, Queen of Sweden and Norway, Queen Olga of Greece, Rainbow, Raoul Chauvry, R. B. Cater, Red Dragon, Reichsgraf von Kesselstadt, Rev. Alan Cheales, Rev. David R. Williamson, Roger Lamberlin, Rosomane Gravereaux, Rose d'Evian, Rosiériste Jacobs, Rosslyn, Royal Scarlet, Rubens, Salmonea, Sappho, Senateur Belle, Senateur Vaisse, Sheila, Shirley Hibberd, Sir Garnet Wolseley, Sir Rowland Hill, Socrates, Souvenir de Anne Marie, Souvenir de Camille Godde, Souvenir de Catherine Guillot, Souvenir d'Emile Peyrard, Souvenir de Gabrielle Drevet, Souvenir de Jean Ketten, Souvenir de Madame Eugenie Verdier, Souvenir de Mdlle. Marie Drivon, Souvenir de Maria de Zayas, Souvenir de Marie Zozaya, Souvenir de Pierre Notting, Souvenir de R. Terrel des Chenes, Souvenir de S. A. Prince, Souvenir de Thérèse Levet, Souvenir de William Robinson, Souvenir de Président Carnot, Souvenir d'un Ami, Spenser, Star of Waltham, Sulphurea, Sunset, Suzanne Marie Rodocanachi, Sweet Little Queen of Holland, Sylph, The Bride, The Queen, Tom Wood, Triomphe de Pernet Père, Valentine Altermann, Vicomtesse R. de Savigny, Violette Bouyer, Violiniste E. Leveque, Viscountess Folkestone, Waltham Standard, Warrior, White Baroness, William F. Bennett, William Notting, William Shean, Yvonne des Buffards, Yvonne Vacherot, and Zephyr.

The varieties of Hybrid Perpetuals, Hybrid Teas, Teas, and Noisettes which require light pruning are the following. They should be treated as the previous classes, but still less wood should be cut away. The centre of the plant should be kept open, but beyond this the strong shoots from the base should be left about eight inches long, while the other shoots should be cut back till on their laterals or side shoots there are from one to three buds left. This is for exhibition purposes, and should be supplemented as before by the May pinching out of bad shoots. For

garden decoration the base shoots should be left twelve inches long, while the laterals on the older wood may be reduced to four or five eyes. Abbé Andre, Reiter, Abel Carrière, Abel Grand, Alexandra, American Beauty, Anna Chartron, Anna de Diesbach, Annie Wood, Augustine Guinoisseau, Belle Fleur, Bessie Brown, Billiard et Barré, Capitaine Jouen, Captain Hayward, Caroline Testout, Charles J. Grahame, Charles Lefebvre, Cléo, Commandant Felix Faure, Comte de Raimbaud, Comtesse de Turenne, Comtesse Panisse, Comtesse Sophy Torby, Countess of Caledon, Countess of Rosebery, Duchess of Albany, Duchess of Portland, Duke of Edinburgh, Duke of Teck, Dupuy Jamain, Eclair Edelstein, Ellen Willmott, Florence Pemberton, Frau Karl Druschki, General Schablikine, Gladys Harkness, Gloire d'un Enfant d'Hiram, Glory of Cheshunt, G. Nabonnand, Goubault, Grace Darling, Gustav Grünerwald, Her Majesty, Homère, Hugh Dickson, Irish Brightness, J. B. Clark, J. B. M. Camm, Johanna Sebus, John Hopper, John Ruskin, Jules Margottin, La France, La France de '89, La Tosca, Lady Waterlow, Lina Schmidt-Michel, Louis Ricard, Madame Antoine Mari, Madame Clemence Joigneaux, Madame Errera, Madame Eugene Verdier, Madame Gabriel, Luizet, Madame H. de Potworowska, Madame Hector Leuilliot, Madame Jean Dupuy, Madame Jules Gravereaux, Madame N. Neruda, Madame P. Bersez, Madame Victor Verdier, Madame Wagram, Magna Charta, Maharajah, Maman Cochet, Maréchal Vaillant, Margaret Dickson, Marguerite Appert, Marguerite Brassac, Marie d'Orleans, Marie Rady, Marie van Houtte, Marquise de Salisbury, Mavourneen, Mosella, Mrs. R. B. Cant, Mrs. George Dickson, Mrs. Rumsey, Mrs. Stewart Clark, Paul Jamain, Paul Nabonnand, Peace, Princess Alice de Monaco, Princesse Marie d'Orleans, Queen of Edgely, Robert Duncan, Rosette de la Legion d'Honneur, Senateur St. Romme, Souvenir de Jeanne Cabaud, Souvenir de Madame Ernest Cauvin, The Dandy, Thomas Mills, Ulrich Brunner, Venus, White Maman Cochet, need this treatment.

The next section includes the climbing kinds of Hybrid Perpetuals, Hybrid Teas, and Teas, as well as some of the other climbers. These roses need very little pruning, most of them doing best if left to grow naturally. The necessary thinning out of dead wood and of the shoots which are likely to overcrowd the plant, together with the worn-out wood of over two years' growth will keep the plants in full vigour and blossom. The removal of the old worn-out wood is as well done in the summer, directly after the plants have done blooming, and the young shoots should at once be tied in to take the place of those removed.

It is at this time that any necessary re-shaping of the rose should be done, crowded growths being thinned and the branches re-spaced over the wall or trellis so as to keep as much flowering wood as possible. Where the base of the plant becomes bare, as often happens with climbing roses, the space may be filled either by bending down one or more of the lower shoots to cover the bare space or by shortening one or two of the base shoots to induce them to throw out laterals. Among these climbing roses are Abbé Thomasson, Ards Pillar, Ards Rover, Bardou Job, Cheshunt Hybrid, Climbing Captain Christy, Climbing Caroline Testout, Climbing Cramoisie Superieure, Climbing Devoniensis, Climbing K. A. Victoria, Climbing La France, Climbing Mme. de Wattville, Climbing Marie Finger, Climbing Mrs. W. J. Grant, Climbing Niphetos, Climbing Papa Contier, Climbing Perle des Jardins, Climbing Queen of Queens, Climbing Souvenir de la Malmaison, Comtesse de Galard Bearn, E. V. Hermanos, Fanny Stolwerck, F. B. Hayes, Field Marshal, Frances Bloxam, François Crousse, Gloire de Margottin, Gruss an Langerhausen, Gruss an Teplitz, Gustave Regis, L'Idéal, Longworth Beauty, Longworth Fairy, Longworth Rambler, Madame Alfred de Rougemont, Madame Charles Mornier, Madame Edmée Cocteau, Madame Pierre Cochet, Mai Fleuri, Monsieur Desir, Morgenrot, Noëlla Nabonnand, Papillon, Pink Rover, Reine Marie Henriette, Reine Olga de Wurtemberg, Sitina, Souvenir de Madame Léonie Viennot, Waltham Climber No. 3, Zephirine Drouhin.

After these sections we come to the definite families of roses, descriptions of which will be found above. Of these the Provence roses, which are summer flowering, should be pruned in February or March, and should be well thinned out, taking out all the old wood and, if necessary, some of the younger as well. These roses shoot out well and strongly from the base, and these vigorous young shoots should be shortened to about five or six buds, leaving the bush when finished, if a full-grown specimen, about two feet high.

The Moss roses are pruned like the foregoing, except that the stronger growing sorts, such as Blanche Moreau, the common Moss, Laneii and the White Bath, may be left taller, while those known as perpetual flowering Mosses, as they have somewhat more of the Hybrid Perpetual habit, may be pruned as described above for Hybrid Perpetuals for general decoration. These latter are Mme. Edouard Ory, Salet, and the Perpetual White.

The other class which is pruned in March is that of the miniature Provence roses. These need well thinning, and should be cut back to within six inches of the ground. The one thing to

remember in thinning and pruning is that the plant shall be symmetrical when in bloom.

In early March the French and the Damask roses will want attention. There are two types of these, requiring slightly different treatment. Thus Lady Curzon and the other two of the same type, Mrs. Orpen and Commandant Beaurepaire, is the taller of the two, and the varieties of it make good tall bushes or pillars. For this purpose the best one- and two-year-old shoots should be kept, thinning the old wood well out, and keeping the best laterals from them. Rosa Mundi, Red Damask, and Tuscany are dwarfer in habit, and should be pruned in a similar way, but keeping the resulting bush much smaller, not more than three feet high.

Rosa Alba and its varieties are pruned in early March. They make good tall bushes or pillars, and should have all weak wood cut severely away. These roses bear their best blooms on the laterals from old wood, and these should be preserved, as far as possible, cutting them back to about nine inches to a foot long.

The Hybrid Chinas are among the best roses for tall bushes and bushy pillars, and their strong shoots may be left to a length of five or six feet. The three-year-old wood should have its laterals cut back to three or four buds.

The Hybrid Bourbons partake of much of the character of the true Bourbons, blooming best when well established and on well-matured wood, so that where the old wood is strong and vigorous a good deal of it may be left, together with the laterals from the two- and three-year-old shoots. The best of the base shoots should be left, and the laterals should not be too severely shortened, or much bloom may be lost.

Hybrid Noisettes and Hybrid Musks require practically no pruning. Their dead wood should be cleared out, together with a few of the older shoots, tying in young stuff to replace them.

The Austrian Briars require a good deal of forethought in pruning, as they bear much of their bloom on three-year-old wood. Practically none of the young wood should be cut out, only the dead wood being removed, except in the case of Soleil d'Or, which, as it blooms on the current year's growth, must be cut back more severely, the shoots being only left about two feet long, and not much thinned. In the cases of all the others the strong one- and two-year-old shoots from the base should be left to ripen for flower bearing, as should the good three-year-old wood, on the laterals of which much of the bloom is borne.

The Scotch Briars do best as a bush of about three or four feet high. They need hardly any pruning, the removal of the

dead wood being quite sufficient. Where the plant is bare at the base a selected few of the good shoots from the base should be cut short, so that they may send out laterals and clothe the bare part. These also are pruned in March.

The Sweet Briars should be pruned fairly early in March, and for pruning purposes fall into two classes, that of the Sweet Briars proper, which includes the common Sweet Briar and the pretty kind called Hebe's Lip, and the Penzance Briars, including all the family of Hybrids raised by Lord Penzance, together with one or two others, such as Janet's Pride. The first section should be left as bushes about four to four and a half feet high, and should not be much cut about. The weak wood, and such shoots as have become bare and straggling, should be cut away. The Penzance Briars are far more vigorous, and throw up long, fine shoots from the base which should be left as long as six feet, or more, as required. The two-year-old wood will have produced good strong laterals, and should be cut short to keep these strong and vigorous, that the plant may be well clothed throughout. Ten feet is not an unusual length for these massive base shoots. One or two of these briars, notably Lord and Lady Penzance, are rather less vigorous than the others and should not be allowed to carry such an amount of wood. Six feet is the limit to which they should be kept. Most of these briars will need some thinning, and where they are used as hedges the long shoots should be bent down and pegged or tied down in position to keep the lower part thick and full.

The Ayrshire section are extremely hardy and strong growers, and need little attention but the cutting away of dead and useless wood. They should be pruned early, February being the best time.

Sempervirens needs much the same treatment as the foregoing and is pruned at the same time. As the shoots are rather more slender and fragile than those of the Ayrshires, the laterals should be shortened slightly, or they will be too pendulous, Where they are used as covering for a bank they may be left untouched, the disfiguring dead wood only being removed.

The Boursault section is a very vigorous one, and should be treated in much the same way as the Penzance Briars. It has the same habit of throwing up fine great shoots from the base, while the older wood will carry good strong laterals. Six to ten feet is not too long to leave the young wood of these roses. One of them (*Alpina Florepleno*) is slightly more dwarf in habit, and makes a good thick broad bush. These roses are pruned in February.

The Banksian class requires no pruning. The old plants, however, gradually become less vigorous, and where this is happening it will restore them to cut them back, to obtain good shoots again from the base. These roses bloom chiefly on the small twiggy wood produced on three-year-old laterals, so that the aim in distributing the wood, when the rose is grown on a wall, should be to leave as much young wood as possible to ripen, carefully arranging the main stems to allow it as much room as possible. What pruning is done should be done in April.

The Multiflora class is made up of roses of rather diverse habits, and must be treated in sections. As a general rule they all have a tendency to flower on the ends of the shoots, a habit which tends to leave the blossom badly distributed over the plant, with a bare space at the lower portion. In pruning, some of the wood should be shortened to clothe these spaces. Where they are grown as pillar roses the weaker one-year-old shoots will need shortening, but the strong ones can be left to the required height. The group of which *Euphrosyne* is the best type, including *Thalia*, *Queen Alexandra*, and *Eleanor Berkeley*, should be well thinned out, only the best of the young wood and the best and strongest laterals being left. A few young shoots should be cut back to keep the base clothed. The class of the "Crimson Rambler" kind will need thinning out of old wood to make room for the strong young shoots. The two-year-old wood will have produced good laterals, and should now be shortened, while all straggling wood should be cut out, and old laterals cut back to five or six buds. *Claire Jacquier* is best treated exactly as the *Boursaults*, except that more laterals should be removed, and there will probably be more dead or otherwise undesirable stuff to be cleared out. The *Lion* should be treated like the Hybrid Bourbons, while *Leuchstern* is best pruned and grown as a pyramidal pillar, the strong shoots being left to the full length required. *Aglaia* requires careful treatment, as it flowers only in the third year, and on the sub-laterals produced from the old wood, which must therefore be very sparingly dealt with, only just so much as is absolutely necessary for the shape of the plant being removed.

The Bourbons are pruned in March, and need little pruning back but vigorous thinning. They must retain a good deal of their best laterals and mature wood, as they carry most of their flowers on these. *Hermosa* or *Armosa* is a kind which makes a good low bush, preferably not more than two feet high. It has much of the free-flowering habit of the China roses. The larger flowering kinds, such as *Mrs. Paul*, *Madame Isaac Percire*, and



*Souvenir de la Malmaison*, make good standards, and are also good for pegging down. *Malmaison* is the dwarfiest of them. They should be pruned much as the vigorous *Hybrid Perpetuals*, when grown for garden decoration.

The *Chinas*, like the *Banksias*, require rather thinning than pruning. They should be dealt with in March, and should they be bare at the base some of the strong young shoots may be cut back to re-clothe them.

The *Noisettes* are only moderately vigorous in growth, and where they are used as climbers they must not be allowed to make or retain too much new wood, or they will become straggling and weak. They should rather be kept back, and gradually built up to fill the space allotted to them. Much of the wood will need removal for unsoundness, but as much as possible of the good older wood must be retained, as it is on the laterals produced from this that the flowers are borne. *Aimée Vibert* (the dwarf kind), *William Allan Richardson*, and *L'Idéal* make good five to six foot pillars, and are good for bedding roses if pegged down. They may have their laterals moderately hard-pruned. These also do well as standards. Climbing *Aimée Vibert*, *Rêve d'Or*, *A. S. Gray*, and *Celine Forestier*, are rather more vigorous, making excellent standards and wall-climbers. They are good for arches, as they throw up good thick six to ten foot shoots. One or two of these roses are so tender as to need a wall if they are to do well in the open. *Lamarque* is one of these, *Fortune's Yellow*—a summer flowering kind—another. *Rêve d'Or* and *Ophirie* need little pruning, only the most necessary cutting being done. *Maréchal Niel* wants care in pruning. It flowers on the previous year's wood, so that all the best of this growth should be retained as long as possible, although the plant needs thorough cleansing of all weak and cankered wood of whatever age. The *Noisettes* should be pruned in March.

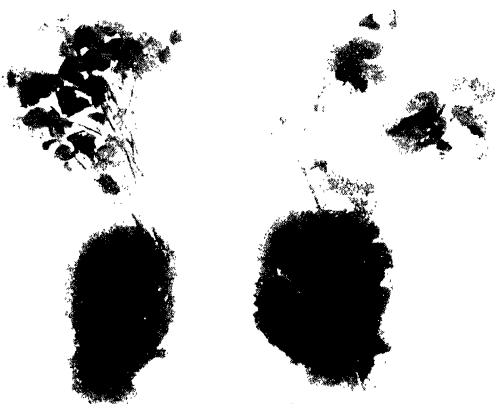
The *Polyanthas* or *Pompon* roses are all dwarf in habit, bearing their flowers on good strong flower stalks rising from thick little bushes. Little pruning is needed except the trimming off of those old flower stems, the new growths breaking from the buds below them and from the base of the plant. They should be pruned in March.

The *Rugosa* section should be pruned in February, and a simple and excellent way of growing them is to cut them almost down to the ground each year. In this way they will bloom rather late, but the flowers will be plentiful and the plants kept healthy. If this is not done the plant should be thinned sternly, leaving the best of the many shoots which will be found springing from

No. 21. OXALIS

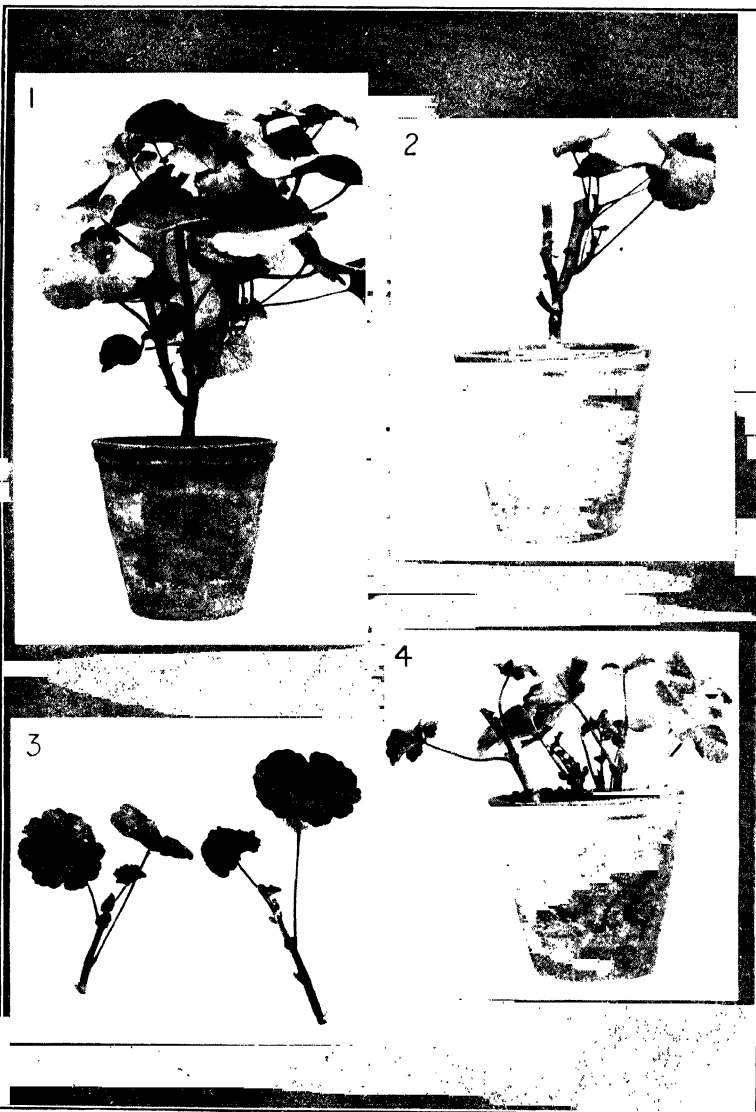


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1. A plant before division. 2. The same, divided into two portions before re-potting.

No. 22. GERANIUMS



1. Suitable plant for cutting. 2. Geranium after cutting. 3. Cuttings.  
4. Cuttings planted.

the base. These shoots should be cut back to about four feet, and will sprout and flower from the heads, again breaking from the base later on. A hybrid with some Gloire de Dijon blood is Conrad Meyer, which is an excellent tall bush or pillar rose, but has a tendency to become bare below. This must be remembered when pruning, and some shoots cut back to remedy it.

The Perpetual Scotch Rose should be grown as a tall bush, or as a half-standard, as its natural habit is very graceful, and its shoots are slightly pendulous. Any pruning which it is given should be merely with an eye to the beauty of the shape, as it has little effect on the flowering.

The Wichuraiana and its hybrids now form a very numerous class, the hybrids needing differing treatment according to which parent they "favour." Those which resemble the Wichuraiana type require little pruning but hard thinning. They flower on the young wood, and the best kinds to use for weeping standards, a form for which they are almost the most successful race of rose. Dorothy Perkins—almost the most popular of these roses—is the type of this section, and with it are Hiawatha, Jersey Beauty, and Wichuraiana itself. The kinds which take after the Tea side of their ancestry, such as Alberic Barbier, Rene André, Gardenia, and Paul Transon, bear their flowers more on the older wood, so that a good deal of this must be left in place, its laterals being thinned and cut back a little.

PROPAGATING ROSES.—The most usual method of propagating the rose is by budding, not a difficult operation, but one needing care and exactness. It consists in the inserting of a slip of the bark of the rose which it is desired to propagate, containing a live bud, under the bark of another rose already established, called the stock. This latter may be of another kind, and indeed always is, the stock chosen being selected with reference to the soil or situation in which it is to be grown. Certain kinds used as stocks do best in light soils, others in heavy, some in dry, and some in moist ground. Some varieties of rose, again, do better on one stock than another. Very few of the choicer kinds of rose are grown on their own roots. The operation of budding is fully described in another part of this book, but in the case of the rose the selection of the bud is so important a part of the operation that it must be touched on separately. The bud must be taken from a shoot which is mature enough to have borne or to be able to bear a flower—what is called a "ripe" shoot. A ripe shoot may be selected by trying it with the finger, which should be gently rubbed over the prickles. If these latter fall off easily the shoot is in a fit condition

for budding. It should be taken with all its buds, and the leaves cut off, leaving about an inch of the footstalks to help in handling the buds. A thin slice of bark, about as thick as a piece of writing paper, should then be cut from it, having a bud in its centre.

Before cutting this the stock should have been prepared by making a cut in it vertically and just deep enough to cut through the bark, though not to pierce the wood. Another cut is made across this at the top, making a T shape, and the bark gently opened at the angles with the flat handle of the budding knife. The bud, prepared as above described, is then gently inserted in the space between bark and wood, beginning at the top, and being pushed firmly downwards. When it is well down the tip of the bark containing the bud will stick out at the top, and should be cut across exactly at the line of the transverse cut, so that it will lie flat against the stock. Stock and bud are then bound firmly together with soft cotton, so that the bud is exposed, but the rest held closely together. This binding must be kept on for thirty days at least. Budding should be done in the summer, between June and September, the earlier season being good if enough really ripe shoots can be found. This is an important point, however, and if there is any doubt the budding should be put off. In November, if the budding has been successful, all the branches of the stock, except those which have had buds set in them, should be cut clean away with a sharp pruning knife, and those containing the inserted buds cut back to within two or three buds of the inserted one. These buds of the stock are left to draw the sap up to nourish the fostered bud, or scion, which would starve without them. It is thus important that their number should not be reduced too early in the season, before the new bud has effected a good union. In the following spring, about May, the stock should again be looked over, all buds below the scion being removed and those above it only allowed to grow four or five inches, at which stage they should be pinched off. Each time that they shoot out they should be pinched back, till their final removal in the middle of June. It is important that all budded roses should be firmly staked and firmly tied, or a gale of wind may pull out every head from the stocks. This precaution should be still adopted even when the foster rose has made as much as a year's growth, as the head will be heavy and will easily catch the wind.

Roses are often propagated from cuttings, and certainly where the roses do as well on their own roots they are easier to deal with than when budded. There is always a risk, particularly with the amateur, that the stock may shoot out vigorously and unsuspected, especially where its leaves are like those of the

budded rose, and choke the more delicate scion. This cannot, of course, happen where the rose is grown from a cutting on its own root. Climbers and ramblers, as a rule, do well grown in this way, as do a good number of the Hybrid Perpetuals. When making cuttings it is simplest and best to take cuttings from well-ripened wood, which carries a good number of strong healthy leaves, in the summer, after the roses have done flowering. These cuttings will root well in the open air, while by the old-fashioned methods artificial heat is required. A shoot should be selected which has borne a flower, and should be cut off with about three or four leaves attached. The leaf nearest the flower should be removed, the shoot being cut off short above the second leaf and just below the lowest. If the cuttings are to be rooted absolutely in the open a bed should be prepared in a shaded situation, the soil being worked up a little with decayed sand and leaf-mould. A frame is perhaps more satisfactory than the open ground, but is not essential. The cutting should be set three to four inches apart, and should be well watered in, water being again given with a sprinkler morning and evening. The cuttings do as well or better planted in pots, as they seem to root more quickly. A hand light or a cold frame placed over them will help rooting.

Where roses are grown from seed, a method only employed where new varieties are being raised, the chief essential point is that the seed should be allowed to ripen thoroughly and should never become dry. The pods should be left on the plant until they are almost dropping, and should then be picked, stalk and all, and the latter set in damp sand until the following November or December, when the seed is to be sown. The seeds often take a complete year to germinate, so that hope need not be given up if the seedlings show no signs of life for many months. Where seedlings are being raised for the sake of new varieties the tiny plants are budded on to briars even during their first year; as soon, in fact, as it is possible to take a bud from them. The seedlings will usually flower in their first year, but a bud should in all cases be secured if possible, as the little plants often die after flowering, the effort seeming to exhaust them completely.

## CHAPTER VI.

### GARDENING UNDER GLASS.

**Gardening under Glass.**—The gardener who is fortunate enough to possess a “little glass” will find that he is able to attempt successfully many kinds of flower and fruit growing that without some form of glasshouse are either impossible or very difficult. It is by no means necessary to have an imposing array of greenhouses in order to get pleasure out of gardening under glass. The smallest back-yard greenhouse will give a lot of profit and entertainment if it is well used. The fact that flowers and beautiful foliage can be had all the year round, together with a constant supply of pot plants for the house during the dark winter months, is alone worth the trouble of looking after the greenhouse, to say nothing of the pleasure of the work itself.

It is important in building a greenhouse that the situation be carefully considered, with regard to the kind of plant that it is required to grow. If the greenhouse can only be placed in a shaded corner of the garden it is clearly hopeless to attempt to grow plants and flowers which need much sunshine, and indeed, in such a case it is well to give up the idea of flower cultivation at all, and devote the space to the growing of the many most beautiful and interesting classes of ferns to which shade is not only not harmful, but is absolutely necessary. If the greenhouse is to be used for fruit and flowers it should stand in full sunlight, no buildings or trees being allowed to over-shade it. Daylight and shelter from north and east winds are essentials. The furnace may be either sunk—the easiest and most economical method—or level with the house; the latter position being only made necessary where the ground on which the building stands is liable to flooding, in which case the fires might be put out and many plants lost. The sunk furnace is far preferable in ordinary cases, as the heat is better distributed and less coal is consumed.

The greenhouse may be built in either of two shapes : the span-roof, where the roof has two equal sized and equally sloping sides, or the lean-to, where the roof slopes down in one plane from one side, or from a wall. Span-roof houses are best placed with the gable ends north and south ; the light and heat from the sun can be better regulated in this way, and the house requires less attention. If one end of the house touches a wall it should be the north end. Lean-to houses are best and most economical when built with their highest side against a wall. This gives stability and cheapness together. Needless to say, the wall should not come on the sunny side of the house. There is an intermediate form of roof known as the hip-span, which is built with one slope of the roof very much shorter than the other, and is very useful for building against a wall too low to support a lean-to house. By using the hip-span form, sufficient height is given to the house, while the wall is utilised where the short roof-slope ends. In this form of house it is usual to place the roof ventilators along the slope of the short side of the roof. Lean-to and hip-roof houses can be built with any aspect from south to west, the east being the worst of all, and a north being best for a certain kind of ferns.

The arrangements of the staging or support for the plants may vary. In a large house of the span-roof type where there is a good width, the plants always look best arranged with a central staging running down the middle of the house, and two narrow stagings along the sides. Plants look their best arranged in this way, but it is only possible in a good-sized house. Smaller span-roofs are inconvenient in this way, as when the stagings only run along the sides it is necessary that the tallest plants shall be placed towards the middle of the house, and therefore nearest the path, an unfortunate arrangement from the point of view of appearance, as the bigger plants hide the smaller ones nearer the outside of the house, the gradation being the reverse of the proper one. Lean-to houses are best arranged with a narrow staging on the outer and lower side, and a wide and high one on the higher side, the path lying between the two. Where the house is a fair height at the back the staging should be built well up it, for health as well as looks, as otherwise the back plants would be too far from the glass to thrive well. By building up the staging in tiers these plants can be kept well up to the glass, as well as being displayed to the best advantage.

There must be ample ventilation in all greenhouses, if the plants are to be kept in health and insect pests kept under. It is a bad plan to have the roof ventilators made to open alternately



with fixed panes of glass. They should be continuous, or some plants will be scorched which come under the fixed lights, while this form of ventilator is favourable to the increase of insects in the house. Where there is ample top ventilation there is far less need of side ventilation as well, indeed many experts now discontinue the use of side ventilators altogether, as they are held to make the atmosphere over-dry. In cases in which this dryness is desired, as it may be in a few houses built for particular plants, side ventilation may be employed by means of small, sliding shutters placed in the side of the house and below the hot-water pipes. This latter position will ensure the slight warming of the air as it passes over the pipes and before it circulates in the house. Upon the proper ventilation and regulation of the heat and moisture of the greenhouse much of its success depends. It is very easy to kill, or at least gravely to injure, a house full of plants by injudicious opening or closing of all ventilators. Such plants as cucumbers and melons, for example, need very careful watching at certain stages of their growth if they are to attain perfection.

The leaves of plants, both under glass and out of doors, though most frequently the former, are liable to become scorched, in certain conditions, just as if they had been held before a fire. Dry heat and lack of sufficient moisture produce this effect, and the young leaves of vines and other greenhouse plants are often badly damaged in this way. The grapes themselves are sometimes injured also. It is important that the temperature of the house should be carefully watched, especially in the morning—the sun will often come out suddenly with surprising power, and unless the ventilation is regulated in time the heat will become intense. In order to avoid the risk of scorching, the ventilators, in mild weather, should be opened early, beginning with a little opening, which is gradually increased as the sun becomes more powerful, reversing the process towards evening as the temperature falls. Violent changes of temperature are as harmful to plants as to people, and the sudden check given to foliage which is in a state of great heat and transpiration on the sudden lowering of the temperature of the surrounding atmosphere will give rise to risk, indeed almost certainty, of mildew.

The very best material of all for staging is slabs of slate, this material never becoming absolutely dry, and so keeping the bottoms of the pots from drying up too much. The usual strips of wood with an inch or so between each strip, of which most ordinary greenhouse staging is composed, is not good. It permits

far too free a circulation of air and heat round the pots and by over-drying the latter withers up the root tips which may happen to get near the sides of the pot within.

Slate slabs are, however, costly, and the initial expense is prohibitive to many people, for whom the best substitute is substantial wooden boards like small benches. A narrow strip of flat beading, an inch or so deep, should be nailed round the edges of these boards, and the shallow box thus produced should be filled with ashes, shingle, or some other absorbent material. Staging over pipes should touch the wall at the back and project far enough in the front to protect the plants standing on it from the direct heat of the pipes. If there is any space behind the staging, the heat will come up the crack on to the hindermost plants on the staging, injuring them very much.

For raising seedlings, propagating cuttings or slips, and such purposes, a box within the greenhouse is very useful where a house cannot be set aside for this alone. This box may either be a fixture, in which case it should be built in such a position as to include within it some portion of the heating pipes, or it may be movable, if space is an object, so that it may be cleared out of the house when not wanted. Where the pipes are built in they should be covered with a good depth of cocoanut fibre, and the pots or boxes containing the plants to be dealt with plunged in the fibre.

During the summer the house will require shading from the strongest sunshine, or there is great risk of the plants being scorched and dried up. Where constant attention can be given, an arrangement of roller blinds is, of course, the best, as the amount of light can be better regulated, and the blinds can be left up on dull and sunless days. Where, however, as is often the case, the greenhouse must of necessity be left to look after itself for a good part of the day, some temporary application should be washed over the lights in the early summer, as it is far better to risk losing a little sun than to risk damage from burning. One method is to tack thin canvas or tiffany over the lights, but the simplest, and on the whole the most satisfactory, is to wash the glass over with a mixture of whiting and milk. The milk "fixes" the whiting and renders it fairly permanent. Various mixtures are sold by nurserymen for this purpose, but the above is as satisfactory as any bought preparation.

As the summer comes on a careful watch must be kept for insects in the greenhouse. By dealing with them at the earliest sign of their presence, they may be got rid of with comparative

case, while if left they multiply with appalling speed. If greenfly are seen, fumigate the house with some insecticide. This will check them, and at the same time discourage slugs and other pests which are particularly fond of young, tender shoots. In the summer full ventilation is usually needed, except in most exceptional weather, and the ventilators should be left open continually. The atmosphere must, however, be kept moist, and this is best done by syringing. While the plants are not in flower the syringing should be done freely upwards, so as to fall on the plants like rain. This helps to keep the foliage in good condition as well as moistening the atmosphere—a condition which most plants appreciate in summer. Where, however, the plants are in flower, the syringing should be done over walls and staging alone, as water will injure the flower petals. When the plants are well rooted and in full flower and leaf they are often grateful for a little liquid manure or other stimulant. In hot weather three or four times a day is not too often to syringe the greenhouse, and throughout the year the floor of the house and stagings should always be sprinkled once a day.

Every greenhouse should possess a water-tank inside it, and this may conveniently be constructed to receive the rain-water from the roof. Soft water should always be used for watering plants, and by having a supply always inside the house itself, the water is kept at a temperature suitable to that of the soil. Cold water applied to plants in a warm atmosphere is most harmful.

Cleanliness inside the greenhouse is most essential. Every dead leaf and withered stem left about is a hiding-place for insects and the breeding-ground of fungi. We create artificial conditions within our greenhouses, where the balance of nature is destroyed and the natural enemies of insect life cannot enter, so that unless we take their place in the thinning-out of superfluous insects we shall soon be over-run. Keeping every corner of the house and the stem of every plant as clean and free from rubbish as possible will do a great deal to keep down insect pests. As a remedial measure, where red spider, thrips, green fly, or mealy bug are suspected, a good fumigation is the best thing, together with spraying of the affected plants, and syringing dark and possibly infested corners. Fumigation with tobacco paper is useful in the case of greenfly, but should only be used where the plants in the house are full grown and the leaves mature. It is often too strong a remedy for young and tender plants. Tiny plants and seedlings may be dipped bodily into a weak solution of the insecticide, and safe and good insecticide is fir-tree oil.

Many small greenhouses fail through over-ambition on the part of their owner. He wants to be able to grow at the same time and in the same house a quantity of plants with quite different habits as regards temperature, moisture, and ventilation. He has not a large amount of space at his disposal, so that he overcrowds his plants and dwarfs his specimens in consequence. Plants, like people, cannot stand crowded conditions. It is always unwise and a courting of failure to try to grow plants requiring such different culture as, say, roses, lilies, grapes, ferns, and, perhaps, orchids, in one and the same house. What is health and comfort to one is death to the others, and it is a far better plan to select carefully the several species that require much the same treatment and to grow only such a number of these that they each have sufficient room to develop fully.

All evergreen foliage plants in the greenhouse should have a frequent wash with warm rain-water and a little soap, applied either with a small sponge, where the leaves are large, or with the syringe where they are too small for this treatment. On each occasion the plants should be finished off with a rinsing of clean warm rain-water. The soap and water will remove all insects, and the process of sponging will keep the pores open and the plant in health. Pots should always be kept clean, no moss being allowed to grow on their surfaces. They should be scrubbed also with soap and water at times. The greenhouse should be thoroughly turned out once or twice a year, when the plants are least active; all fibre, shingle, or such material should be replaced, and all woodwork and glass thoroughly washed with soap and hot water. Really hot water is a very good insecticide.

Fumigating is a very important operation in greenhouse management. It must be done where the house has become infested with insects and should also be done whenever the house is "spring-cleaned." The best time for fumigation is when there is neither wind nor sun, the former being apt to clear away the fumes before they have had their full effect, and the latter being liable to injure the plants if it falls full on them while surrounded by the fumes. On a dull day and in cloudy weather the operation can be performed in the morning; in calm fine weather the evening is the best time, the sun being either set or at its weakest. Of the two, other things being equal, the evening is the better time, as the house can be then kept shut all night. To prepare a house for fumigation, shut all ventilators, and cover with damp matting all broken or cracked lights and all roof ventilators, which are likely to leak at all. Where

convenient, plants which are in full flower should be removed during the actual process of fumigation, as the smoke is apt to injure the blossoms. Most gardeners will find the fumigating material sold ready for use with the necessary apparatus for burning, the most satisfactory in the long run—but there are also the old-fashioned tobacco, tobacco-rag, and tobacco-paper, all of which are useful fumigating materials, if a little more risky in the way of injury to plants. These latter materials can be consumed in an improvised fumigator composed of an old saucepan, or an eight-inch flower-pot, with a hole knocked in its side. A pail, also with a hole or two pierced in its sides, will do very well, the holes in each case providing the needed draught. Having arranged the house in readiness for the operation, bring a few live, red coals—not too many—and place them in the bottom of the pail or other receptacle. Put a few pieces of old brown paper on the coals, then some dry shreds of tobacco paper, and then some shreds that have been moistened a little. The materials should never be allowed to break into flame, but should smoulder slowly. If it flames, sprinkle water on it till it smoulders again. Should it blaze it will inevitably yellow and injure the leaves of your plants. The fumes should not be allowed to get very thick, and if they show signs of doing so, the fumigating apparatus should at once be removed. A mist thick enough to prevent vision for more than a few inches into the house from without is as much as is ever necessary. Where the house is badly infested with any insect pest, it should be dealt with two or three times on successive evenings. This is almost always necessary when extirpating red spider. The next morning, or when the fumes have thoroughly cleared, go round the house with the syringe and warm soft water, and free all plants from dead insects, washing the bodies off the stems and leaves.

It is sometimes useful to fumigate one or two plants alone, they having been badly attacked while the rest of the house has escaped. A simple method is to put the plants on the ground and round them place a low clothes-horse, or two chairs back to back. Cover this improvised tent with an old sheet of a close texture, and push under it a pan containing a live coal or two and a little of the material used for the fumigation. If the tent has been made carefully, so that the fumes do not escape, the fumigation will be perfectly effective.

One fumigation will generally get rid of aphides, and the destruction is made more certain by syringing the plants attacked with hot water—temperature 120 degrees—or with quassia water. Thrips take two fumigations to kill them, and nicotine

soap should be used as well, in solution through the syringe. Red spider is the most intractable, perhaps, of all, and will need three fumigations, at least, in addition to which the greenhouse should always be kept moist, both as to walls and atmosphere. Red spider thrives in a dry place, and constant damping of all surfaces which might harbour it will soon discourage it. This is one of the most dreaded greenhouse pests, and in a vine house can do incalculable injury. It attacks most plants grown under glass, and in a dry atmosphere multiplies rapidly. In spite of its popular name it is neither a spider nor indeed an insect proper at all, but a mite. In greenhouses infected with it a dry state of the air should be avoided, and combined with moisture, sulphur in some form should be employed. Dusting with dry sulphur and spraying with sulphur solutions should be employed, both inside and outside, where the red spider is found.

Mealy bug is another enemy to the greenhouse gardener. Fumigation will help to dislodge it, together with sponging with a soap, water, and paraffin mixture, made by boiling a pound of soft soap with a quart of water, adding half a pint of paraffin, and thoroughly emulsifying the whole. This process can be performed with a syringe and a pail, the mixture being violently drawn in and out of the syringe until a thorough union has been effected. Of this the quantity given above should be mixed with ten gallons of water, and is then of a good average strength for using with all but tender and very young plants. For these it may be still more diluted.

Scale insects and mealy bugs are closely related, and share the common characteristic of hostility to plant life. To the two classes belong a great number of the most troublesome of the gardener's enemies, in orchard, garden, and greenhouse alike. Some of the most destructive of the scale insects are so far only known abroad, but a few have recently established themselves in greenhouses in England. The mealy bug of the greenhouse is well known to most gardeners, while trees are attacked by several kinds, among them the peach scale, the oyster-shell bark louse, the brown currant scale, and the cottony cushion scale. Roses and many greenhouse plants are also preyed upon. The remedy for most of these is the thorough application of some reliable insecticide; but these latter, if strong enough to be really effective, need careful handling, or the plant may end in a worse state than before. A fair knowledge of the structure and parts of plants, together with common sense, are necessary for the safe using of such preparations as fir-tree oil, paraffin emulsion, or any of the good, advertised insecticides. It is obvious that the

strength of the solution, for example, must vary greatly with the plant or the part of the plant to which it is to be applied, and that a mixture which might be perfectly safe and none too strong for the bark of an outdoor fruit tree may be deadly if applied to the leaf of a greenhouse plant. In dealing with scale insects the insecticide must be applied with a brush, the fluid being well worked into all likely cracks and crevices. Spraying is often ineffective in the case of these creatures, as the scale which they make and from which they derive their name forms a complete protective covering. The brushing is best done, in the case of trees, and other plants of a bushy kind, in winter when they are leafless and at rest, the absence of leaves making the job an easier one, as well as more thorough. Where plants under glass require treatment it should be given in the evening, never when there is bright sunlight.

Woodlice are frequent and destructive visitors to greenhouses in which plants and vegetables are being forced, the latter often suffering greatly from their depredations. Mushrooms, young melons, and young tomato plants all attract the woodlouse, and as these creatures are night feeders, they are difficult to deal with. The most effective form of trap in most houses is a small flower-pot half filled with moss and laid on its side. The woodlice hide themselves in the moss during the day, and can easily be shaken out over a vessel full of boiling water. A few of these pots laid about the greenhouse, and dealt with systematically every morning will soon diminish the number of the pests. Out of doors the woodlouse is not so destructive, partly because the young out-door growths are both hardier and less tempting, partly because hiding-places are fewer. Another good way of getting rid of the animals is by means of the phosphorus paste used to poison cockroaches. This, spread upon bread and butter as for cockroaches, or mixed with barley-meal and laid upon pieces of wood, is very effective. It must, however, be remembered that the paste is a deadly poison, and must on no account be left within reach of children or domestic animals.

It is not possible to give any fixed rules for the temperature of the greenhouse. This must of necessity vary with the plants grown, and instructions in this matter will be found under the headings of the different plants. Greenhouses are, however, roughly divided into cold, cool, and warm houses, and as a rough guide the following may be taken as their mean temperatures. The cold house depends merely on the heat of the sun for its warmth. It is really only a glass shelter for storing and preserving the natural heat of the air. Thus its temperature

varies enormously at different times of the year. The cool house will need heat during the colder periods of the year; in the summer it can look after itself in that way. During the autumn and winter months—that is to say, between October and March—a day temperature of fifty degrees with a night temperature of forty is necessary. Later in the spring, during April and May in a normal year, a temperature five degrees above that of the outer air, both night and day, will be enough. The warm greenhouse will require more heating than the cool, requiring a forty-five night temperature and a fifty-five day one all the colder part of the year, and sixty to sixty-five in the day all the summer and spring. The temperature should never be allowed to fall below these lower figures in either of the artificially-heated houses, and if in summer the heat grows during the sunny part of the day the house must at once be ventilated when the indicated maximum has been reached. The windows should at first be opened only slightly, but should be thrown wider and wider as the heat increases. Where heaters are working they should be stopped directly the top artificial heat mark has been reached and the ventilators opened, to be restarted when the temperature has again fallen to the maximum required, while the ventilators should at the same time be closed.

The method of heating greenhouses is, in its details, still a matter for individual opinion, but it is generally recognised in this country that the hot-water system is the best and least dangerous. The various hot-air methods had certain good points, but their bad ones far more than counterbalanced these. They were extremely apt to leak, and once this occurred damage to plants was inevitable, the sulphurous fumes being most injurious. The leakage, too, was by no means easy to detect. The hot-air flues cooled off at once if the fire grew low for even a short time and were more difficult to get really hot in the first instance. Steam heating is excellent and efficient, but requires much more care and supervision, and is for that reason more suited for big houses and ranges of glass than for the smaller man.

In fitting in a system of hot-water pipes, there are several simple points to be borne in mind. As I have said elsewhere, the boiler should be set below the level of the house, first because it is more economical of heat, and second because this position will facilitate the next condition, which is a good level rise of the piping from the boiler to the highest point. It is fatal to the efficient circulation of the hot water in the pipe for the latter to dip and rise again. Within reasonable limits the greater the rise in the piping the better the circulation, and at



the highest point of the system an air-tap should be provided to allow of the escape of any air which may get into the pipes, which, without this escape, would check the circulation. The upper system of pipes should be connected with the boiler fairly high up, the under set—the return pipes—being set nearly at the bottom. It is well to err on the side of over size in buying your boiler. Small boilers give a lot of trouble, and require far more attention than does a large one. The amount of piping required varies with the desired maximum heat of the house. The usual allowance is one foot of four-inch piping to every thirty cubic feet of space in the house, but a small margin had better be allowed over this for the small greenhouse and for the amateur. Where a new boiler and a brand new system of piping may do all that it is supposed to do, it will be found, as it ages, to require more and more attention if the necessary heat is to be attained. It is better to over-do it a little at first in the matter of quantity, and feel safe about it. It is easier to keep down the temperature by using the ventilators than to raise it up to the very fullest capacity of your piping. If possible, soft or rain water should be used in hot-water apparatus, as hard water is apt to deposit lime in the pipes, eventually seriously decreasing their inside measurement. Gas, oil, coal, and coke are all used for heating greenhouses, and all have their good points. The most usual, however, are coal (the hard, anthracite kinds) and coke. Between the two there is not much to choose, the coke being a little duller in its fire, but nothing to make one hesitate to use it. In the case of small, upright boilers, coke must be used, the anthracite being unsuitable, and the fuel must be broken into pieces of the size of a walnut before being used. For the last stoking before leaving the fire for the night the bars of the furnace should be raked thoroughly clear, and the hot coke raked down together. The furnace should then be filled with coke which has been slightly moistened, and mixed in a heat with breeze or slack. The addition of the latter will help to liven up the coke fire, and if properly stoked the fire should go well till next morning. The slow-burning, smokeless anthracite which is used in slow-combustion stoves is good for the heating of large boilers, being perhaps a little better than coke for this purpose, from the point of view of fitness and economy. Oil stoves will do well for heating small boilers, and will do it at a cost slightly larger than that of coke. They require very little attention, except in the way of cleanliness.

Setting the boiler is rather an expert's job, but if absolutely

necessary it can be done by anyone handy with tools and materials. The piping is usually supplied for amateur setting with rubber rings for securing watertight joints. A rise of an inch per nine feet is the usual slope for piping.

A small but important point to be considered in fixing piping is the painting of the pipes to prevent them rusting. Brunswick black is often used for this purpose, and while excellent in many ways, having a good, glossy surface, and being fairly lasting, it is a dangerous thing to use in a house full of plants. While it is drying, and especially when the pipes are hot, this varnish paint gives off powerful fumes, which will injure tender plants, so that it is only suitable for applying when a new house is built, when plenty of time can be allowed for the paint to dry up, or for use when the house is empty, as it often will be in the summer. A good and harmless paint may be made of boiled linseed oil, a little "dryers," and vegetable black. This will smell a little while drying, but its fumes are harmless. The oil is an important constituent, and should be of the best kind. Tar should never be used on pipes.

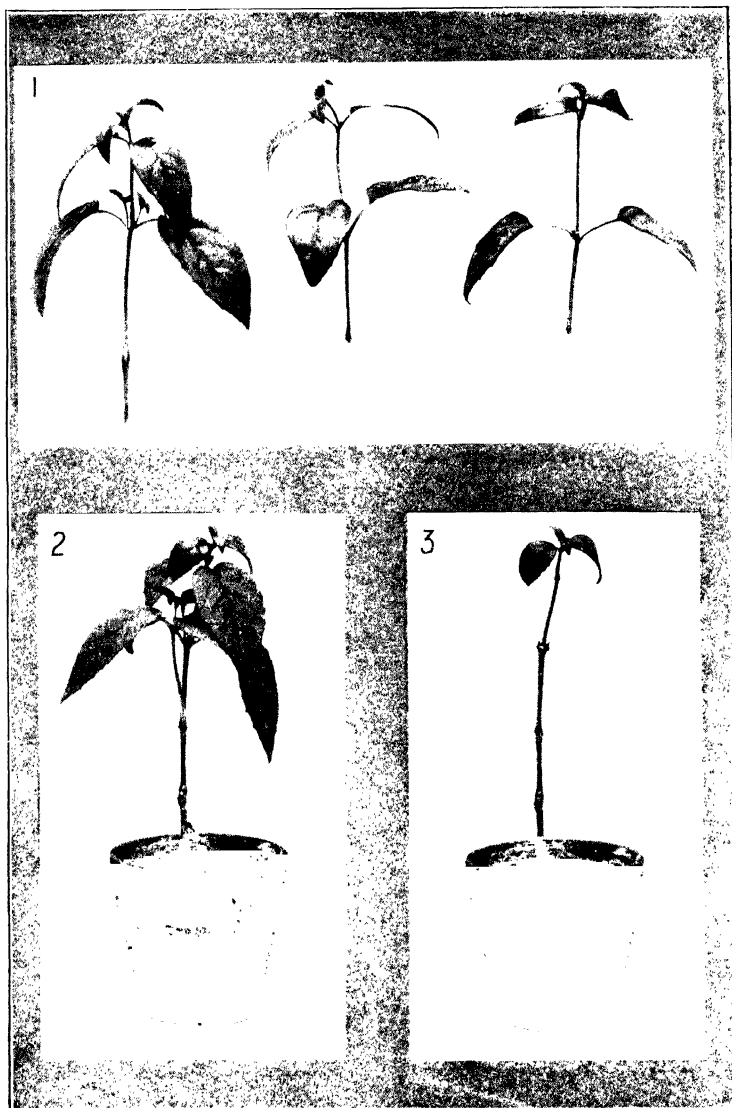
In using an oil heater for the boiler perfect cleanliness is essential if the lamp is to burn well and give no trouble. The wicks should be quite dry and clean when inserted, and short pieces should be used and renewed at intervals. The wicks absorb a great deal of dirt, and when long strips are left for months in the oil reservoirs they become quite choked with dirt and do not draw well. When first lighting the wicks turn them up about an inch and moisten the ends with oil; turn them down to about half an inch and let them burn clean away, this ensuring an absolutely even end. Do not light the lamp immediately the reservoir is filled, but allow time for the wicks to become thoroughly saturated with the oil. Adjust the height of the flame by turning the lamp higher than you require it, and slowly lowering it to the desired height. If the reverse is done there is always a danger that the flame will increase after it has been, as one imagines, raised to exactly the right point. Never cut the tops of the wicks when trimming the lamps, but wipe them off level with a piece of soft paper or an oily rag. The level is kept by turning the wicks down nearly to the bottom, and wiping gently away to the level of the socket. If kept clean and level-wicked the lamps will never smoke.

Gas-heating is very little trouble, but, on the other hand, it is undoubtedly expensive. There is very little to be said about it, except that the burners should never be placed inside the house, as there are few things more injurious to plants than

the fumes of gas. Do not trust to the arrangements made by makers of gas heaters for the carrying off of the fumes. Although theoretically excellent, they require most careful arrangements of draughts and exits, and the risk of something going wrong is great. Gas-heating should be arranged to work from outside the wall of the house.

**Building a Greenhouse.**—A greenhouse is a structure which, given a good stock of common sense and a fair knowledge of carpentry and the handling of tools, can be built quite efficiently by the amateur. Of the two shapes, span-roof and lean-to, the latter is far the easiest to construct, and is therefore the shape most usually chosen by the man who wishes to build his own house. The choice of a site is naturally the first thing in the undertaking, and this I have dealt with elsewhere. The choice of shape, even supposing that the lean-to has been selected, remains still to be settled, for there are more ways than one of constructing a lean-to house. It may, as is most usual, have a front wall of brick to a certain height, and above this glazed windows, or it may have no windows in front at all, relying for its light upon the roof space alone. In this case the roof may slope directly upwards from the ground level, or it may spring from a low wall of brick. In the case of the first shape, the height in front may be anything from five to eight feet; at the back it must be no lower than eight feet, and may be as much higher as is desired. The house should not be too wide to allow of a slope of twenty-six degrees, anything less than this is unsatisfactory. Of course, with increased height at the back the width may be increased, but with the back wall not higher than twelve feet a width of fifteen will be found to work well. With lower walls the floor space must be narrowed proportionately. In the other form, that sloping from the ground or from a point nearly as low, the roof-angle should be thirty-five degrees. Where this latter form of house is used it gives more scope if the inside is arranged with a staging along the front at a convenient height, then a narrow path, and at the back, against the wall, another narrow shelf. If the front staging only is used, there is not so good a space allowance for tall plants—but they can be placed conveniently on the back shelf. The first form of house usually has a good wide staging along the front, the path running behind it. In this form the ventilation is secured by movable lights in the top of the roof, together with sashes made to open along the front. In the second form a series of holes must be left in the front brick-work, closeable by

No. 23. FUCHSIAS



1. Fuchsia cuttings. 2. Fuchsia cutting rooted. 3. Fuchsia cutting, training for stand.

No. 24. CALCEOLARIAS



1. Cuttings potted up. 2. A box of cuttings prepared for planting.

means of shutters. This second form is the cheapest to construct, and is excellent for all small plants, as well as roses and cucumber.

Before beginning to build a greenhouse, unless on land held in freehold, the law relating to "Tenant's Fixtures" should be studied for a short time. There are many rules as to what constitutes a removable structure, and where there is any question of subsequent removal of the greenhouse to any other place trouble may arise unless the structure comes under the heading of a tenant's fixture. The regulations which govern this matter are based on the supposition that a fixed structure must not only have been placed upon the ground, but shall have either been attached to the ground or to some structure already existing and attached to the ground. A greenhouse complete in itself, and merely resting upon a foundation of dry bricks, not connected by mortar or cement, fitted with a system of pipes joined with rubber, and attached to a boiler which is not bedded or built into either cement or bricks, would constitute a tenant's fixture, and as such could be removed by the tenant at any period of his tenancy, but not afterwards. If he does not remove his structure before his tenancy expires, he cannot legally remove it at all. Where a lean-to house is constructed, and is to be a tenant's fixture, the top of the roof should lean on and be supported by iron brackets fixed to the wall, but it must not be attached to these in any way. In some districts it will be found almost impossible to comply with these conditions, as greenhouses, at any rate in many places, come within the province of the Local Authority, and many district surveyors insist on a solid, brick foundation for any structure, however slight. Notice must, except in a very few districts, be given to the Local Authority before erecting a greenhouse, and work should not be begun until approval has been given. Where there is any doubt whatever as to the nature of the building about to be erected, it is by far the best plan to have a definite agreement on paper between the landlord and the tenant, specifying that the latter shall be allowed to remove the greenhouse at the end of his tenancy. This prevents any doubt; and having got the permission of the Local Authority, the work may be proceeded with. The foundations of the house should be laid in concrete laid at the bottom of a trench eighteen inches deep, and a foot in depth itself. On this concrete, made quite level, two layers of bricks should be placed, the upper one a brick and a half wide, the bricks laid end to end across the trench, the lower one two bricks wide laid in the same way. You thus have a block of

concrete, and on it a tapering wall. The earth should be replaced to a level with the top bricks, and the foundation is complete. The actual building of the house is too detailed a matter to be dealt with here. There are several good books on the subject which give complete practical details of the whole work from the beginning to the end. A few points, however, must be insisted on. Whether building your own house or having one built for you, never allow cheap glass to be used in the lights. The best twenty-one ounce glass should be used, although it may make a little difference to the expense at first. Cheap glass will give infinite trouble, the little flaws and bladders in it acting as so many burning glasses, and damaging many a valuable plant. Opinions differ as to the best method of putting in the glass—whether with or without outside putty. The general opinion seems to be in favour of both in and outside putty, the inconvenience when repairs are needed being more than counterbalanced by the greater weather-proof qualities. Each pane should overlap its lower neighbour by a good quarter of an inch. The house should be painted outside once a year, and inside every two or three. All brickwork, inside and out, should be lime-washed at least once a year, and a little flowers of sulphur added to the wash will do no harm, and will help to keep out red spider. I have already discussed the matter of staging. I have only to add that in a small house it is a great advantage to have all stagings made removable.

**Watering.**—There is no golden rule as to watering pot plants in the greenhouse. The amount of water varies so greatly with the surrounding conditions that it is useless to dogmatise about it. A few things must always be observed. Thus, when watering a plant, give it a sufficiency of water; do not merely damp the surface of the soil. The earth in the pot should be thoroughly saturated, but so much water that it pours over the sides of the pot or straight through it down the drainage hole is not needed. Plants will need the most in the spring and summer, both because the air is then drier, and because the plant is in full activity and is using up water at a great rate. Dormant plants are best kept rather dry until growth begins. Rain water, of the same temperature as the house, should always be used for watering, but where this is quite impossible, hard water may be softened and made fit for use by dissolving four ounces of soda in hot water and adding it to the water in the proportion of four ounces to thirty gallons

of water. The best time for watering varies with the season : twice a day is often necessary in the summer. In the greenhouse watering is often as useful for keeping the air in a proper state of moisture as for anything else, and in hot weather the walls, staging, and floor, should be frequently syringed. When the air is very hot and dry, the floor may with advantage be absolutely swilled with water, which will evaporate into the air and keep it moist. In the summer, watering of the plants themselves should be done when the sun's heat is at its lowest, early in the morning or in the early evening. Plants should never be allowed to become so dry as to droop, but if this has occurred, the whole plant, pot and all, should be stood in water deep enough to cover the pot. When thoroughly soaked, it should not at once be replaced on the staging, but put in the shade for an hour or two to recover. Hard water containing lime is especially bad for heaths, rhododendrons, and azaleas, and these will not tolerate the least suspicion of lime or chalk in their soil.

A propagating frame is a most useful adjunct to the greenhouse, both for the purpose implied in its name and for bringing on plants and bulbs required for forcing and for greenhouse decoration. It saves a great deal of room in the house, as well as giving a home to all kinds of plants, cuttings, and seedlings which do not help the attractive appearance of the house. The frame, for instance, is very useful in the case of forced tulips, lilies of the valley, narcissus, and other plants of the same habit. These may be left in the frame until the flowers begin to show, and should then be brought into the house and placed close to the glass. As the flowers attain their full beauty they should have a warmer and warmer spot until they have reached their finest state, when removal to a cooler place will help to prolong their beauty.

**Orchid-growing in a Cool House.**—There is a popular notion that orchid-growing is a hobby for millionaires, and that it is futile for the amateur to attempt it. This is far from being the case. There are many orchids, and those by no means among the least beautiful, that can be well grown by the amateur in a cool greenhouse. The best house in which to begin orchid-growing is one of the lean-to kind, with a north or north-west aspect, and not more than twelve feet high at the back. The front lights should not be made to open, but ventilation should be ensured by letting shutters into the low front wall, working on a central pin, and so placed that the incoming air may be



warmed by passing over the hot-water pipes. The top ventilators should run the whole length of the house. The pipes will only be required in order to keep out frost in hard weather, so that little piping is needed. The winter temperature should never fall below thirty-six degrees, nor should it rise above fifty degrees.

The house should never be allowed to get too hot in summer, and for this purpose outside blinds will be required, made of some material substantial enough to keep out the heat, and yet excluding as little light as possible. The blinds should not lie close to the glass, but should be fixed to iron rods projecting from the house, so that when pulled down there may be an air-space of about nine inches between glass and blinds. This space will provide a cooling current of air. An ash floor, with a wooden lattice for path down the middle, is the best and most economical, and when well damped will give out moisture enough to keep the atmosphere in the state of dampness which orchids enjoy.

Soft water is required, so that a tank should be provided to catch the drainage from the roof. Hard water is injurious to orchids, and it is best to have the tank inside the house, that the water may be at a temperature suitable to that of the air within.

The stages should be four feet wide, running along both front and back of the house. The back one should be slightly higher than the front, which should be just on a level with the bottom of the front lights. Slate, or, if slate is too expensive, iron galvanised sheets covered with shell shingle two inches deep, should form the shelves.

For suspended plants a few wires should be firmly stretched along the roof.

The best, and by far the most "sporting" plan is to buy unflowered plants from the importers either at sales or direct, this being the cheapest as well as the most exciting method of obtaining them. The element of chance in these purchases is pleasantly stimulating, as among a lot of good ordinary flowers there is always a chance of getting a really good specimen; while many of the orchids which are despised by the professional orchid-growers are far more decorative and useful for the amateur than their show cousins. The following list includes nearly all those which may be well grown throughout the year in a cool house of the kind described above, from which a selection should be made with a view to a final disposition of the plants in their house.

All the forms of <i>Odontoglossum</i>	<i>Oncidium Forbesii</i> .
<i>crispum</i> .	" <i>Gardnerii</i> .
<i>Odontoglossum Andersonianum</i> .	" <i>macranthum</i> .
" <i>aspersum</i> .	" <i>nubigenum</i> .
" <i>Bictoniense</i> .	" <i>Phalænopsis</i> .
" <i>blandum</i> .	" <i>serratum</i> .
" <i>cordatum</i> .	" <i>tigrinum</i> .
" <i>constrictum</i> .	" <i>undulatum</i> .
" <i>coronarium</i> .	<i>Masdevallia bella</i> .
" <i>Coradinei</i> .	" <i>Chimeara</i> .
" <i>Cervantesii</i> .	" <i>coccinea</i> .
" <i>cirrhosum</i> .	" <i>Houtteana</i> .
" <i>Edwardii</i> .	" <i>Harryana</i> .
" <i>Hallii</i> .	" <i>Lindeni</i> .
" <i>hebraicum</i> .	" <i>ingea Massan</i>
" <i>luteo-purpureum</i> .	<i>geana</i> .
" <i>mulus</i> .	" <i>trochilus</i> .
" <i>nebulosum</i> .	" <i>Shuttleworthii</i> .
" <i>macranthum</i> .	" <i>Schlimii</i> .
" <i>naevium</i> .	" <i>Roezlii</i> .
" <i>Pescatorei</i> .	" <i>Wallisii</i> .
" <i>polyxanthum</i> .	" <i>Wagneriana</i> .
" <i>ramosissimum</i> .	<i>Sophronitis grandiflora</i> .
" <i>retusum</i> .	<i>Cattleya marginata</i> .
" <i>Rossii majus</i> .	<i>Lealia prestans</i> .
" <i>Schroderianum</i> .	" <i>Dayana</i> .
" <i>tripudans</i> .	<i>Ada aurantiaca</i> .
" <i>triumphans</i> .	<i>Mesospinidium vulcanicum</i> .
" <i>Uro-Skinnerii</i> .	" <i>sanguineum</i> .
" <i>Warnerianum</i> .	<i>Mormodes Medusaa</i> .
" <i>wilckeanum</i> .	<i>Maxillaria grandiflora</i> .
<i>Oncidium cheirophorum</i> .	<i>Cypripedium insigne</i> .
" <i>concolor</i> .	" <i>Boxallii</i> .
" <i>cucullatum</i> .	" <i>villosum</i> .
" <i>excavatum</i> .	<i>Pilumna fragrans</i> .

The *Masdevallias* will enjoy the coolest and dampest part of the house, some of the dwarfiest of them—such as *Shuttleworthii*, together with *Odontoglossum Cervantesii*, *Sophronitis grandiflora*, and *Oncidium concolor*—occupying the roof. The *Oncidiums* will fill the back part of the staging, as they are the tallest growing of our plants, among them *O. macranthum*, with *Odontoglossum Edwardii*, also tall in habit. The smaller growing plants, the *Cypripediums*, the medium-sized *Odontoglossums*, *Ada aurantiaca* and *Oncidium cucullatum* will fill the first stage.

There are three things to remember in growing orchids if success is to be obtained, the first is proper watering, the second proper temperature, and the third cleanliness of air, house, pots, soil, and water. If the latter condition is observed pests will trouble the orchid-house very little, but they must be watched for with great care. The commonest of them is thrips, and the orchid thrip is so small that it will often be overlooked unless sought for with the magnifying glass. It should be made a rule to examine each plant for thrips at least once every three weeks, and examination should be directed chiefly to the axils of the young leaves. The best weapon against it is a soft, camel's-hair brush, dipped in an insecticide and poked gently into all hollows and cavities about the plant. The foliage should be washed with weak soap and water. Slug traps are needed in the orchid-house, and should consist of small pieces of turnip, orange peel, or carrot. Slugs are very fond of climbing the stems and devouring the young flower-buds, which they enjoy extremely. A band of cotton-wool fastened round the base of the flower-stalk will prevent them from securing this feast. Fumigate with pure tobacco at once should green-fly appear in the house.

It is very unwise to allow orchids to over-flower themselves. It is easy to kill a strong plant by allowing it to bear too many flowers, and to keep them too long. If you have room, have two plants of each kind, and allow them to flower in alternate years only, and where the plant is at all delicate, cut its flower-spike as soon as it has reached perfection and place it in a tube of water beside the parent plant. This preserves the flower as well and for as long a time as if it had been left *in situ*, while it relieves the plant of a great strain.

Orchids are freakish plants, and will often take likes and dislikes to particular positions in the greenhouse, flourishing freely on one shelf and pining on another. Take notice of these whimsies, and humour them. If a plant seems ailing move it about in the house, leaving it long enough in each place to give it a chance of settling down, but removing it if it does not seem happy. When once the ideal spot is found leave the plant there, and do not allow it to be removed.

Grown in this way and with careful treatment, as perfect blooms may be grown by the amateur as by the professional with his range of heated houses. It all lies in the selection of the varieties of plant which enjoy the conditions which you are able to provide, and in then setting yourself to provide these conditions in their most perfect form. Soil is one of the things

to study for those orchids which root in the earth, while the provision of special pots with extra openings shows how essential is good and thorough drainage. In addition to these provisions, the pot destined for an orchid should be half filled with drainage crocks, instead of receiving a layer at the bottom only, the rest of the pot being filled with a layer of fibrous peat for the roots of the plant, mixed with sphagnum in the proportion of one part of the latter to one of the former, although these proportions are not unvarying. This compost is all the better for a liberal admixture of charcoal in lumps. Occasional re-potting is good for orchids, as their roots are apt to die off and should then be cut away. The aerial or Epiphytal orchids do not grow in soil, most of them doing best fixed to a block of some such hard wood as teak, which does not readily decay, and placed near the glass. Orchid baskets, for suspension, are also made of this hard wood, though in the case of such orchids as send their flower-spikes downwards through the soil the wire baskets must be used.

**Greenhouse Foliage Plants.**—There has been a great increase of late years in the number of foliage plants grown for conservatory, greenhouse, and indoor decoration. A quarter of a century ago the use made of plants indoors was very limited, the cottager's window geranium or cactus being almost the sole example. Foliage plants now enjoy a high degree of popularity for indoor use. They are beautiful throughout the year, or nearly so, an advantage which the flowering plant does not possess; they can be used at various stages of their growth in various ways, and they are usually fairly easy of cultivation.

The greatest increase in popularity is undoubtedly in the case of the palm family. These plants are now used more than any others for indoor decoration, and the fact that they vary so enormously in size makes them useful in a number of ways. The smallest kinds are excellent for table decoration, and from these dainty specimens we can ring the changes on all sizes up to the twenty or thirty foot giant which lives in the big conservatory or palm-house. Half-way up the scale we find many kinds which do well in the milder spots of the garden during the summer. One kind, *Trachycarpus Fortunei*, will, if well looked after and protected in winter, do fairly well out of doors, but the majority of species are house plants. For general purposes, *Cocos Weddelliana* is an excellent palm: its elegant, fern-like leaves, together with the fact that it shows its full beauty while still in a small state, making it an almost ideal

foliage plant for the table. Besides these two, useful palms for the greenhouse include the Kentias, notably *Kentia Belmoreana* and *K. Fosteri*, *Chamaerops humilis* and *Fortunei*, *Areca Sapida*, *Corypha Australis* and *Latania Borbonica*.

To grow palms successfully they must be well drained, with a plentiful supply of water, both winter and summer. They are peculiar in that they do best with their roots somewhat restricted as to space, so that they should never be put in too large a pot. Many of the species need a considerable amount of heat, and often moisture as well, though these are not the best for the amateur to select. Those named above do well in a house merely protected from frost. During spring and summer the palms should be syringed morning and evening. In a warm house the evaporation from sprinkled walls and staging will be sufficient during the winter. Partial shade in the hottest part of the day should be provided. In the cool house the temperature for palms should vary from between 45 degrees and 55 degrees in winter to between 55 degrees and 65 degrees in spring and summer. Palms are usually bought by the amateur as small plants, as they are cheap enough and are rather troublesome to raise. When purchased they should be re-potted in pots of the same size in a good mixture of yellow fibrous loam and silver sand, or, if preferred, of fibrous peat and grit. The spring or early summer time is the best time to re-pot. The pots used should be of a size just to contain the roots without injury, and it is most important in potting that no part of the stem should be buried in soil. The earth should be well rammed with a hand rammer. The base of the stem should be set so as just to rest on the surface, and any injury to or cutting of the roots may easily prove fatal to the more delicate palms, so that care is needed in the re-potting process. Palms should be inspected at fairly frequent intervals to see whether re-potting is needed, but it should not be done until the roots are really crowded. In potting, the ball of soil and roots should be lifted intact, the old crocks removed, if the roots are matted round them, and a little soil substituted for them. The ball should then be placed, still intact, in another pot, of such a size as to allow about two inches all round of new soil, which will in many cases keep the plant in health for a couple of years. Where the plants are small in size, the increase in size of the new pot should be as little as possible, or the roots will have too much running room. Palms are the better for a little liquid manure, preferably a manure-water made from cow-manure and soot, and where their foliage has a tendency to yellowness or pallor a small lump of sulphate of iron, placed

on the surface of the soil and allowed to dissolve slowly, will often work wonders.

With the palms we should consider the Cycad family as greenhouse and sheltered garden plants. They are useful and beautiful, though as their growth is somewhat slow they are not so popular as the palms. They like a fairly dry atmosphere, which makes them suitable in some cases where palms cannot be used. The variety *C. Revoluta* is excellent in a sheltered spot in the open garden, and may be left there from May until September. This variety and *C. Circinalis* are the two most useful for the small house, as the others only differ from them in minor details. They enjoy much the same conditions as do the palms, liking a mixture of strong loam and river sand, and needing good and thorough drainage.

The greenhouse yuccas are good foliage plants, and although they are slow of growth, the fact that they are equally decorative in a small state counterbalances the defect, as they may serve various uses at various stages. Their varieties are endless, and comprise both hardy and stove plants. The *Dasyliirions* are a useful family of evergreen foliage plants, with fine flowering heads, but are rather large for the small greenhouse. Their flower stems, in well-grown specimens, are sometimes ten and twelve feet in height, and make magnificent ornaments to a house large enough to show them well. They enjoy a compost of one part each of peat and sand with two parts of loam, while, as with the above-mentioned plants, good drainage and a plentiful supply of water in the summer are essential.

Of beautiful plants, far too rarely seen, perhaps the best is *Cyanophyllum magnificum*, one of the most lovely foliage plants in cultivation. The fine colouring of its leaves, velvety green above, reddish purple below, with ivory veins and midribs, give it a most striking appearance. It is equally good used in a small state as a table plant or as a fine specimen in the greenhouse. It likes a somewhat more moist atmosphere than the foregoing plants, or the leaves are apt to become deformed if allowed to get too dry when immature. Otherwise the cultural directions are the same, the plants thriving best in equal parts of fibrous peat and leaf-mould, with one-fourth part of silver sand added.

The silver-foliaged plants are worthy of a place in all greenhouses, and amongst them the best are *Eulalia Japonica variegata*, *Pandanus Veitchii*, *Cyperus alternifolius variegata*, and *Anthericum argenteo-lineare*. The *Eulalias* are half hardy, and do not require much heat, indeed some of them make good border plants. They will do well in any good garden soil. *Pandanus*

requires some heat, and does best in sandy loam, mixed with a little charcoal and leaf-mould. In winter it needs but little water, but in summer should have a liberal supply. In watering during the winter care must be taken that no water remains in the axils of the leaves, as this is very injurious to the plant. *Cyperus* likes moisture, with a soil of loam and sand, mixed with a little peat. The *Anthericum*s do best in a rich, light soil, composed of fibrous loam and either leaf-mould or well-decayed manure, with some coarse sand. They should be potted in pots about a foot across, and kept well watered while flowering; after that time the water may be lessened, but the roots should never be dry. This family is largely hardy, and the plants therefore do well in cool houses, or in a room.

Where plants are required to serve as table decorations—where they are often most successful—the grower should select dwarf-growing plants, which give their full effect while still small enough to be suitable. Amongst them he should place the *Fittonias*, *F. argyroneura* and *F. Pearcci*; *Selaginella saesia*; *Panicum variegatum*, and *Cyrtodeira metallica*. These make pretty dinner-table decorations, grown either in thumb pots or in the shallow pans used for growing orchids. The *Fittonias* have prettily variegated leaves, and enjoy partial shade and a liberal water supply. The best soil for them is a compost of loam, peat, and silver sand. *Selaginellas* like the same conditions as do ferns, and thrive well in light ordinary soil, to which charcoal or small potsherds have been added and freely mixed, so as to keep the texture very open. Moisture and shade suit them. *Panicum variegatum* is a grass, variegated with pink and white, and does well in ordinary light garden soil. It is nearly hardy, but in winter should be kept in heat. *Cyrtodeira* likes shade, with a soil of peat, leaf-mould, and sand, which should not be pressed too firmly round the roots in potting. This plant, like *Selaginella*, likes an open-textured soil. The drainage must be thorough, and the plants enjoy a moist bed, such as is provided by a layer of moist coal ashes under the pots.

For the actual decoration of the greenhouse the foliage plants are most useful. The dwarf varieties may be used in small pots to cover and decorate the fronts of the stagings, and others, a trifle higher, as an undergrowth to larger specimen plants. Where, as is often the case, there is a damp wall which will not retain whitewash or other colour, and is always patchy and untidy, the maiden-hairs and other ferns, such as *Pteris longifolia* and *Nephrodium molle* can be used to clothe them. Climbers,

if used with discretion, help enormously in the look of a greenhouse, amongst them the varieties of *Asparagus*, some being suited to the warm and others to the cool house. *Aristolochia elegans*, *Gloriosa superba*, and the passion-flower, *Passiflora Kerresina*, are all useful and beautiful. For a quite cool house the African *asparagus* is admirably suited, as it can stand a temperature as low as forty degrees. Another climber which can stand a low temperature is *Lygodium scandens*, but this is less hardy than the foregoing. *Myrsiphyllum asparagoides* is so good for cutting that it should be included wherever possible.

These ferns can be established on the wall itself with very little trouble, wherever the surface is not cement. A little soil rammed into crevices will help the plants to get a foothold.

For baskets many ferns are admirably suited, notably *Adiantum amabile* among the maiden-hairs, and with it *Gymnogramma schizophylla gloriosa*. *Asparagus deflexus* is a good basket plant. Many basket plants get an insufficient supply of water, and look dwarfed and poor in consequence. This fault should be avoided.

Rockwork is far too little used in conservatories and ornamental greenhouses. It has quite a unique utility in hiding unsightly walls and filling useless corners, and may be utilised for growing such things as the ferns, variegated grasses, and the foliage begonias. Many of the hardier of the exotic ferns may be grown in this way in a cool house without artificial heat at all, the filmy ferns in particular doing well in this manner.

**Cacti.**—Nearly all the species of cacti may be easily grown in a moderately-heated greenhouse. For most kinds a winter temperature of about fifty degrees, and a summer temperature of seventy to ninety degrees will be found suitable. Those species which come from tropical regions should be kept in the warmer parts of the house, and should be kept very dry throughout the winter. Cacti may also be grown to advantage in frames, and a large number of varieties do well if kept in an ordinary dwelling-room if placed in the window. The soil used should consist of one half fibrous loam, and one half of an equal mixture of sand, broken bricks and lime rubbish, the pots being filled to about one-third of their height with broken pots and other sorts of drainage material. In this soil, in an almost dry condition, cacti should be firmly planted, preferably during February or March. In the cultivation of cacti, watering is most important, the great danger being the giving of too much rather than too little. When the plants are in active growth,



they may be watered twice a week during the summer, but in winter water should not be given oftener than once a week, or even once a fortnight. Propagation is generally managed by cutting or by off-set. These should be cut off with a sharp knife, and laid on a sunny shelf until roots show themselves, when they should be planted and lightly syringed.

**Plants for the Unheated Greenhouse or Conservatory.**—In arranging an unheated greenhouse it should be remembered that plants which have their roots under the surface of the ground can stand cold far better than those whose roots are in a pot and above the surface of the earth. Plants in the border will stand many degrees more cold with less damage than exactly similar plants standing beside them in pots. It follows that in the unheated house plants should, as far as possible, be grown in the soil, or at least as many pots as possible should be plunged in the ground. Permanent groups of such plants as camellias, for example, are a beautiful feature in such a house, and should be planted straight in the soil. Rhododendrons, palms, and dracaenas all do well in the unheated house, while the Japanese lilies are lovely additions. Among suitable shrubs for this house are the Myrtles, the Camellias, the Oleanders, various Jasmines, Tree Carnations, Rhododendron arborea, and the Azaleas. Laurustinus and Daphne Mezereum will enliven it in the depth of winter. Among other plants suitable are the Agapanthus, both white and blue, Aralia Sieboldii, and the various Azaleas; Arundo, the New Zealand Flax, *Aspidistra lurida variegata*, the various Bamboos, the various Cannas, Clematis, Camellias, *Coronilla glauca*, the various Dracaenas, *Dielytra spectabili*, *Edwardsia grandiflora*, all the Fuchsias, the Fan palms, Hydrangeas, Jasmines, Myrtles, the white and red *Lapageria*, *Mandevilla suaveolens*, the Oleanders, *Phormium tenax variegatum*, the lilies, *Solanum jasminoides*, *Rhododendron arborea*, and *Lycopodium denticulatum*. Added to these are nearly all the hardy and nearly hardy garden plants which do well in pots, including the primulas, wallflowers, Brompton stocks, pinks, columbines, pansies, Michaelmas daisies, Christmas roses, and anemones, all of which do well and flower freely in the unheated house. All the bulbs do well, as do the cyclamens and lilies of the valley. The best arrangement for such a house is on the whole to group a selection of the shrubby plants together, planted permanently in the soil, and to arrange the pot plants harmoniously around and among them, using staging and shelves as supports. If the house is sufficiently large a very charming effect is produced by

arranging it almost in the manner of a garden border, with the plants grouped just as they would be in a herbaceous border, with a winding path running between them as in the open garden. If the plants and shrubs are well arranged a real winter garden may be produced.

The following list will be found to include most of the plants suitable for the cold house or conservatory, with the exception of a few of such a size as to render them unsuitable for the amateur's handling:—

Anomatheca cruenta.	Lastraea Sieboldii.
Agapanthus (the blue African Lily).	Adiantum pedatum.
Antholyza.	Pellaea atropurpurea.
Auricula.	Woodsia elvensis.
Azalca mollis.	Platyloma falcata.
Calochortus (the Mariposa Lily).	Lomaria alpina.
Camellia.	Polypodium vulgare.
Canna.	"    Cambricum.
Carnations.	Schlopendrium vulgare.
Celosia.	"    crispum.
Celsia cretica.	Osmunda palustris.
"    arcturus.	Polystichum angulare Bayliae.
Cenothus rigidus.	Funkia.
Chrysanthemum.	Iris (bulbous-rooted).
Chionodoxa.	Ixia.
Corylopsis pauciflora.	Lobelia.
"    spicata.	Muscari.
Coprosma.	Myrtle.
Cytisus biflorus.	Nerine.
"    Kewensis.	Phormium.
"    Andreanus.	Schizotytilis.
Daphne cneorum.	Scilla.
"    mezereum.	Sisyrinchium.
Deutzia.	Snowdrop.
Eulalia.	Solanum jasminoides.
Fabiana.	Solomon's Seal.
Farfugium.	Sparaxis.
FERNS—	Stauntonia.
Lastraea decurrens.	Trachelium.
"    atrata.	Tritonia.

**The Cool House.**—The cool greenhouse is one whose temperature ranges in winter and spring from fifty degrees in the

day to forty at night, while during the summer it remains at a temperature of about five degrees above that of the outer air, both by day and night. The cool house provides a home for a very large number of tender and half-hardy plants, and will be found the best all-round house for the amateur to manage. Few of the plants grown in it are delicate enough to be much injured by a variation of a degree or two in the temperature, although they are all too tender to fight in the open air.

Many of the plants which thrive in this house are hardy in the summer months out of doors, but none of them can withstand the rigours of an ordinary mild English winter. The list which follows will give scope for choice in furnishing the cool greenhouse :—

Achimenes.	Erica.
Amapanthus.	Eriostemon.
Anthericum.	Eucomis.
Arundo.	Eulalia.
Arum sanctum.	Eupatorium.
Azalea Indica.	Eurya.
Begonia (tuberous-rooted).	Fatsia.
Bignonia.	FERNS—
Boronia.	Adiantum capillus veneris.
Canna.	"    formosum.
Carex.	Asplenium lucidum.
Tree Carnations.	Cyrtonium falcatum.
Malmaison Carnations.	Davallia Mariesii.
Choisya.	Lastraea fragrans.
Chrysanthemums.	Woodwardia radicans.
Cineraria.	Platyloma cordata.
Clematis.	Pteris cretica.
Clanthus Dampieri.	"    scaberula.
Clivia.	Nephrodium molle.
Cobea scandens.	Osmunda japonica.
"    S. variegata.	"    corymbifera.
Crassula.	Francoa.
Cyclamen.	Genetyllis.
Cyperus.	Gompholobium.
Cytisus.	Haemanthus.
Daphne Indica.	Hovea.
Dianella.	Hydrangea.
Diplacus.	Jasminum.
Embothrium.	Kalanchoe.
Epacris.	Kalosanthes.

Kennedyia.	Pelargonium.
Lachenalia.	Pimelea.
Lapageria.	Polygala.
Leschenaultia.	Pomegranate.
Mandevillea.	Rhododendron.
Mimulus.	Saxifraga.
Mitraria.	Solanum hybridum.
Mutisia.	Sollya.
Olea.	Sprekelia.
Oleander.	Swainsonia.
Ophiopogon.	Tropaeolum.
Orange.	Vallota.
Ornithogalum.	Veronica.
Orthonna.	Yucca.

**The Warm Greenhouse.**—The warm greenhouse is that which can maintain a temperature of from forty-five to fifty-five degrees in the winter, and from sixty to sixty-five degrees in the summer, and this will be found warm enough to grow all the plants which the amateur is likely to try to handle. Houses heated above this point are troublesome to deal with, and all need such careful regulation and watching, to say nothing of the expense of their heating, that they require a special volume to themselves. The warm greenhouse will give the amateur a very wide range of choice, for many of the plants which have been included amongst those grown in the cold and cool houses can also be had in perfection in the slightly warmer house. The warm house also allows of far greater scope in the matter of forced and out of season flowers. The following list will supply a field for choice, and all the plants named will be found to do well in the temperatures easily obtained in this house.

Abutilon.	Aspidistra.
Acacia.	Banbusa.
Adenandra.	Beaucarnea.
Agathaea coclestris.	Begonia (ornamental-leaved).
Alonsoa.	"    (fibrous-rooted).
Aloysia citriodora (the lemon verbena).	Blandfordia.
Aphelexis.	Bouvardia.
Aralia.	Cacti.
Araucaria.	Calla lilies.
Aranja.	Cannas.
Asparagus.	Chorozema.
	Cobea scandens.

<i>Cobea scandens variegata.</i>	<i>Heliotrope.</i>
<i>Datura.</i>	<i>Hippeastrum.</i>
<i>Epiphyllum.</i>	<i>Hoya.</i>
<i>Erythrina.</i>	<i>Isolepis.</i>
<i>Eucalyptus globulus.</i>	<i>Lagerstroemia.</i>
" <i>citriodora.</i>	<i>Lantana.</i>
<i>Eulalia.</i>	<i>Lasiandra.</i>
FERNS—	<i>Linum trigynum.</i>
<i>Adiantum cuneatum.</i>	<i>Lomatia.</i>
" <i>Williamsii.</i>	<i>Lotus.</i>
<i>Asplenium bulbiferum.</i>	<i>Marica.</i>
" <i>Colensoii.</i>	<i>Manandya.</i>
<i>Davillia bullata.</i>	<i>Monochaetum.</i>
" <i>Canariensis.</i>	<i>Plumbago.</i>
<i>Lygodium japonicum.</i>	<i>Rhopala.</i>
<i>Onychium japonicum.</i>	<i>Rhynchospermum.</i>
<i>Platyterium alciorna.</i>	<i>Saintpaulia.</i>
<i>Pteris Victoriae.</i>	<i>Salvia.</i>
" <i>tremula Smithii.</i>	<i>Selaginella.</i>
" <i>serrulata densa.</i>	<i>Smilax.</i>
<i>Ficus.</i>	<i>Sparmannia.</i>
<i>Fuchsia.</i>	<i>Statice.</i>
<i>Freesia.</i>	<i>Stephanophorum.</i>
<i>Gloxinia.</i>	<i>Strelitzia.</i>
<i>Grevillea.</i>	<i>Streptocarpus.</i>
<i>Habrothamnus.</i>	<i>Tuberose.</i>
<i>Hebeclinium.</i>	<i>Veltheimia.</i>

No. 25. ASPIDISTRA



1 Aspidistra, showing pot-bound plant.



2. Division of Aspidistra for potting up.

No. 26. MAIDENHAIR FERNS

2



3



## CHAPTER VII.

### PRUNING AND GRAFTING.

**The Objects of Pruning.**—There are three main objects at which we aim in pruning a tree. The first is to promote healthy growth of wood, and this is the chief aim of the grower in pruning his young trees. The second, and one almost equally important in the early life of the tree, is to give the form desired, a point of great moment in the future of the tree as regards fruit or flower. These two ends are attained by the same means: first, the tree is shaped in such a way that when fully grown it may be well balanced and well proportioned according to its natural habit; secondly, the branches are so thinned as to allow of perfectly free circulation of air and light throughout the tree, thus promoting the ripening of the wood and keeping it healthy; and thirdly, the tree is helped to produce good vigorous shoots and thus to come to maturity as soon as possible, by means of judicious cutting back of weak shoots and shortening of strong ones. The third main object is the increase of fruitfulness which of course means increase of flowers in the case of plants grown for their blossoms. This third point opens a far more extensive field than the two preceding. The latter come under rules which hold good in a rough way for all plants and trees, but the former varies with nearly every family of plants, and indeed often with each variety. When we consider the amount of harm that can be done by injudicious pruning or neglect, the importance of the operation is clear. Trees hacked and stunted, others allowed to run wild and luxuriate into an absolute thicket of barren wood, trees so lop-sided and unbalanced as to be at the mercy of the first high gale, all these are the marks of unskilfulness and ignorance of the art of pruning, and result in fruit poor in quality and small in quantity.

Having grasped the importance of pruning to the gardener, we must next find out the broad principles of the art. There are



not—nor indeed are there in any art—hard and fast rules which apply in all cases. The gardener must use his own judgment in their application, having a due regard to the situation of his tree, its relation to its neighbours, its supply of light and air, and the character of the soil in which it grows. But there are certain general principles which, once fully understood, will give him a good method and direct his calculations. Common sense, working along well understood lines, will give the best possible results, in pruning as in most other things.

**Pruning Newly-Planted Trees.**—When young trees are transplanted from the nursery bed it is almost inevitable that their roots should be injured to some extent in the process. A well-grown young tree usually has roots extending as far on either side of the stem as the tree itself has grown upward. Some of these roots are always torn off and others badly bruised in digging, and must be attended to. If they are planted in a bruised condition they induce decay and disease, so that all torn or injured roots and rootlets should, before replanting, be carefully trimmed off with a sharp knife or with good pruning shears. The knife is preferable to any but good modern shears, as the latter, if blunt or badly made, will bruise the root on either side of the cut. It is well to remember throughout the process of pruning that while a tear or break will heal badly and leave at best an ugly scar, while the wound heals slowly and is liable to disease, a clean cut, neatly trimmed, will heal cleanly and quickly and leave very little trace.

With regard to the question of top-pruning young trees when first planted, opinion has undergone a great change during the last ten or twenty years. Old-fashioned growers were almost unanimous in condemning the practice, but nowadays the unanimity is all the other way. The older school asserts that as the process of transplanting gives the tree a considerable check, it is wise to counteract this check by leaving the tree with its branches their full length for the first year, that they may produce the greatest possible number of leaves, and thus stimulate root action. The modern school looks at the question in a different light. It advocates the shortening of the branches for several reasons: first, to restore the balance of the tree, which has been disturbed by the loss in length and number of the roots. Secondly, it holds that the long shoots if left on the tree cause an unnecessary evaporation of the sap, besides exposing a greater surface to wind, and putting an undue strain on the roots, not yet firmly established in their new ground. Thirdly, it maintains that non-

pruning defeats the end in view, as the leaf growth put out on the weakened shoots is so poor compared with that from vigorous buds on cut-back shoots that the desired root action is rather hindered than helped.

It seems to be well established by experiment that the pruning of newly-planted fruit trees is desirable. This pruning must vary in kind and severity according to the plant operated upon. Speaking broadly, a young and vigorous tree should have its branches shortened to one third of their length. Where the planting is done fairly late in the season the necessary pruning may be done at once, where it is early the operation may well be deferred for a week or two, that the buds may be past the danger of drying up, and the best ones may be more easily selected.

The method of pruning such young trees, so as to combine most of the advantages from each point of view, is to thin out all the feeble shoots, so selecting them that the head when finished may be balanced and evenly filled. The remaining one-year shoots should then be cut back to a good bud, care being taken to see that it is so placed on the stem, inwards or outwards, that the shoot produced from it may occupy a suitable position in the general "design" of the tree. The final shapeliness of the full-grown tree depends much on this first selection of shoots.

Much also depends on the judgment of the pruner in the matter of the amount to be cut from the young tree. The leaves and roots are interdependent; if the leaves are too few the root growth will be feeble: if they are too many the roots will be unable to feed them properly. The amount varies with the kind of tree. The peach readily reproduces new shoots, so that it may be cut back freely with safety, from two-thirds to nine-tenths of the last season's shoot being removed to the advantage of the plant. The grape, too, is a vigorous grower, and may be heavily cut back, while the cherry, on the contrary, is very sensitive, and young trees have been severely injured and even killed by too hard a summer-pruning. Shoots of the cherry should not be cut back in the spring more than half their length at the most. The pear and the apple are between the two, and must be moderately pruned, without excess. The amount of cutting to be done varies also with the size of the fruit, and with other special conditions. For example, plum trees may be left fuller of wood than may apples, as the latter fruit is very much heavier, and the strain of a large crop much greater than in the case of the smaller plum. Again, the apple, to reach perfection, needs sunshine while on the tree;

therefore the shoots must be so thinned that the sunshine may penetrate as freely as possible, while the pear, whose fruit may be, and usually is, ripened after removal from the tree, may carry its shoots more closely packed.

If for any reason young standard trees are left unpruned the result will be quite unsatisfactory. It will be found that during the following season the trees will make very little growth, the buds, excepting for a few leaves, remaining nearly dormant. The next year the now-established tree will from these buds produce flowers, which, if allowed to mature their fruit, will cause breakage of the long straggling branches which bear them. The fruit is generally produced on the ends of these long branches, as the buds on their lower portions will usually be found to have failed to develop, and will have become what is called "blind."

**The Pruner's Instruments.**—The instruments used in pruning are simple in the extreme. First, the pruning knife, a strong knife of good steel, with its blade curved like a cimeter to facilitate clean cutting. The curve should not be so great as to form a right angle, or it will be awkward to use. The handle of the knife should be large enough to fill the hand, and should be of rough stag horn, that the grip may be as firm as possible. Clean cutting is the first thing to aim at in the actual performance of pruning. Two pruning knives will be required: one, very strong, for winter pruning, where the wood to be removed is all hard and well-ripened; and another, lighter and with a thinner blade, for the removal of young green shoots in summer pruning, where the passage of a thick blade might bruise the young wood unnecessarily. The seccateur is used for certain operations, and for the amateur is useful, as it does away with the possibility of injury to other shoots by the slipping of the blade, but it has drawbacks which prevent its use by the skilled gardener. Instead of a clean cut, the seccateur is apt to pinch and flatten the wood as it makes its cut, and the wound, instead of being a clean cut, which will heal at once, will leave a more or less injured piece of wood below it, whose bark is wrenched and torn, and whose substance is bruised and unhealthy. This end frequently withers, and if the cut has been made in the position which in pruning with the knife would be the correct one, the injury affects the bud, which is thus destroyed, and the pruning must recommence lower down. To obviate this difficulty, when pruning with seccateurs, a piece of wood about half an inch long must be left above the bud. This

wood will subsequently dry up and wither, and must be removed the following year.

The only other instrument needed is a small hand saw for the removal of branches too large for the knife. All these instruments must be kept very sharp, or they will bruise the wood and leave unhealthy wounds.

Where a large branch has been removed from a tree the surface of the saw cut should be planed or in some way smoothed, or the wound will heal badly. Where the cut surface is very large it should be covered with the composition known as "grafting" mastic.

**Method of Pruning.**—Almost every detail of pruning is of importance, and has its right and wrong method. The way in which the cut is made is most vital, and on it may depend the whole success of the pruning for the season. The cut itself should be as nearly as may be straight. It should not leave a surface slanting upwards from below the bud, its lower edge below the spring of the bud and its upper on a level with it. This weakens the bud, which does not receive its full nourishment, and it results either in the shoot budding strongly from an undesirable bud lower down, or in the bursting of a new strong bud just below the one chosen, necessitating the re-pruning of the shoot down to that level. On the other hand, the cut should not be made too far above the chosen bud, or the wood left will wither up, and have to be removed the following year. The perfect cut begins on the side of the shoot opposite to the selected bud, and slants ever so slightly upwards across the shoot till it ends immediately above the tip of the bud. It should be clean and unbruised. The bud below it will then shoot out vigorously in a good straight line, carrying out the design which the pruner had in his mind.

Certain of the vicious ways of making the cut have their uses in occasional cases. For instance, where the incision is made about half an inch above a bud the new shoot will grow outwards, in a curve or bow, so that where a tree is very congested and requires opening and extending this cut may have its uses. In all ordinary cases, however, the square cut, with the incision level with the bud, made with a sharp knife, is that to be aimed at.

The first thing to be done before undertaking the operation of pruning is to study the trees to be dealt with, and make up your mind clearly as to what effect you wish to produce. Where you are dealing with young trees it is certainly not a good plan to prune for fruit. The trees are as yet weak and not firmly established,

and their year should be devoted to the formation of good healthy, well-ripened wood, a well-shaped head, and healthy roots. There is an idea among inexperienced gardeners that early summer is a good time to prune, as the wounds then heal rapidly, but this idea is fallacious. It is nearly always found that the pruning of a tree after it has begun its growth has a markedly harmful effect in checking its vigour. Where the object in view is the formation of good new growth as quickly as possible, this checking is certainly not desirable, so that all pruning of young trees should be done before the buds have burst, but when they are well swelled and plump. When this state is reached the pruner can select the best buds and cut back to that without fear that the bud will dry up or become blind. Where young trees are concerned any summer pruning beyond that absolutely necessary to keep them in shape should be barred. Where the new growth shows some defect in shape, such as a bad side shoot or a very lop-sided branch, it may be removed in summer, but the less done in this way the better.

Only very hardy and well-established trees should be pruned actually during winter, as fresh wounds render the trees much more apt to be affected by frost, and a tender tree may be easily killed in this way. Towards spring is the best time for all but the hardiest trees.

Where we deal with already established trees the problem becomes somewhat more complex. As a rough rule, the rapid formation of leaves and wood is adverse to the production of fruit. Obviously the tree has only a certain amount of energy and nourishment, and if this is all, or nearly all, expended on the formation of leaves there will be little left over for the fruit. On the other hand, a certain amount of leaf growth is necessary for the proper nourishment of the fruit and the tree itself. The leaves are, of course, a most important part of the organism, and if an insufficient number are produced or left on the tree its nutrition will suffer severely. On the whole, the slow growth of wood favours the production of fruit and blossom, and should be the end to be aimed at.

The over-production of leaves may be diminished and the nourishment directed into other channels by cutting back, and the crop much improved. Many peach trees, for example, which have run to excessive leaf and consequent small crops of fruit, have been quite restored to their former prosperity by partly cutting back the heads. In such operations the cutting back must be done in winter or quite early spring, before the buds have swollen. The check thus given tends to change the character

of the buds, producing more fruit buds than leaf buds, a change which may be helped considerably by judicious pinching-back during the summer. It is possible to produce this artificial extra growth of fruit buds on a tree which is merely normally vigorous, not over full of leaf, but it is then done at the expense of the health of the tree. The heavy crop of fruit, coming after the artificial check, is often too much for the tree, and good trees have been severely injured or even killed by greediness of this kind.

Summer pruning, to which we have referred several times, is one of the operations which requires judgment and deliberation. It is a very powerful instrument for good or evil in the orchard, and, badly done, is one of the most usual causes of unfruitfulness. If well done it has a most excellent effect. The operation consists in going over the trees in early summer, and pinching off with the finger and thumb nail the soft ends of the side shoots to about three leaves. This will result in fresh shoots being formed from the upper buds, which are again pinched back to two leaves, making five in all. The result of this pinching is the concentration of the sap in the young leading shoot and the gradual change of the leaf buds upon the remainder of the side shoots into fruit buds. This has the additional advantage of concentrating the sap in the leading shoot, which thus becomes vigorous and healthy, and ensures clean strong growth for the next season. Pinching with the finger and thumb nail is advised for this process rather than the use of the knife or seccateur, as the bruise which it gives to the shoot is more effectual in preventing new growth.

Root pruning is an operation which calls for care and attention from the amateur. It is essentially an operation for the garden, not the orchard, and is only fully practicable with young trees. It should not be needed in good conditions where the trees have been well looked after while young, but as a remedial measure where trees have, as it were, got out of hand, it has great uses. It has much the effect of top pruning, but in addition may be used to direct the roots towards the surface of the ground so that they may lie in the upper layers of soil, these being the fullest of moisture and nourishment as well as the best aerated. Root pruning of old and young trees differs in method. Young trees should be completely lifted out of the ground and transplanted. This process will in itself be sufficient root pruning and should be done to those trees whose summer growths are numerous and fruit buds few. Trees with short healthy growth and plenty of fruit spurs are best left alone; they do not need root pruning.

A sharp spade should be used in lifting the young tree, so that the rootlets may be cut cleanly and not broken and bruised, and all cut ends should be trimmed with the knife before re-planting. Try the soil about three feet from the tree, and thence in towards the trunk until fibres are found. Then dig down below the tree and lift it out bodily. Tap roots which are striking straight downwards may be removed before the tree is replaced.

Root pruning of large, established trees is a more difficult matter, and is best done towards the end of the season, when the leaves are still on the trees. A trench is dug round the tree to be operated upon, and all strong roots cut off, care being taken to make the cuts upward, as this helps to keep the rootlets in the top layers of soil. A very sharp spade should then be driven horizontally under the tree, to sever downward-striking roots. This completes the work, and the trench should then be filled up with good loam, mixed, if possible, with some spent manure—some that has been used in a hotbed is best, as it will not be too strong. A pretty safe guide as to the position of the trench for root pruning is the old saying that the roots of a tree spread as far as its branches. This, though not always precisely accurate, is near enough for a rough guide.

**The Best Forms of Fruit Trees.**—In forming a fruit tree from the beginning the grower must consider a variety of things. He has before him his raw material, the "maiden" tree; produced by budding in the summer upon the main stem of the stock a bud of the desired species, and in the following spring cutting off the head of the stock. This leaves the young fruit tree, composed of bud and stock, which, in the following year, will shoot out vigorously from the bud and sprout out side shoots of varying strength. This is the moment when the grower begins to take the training of the tree seriously in hand.

There are a number of different forms into which fruit trees may be trained, and it is essential to success in growing fruit that the proper form shall be chosen for the variety and the situation required. We have a choice of bushes, standards, pyramids, all forms which stand alone in open spaces, and we have the many shapes given to trees which are trained upon supports, among them the cordon, espalier, fan, diagonal, etc.

First, as to space, by a judicious selection of shapes for his fruit trees, it is possible for the gardener to make twice as much use of the space at his command as could be done by using the same form throughout. An especially economical form is the cordon, where the fruit is borne on either side of a single stem, all branches

but the main one being rigorously suppressed. The stem may run either horizontally or at a slant, and the fruits hang along it like onions on a rope. In this form the object of the pruner should be to prevent the tree from developing branches other than the main stem required for bearing, and in order to counteract as far as possible the ill effect to the tree of this rigorous suppression of the side shoots it is well to allow the leader as long and free a run as possible. For this reason, where space is limited, it is as well to slant the main stems of cordon trees, as they can thus pass above each other, and secure a longer run with no more taking up of space. Cordon fruit trees are very good for the edges of beds in the kitchen garden or fruit garden as they are low and very economical of space, and in addition throw very little shadow. The form is good for ripening fruit as the sunshine and air can easily reach every part of the tree. The shape called double cordon, in which two main stems are kept running horizontally in either direction looks very handsome when properly trained as a wall or fence along walks in the kitchen garden. They should not be planted too close to the walk, however, or the fruit may be injured by persons walking in the paths. A clear space should always be left between the trunk of the tree and the ending of the pathway.

A shape very nearly allied to the cordon, in fact almost a development of it, is the espalier. In this form we have a central stem, from which branches extend horizontally sideways, giving the tree the form of a double ladder. Each of these branches is treated as a cordon and restrained to its one main stem, all side shoots being removed. There should be a space of about a foot between the tiers of branches. Where the espalier stands by itself a maximum height of five or six tiers is quite large enough, but where the tree is grown against a wall its size is practically only limited by the available space. It may have twenty or even more tiers quite safely. The form is arrived at, as in all cases, by manipulation of the "maiden" tree, which should be cut hard back to a point where three buds are found not far apart, one on the front of the stem. The leader is then cut back to this point, and, when the shoots push out, the two side ones are trained out horizontally and secured, while the front shoot is left to grow perpendicularly and become the leader. When another trio of buds is formed in a suitable position the process is repeated, until the tree has attained the desired size. Sometimes two or more tiers of good wood have been secured in one season, in very favourable conditions. Sometimes, owing either to accident or to some trick of growth, it is



impossible to find three suitable buds in the desired relative position. In such a case the grower must either resign himself to a badly-shaped tree, or he must supply the missing bud by means of budding or shield-grafting.

The side branches of the espalier are annually cut back to a good bud, preferably a lower side bud, on the last season's wood. This will be found to give a straighter and truer shoot than an upper bud.

The fan shape is another variety of the espalier family. It is, as its name implies, shaped with radiating branches like a fan, and, like the espalier, may stand away from or against a wall. Where it has support from a wall it may be much larger than where it has merely artificial trellises. The fan-shaped tree has no real leading shoot. It is cut back hard as a maiden to a point low down on the stem, about a third of its height being left. From the buds, which break at this point, three good ones should be selected and the others removed, the three selected shoots being shortened in the next spring to six inches each. Of the resulting buds, two are kept on each shoot, the others being removed, and the two remaining buds trained when they burst at equal angles to each other and the other shoots. A young tree of six radiating equidistant branches is thus secured, and is kept in condition by treating each branch as a cordon, as before.

These three forms represent the chief shapes of flat-trained trees. There remain the rounded shapes; the standard, half standard, bush, goblet, pyramid, and so on, trees which stand alone with little or no supporting framework. Of these, for a small garden, the bush form is generally considered the best and most saving of space. Standards are most suitable for orchards, where the requisite space of twenty or thirty feet can be allowed between each pair of trees but for small gardens they are too greedy of room. The bush tree and the pyramid are pruned in much the same way, except for the fact that the pyramid has a central stem, running as straight as possible up the middle of the tree, from which the side shoots spring, while the bush tree has no central stem but branches from the side shoots, the middle being kept clear. The aim of the pruner in forming a bush tree should be to keep his plant well balanced, the branches of equal strength and well directed, so as to allow the maximum of air and sunshine to each. To this end he should, in first forming his tree, cut down his maiden to six or eight buds. These break into a leader and side shoots, which side shoots should be thinned down to three or four, and cut back when they start growth. At the second year the leader and side shoots

should again be cut back to well-placed healthy buds, each branch being allowed from two buds upwards, according to its strength. The strongest branch is best cut back but little, or it will grow too strongly and upset the balance of the tree, but the weaker branches must be dealt with more severely, that their new growth may be healthy and vigorous. The choice of the bud to which the shoot is cut back is a matter of great importance at this stage. A bud should be selected which is so placed that the shoot resulting from it may take its place in the plan of the tree, and will therefore require little subsequent attention and cutting, with its consequent loss of time.

At the end of the third year the tree should be thoroughly overhauled, and all branches which do not take their place in a symmetrical design should be ruthlessly removed. Overcrowding must be avoided at all costs. No tree which is full of useless weakly shoots and rank leafage can produce good or full crops of fruit.

The pyramid form is, as I have said above, pruned on the same lines as the bush, except that the central stem is retained, and is annually cut back to a good bud, as is the case with the side branches. The pyramid form is much used for pears, and for these budded on the quince stock it is excellent, and makes nice small trees for garden walks and among formal edgings. Both bush and pyramid trees may be planted about eight feet apart.

The goblet or cup-shape for trees is a "fancy" shape which has little advantage over the bush or pyramid. It is formed by surrounding the maiden tree with three stakes of good hard wood, planted firmly in the ground as far from the stem of the tree as the diameter desired for the completed cup. Two feet is a good distance to allow. Fasten to these stakes three hoops of wood or iron, at different heights from the ground, to which the young shoots may be fastened while growing to the required shape. The first and lowest hoop should be about fifteen or sixteen inches above the soil, the second as high again above it, and the third fifteen inches above the second, so that the three are equidistant. A framework so constructed will support a tree of four foot six high. The aim of the pruner in forming a bush of this shape should be, when the centre shoots of the tree have been removed, to find enough good outside branches to supply the outline of the goblet, with shoots at intervals of fifteen inches all round. At the same time some of the smaller branches should be cut back to two or three buds that they may form fruiting spurs. The shoots required for the outline of the cup should now be placed in position and secured, as little force being used as may

be. Some pressure is almost certain to be needed, as it is seldom that a plant will be found having enough shoots perfectly placed without a little twisting and turning.

Standard trees are pruned somewhat in the same way as bush trees, allowing for the extra length of the main stem. The maiden standard has, of course, its main stem already strong, the bud having been inserted in the top of a healthy stock. The pruner should, as in the bush tree, cut out the centre branch, and cut clean away any very weak shoots from the branches which are left. The aim should be to leave good healthy branches which shall radiate at fairly equal distances from the top of the main stem. These selected branches should next be cut to a good strong wood-bud, a bud being selected which points in the direction in which new growth is desired. The pruner should seek, as I have said above, to produce a well and evenly-balanced head with branches of equal weight and healthiness. On the first year's pruning the look of the tree greatly depends for the remainder of its life, so that care in this matter is by no means wasted. After this pruning, and as growth becomes strong in the tree, it will generally put out some weak and straggly shoots on the lower parts of the side branches and in the middle of the tree. All these should be carefully pinched out. They are only injurious to the plant. If they are too hard for pinching a sharp knife will remove them thoroughly.

The second year's pruning again helps in the forming of the tree, which now has, or should have, from six to ten good healthy branches, together with a few secondary branches which are unnecessary in the design of the tree. These should either be cut right out, or, if there is sufficient space in that part of the tree for a fruit spur to develop properly, they may be cut back to a good bud and allowed to bear fruit next year. This may also be done with any good small shoots which may have appeared near the base of the main branches. Cut back to two buds, they will bear the following year. The main branches will need shortening to a good bud, to ensure healthy growth in the right direction, and to promote the growth of good shoots to fill empty spaces in the tree. This process is carried on during the third year's pruning, when the finishing touches are given to the shape of the tree. After the third year very little can be done by way of radical alteration. When pruning both bush and standard trees, care must be taken that shoots, as they grow, may not touch or rub against each other, and for this reason the direction of the buds must be carefully noted.

These rules apply to standard trees of both apples and pears,

Plums do not require such hard pruning after the first three years. What pruning is done should be chiefly confined to keeping the tree fairly open, and in removing crossing branches. Where a plum-tree is "worn out" it may often be restored almost to its youthful vigour by hard cutting down of the branches to a length of two or three feet. By this means strong young growth is secured, and the trees may remain fruit bearing for years after their natural old age.

The standard form of tree is a good one for apples, pears, plums, and cherries. It is not, in our climate, so suitable for those fruits—peach, apricot, nectarine, and so on—which require more heat properly to ripen them. For these the protection and concentrating power of a wall is necessary, and the standard shape unfitted. Bush trees are suited to the same fruits as is the standard form, while cordons are best for apples and pears. The same holds good of espaliers, though where these are trained against a wall they are well suited to the more delicate fruits. The fan shape is excellently suited to apricots, peaches, Morello cherries, and nectarines, the Morello cherry particularly enjoying a wall with a northern aspect. The pyramid is a generally useful shape, best suited, perhaps, for pears, though apples, plums, and cherries are grown in this form with success.

**Pruning the Apple.**—The general pruning of the apple has been pretty thoroughly described in the chapter on the shapes of trees, but a few more individual suggestions are still needed.

The first difficulty which occurs to the novice in pruning is the distinguishing between wood buds and fruit buds. These are readily differentiated in the apple both by shape and colour. The fruit buds of the apple are very much rounder and shorter, and greyish in colour, slightly woolly; while the wood buds are brown, thicker, and stouter than the fruit buds, and smoother. A spur is a short cluster of wood buds and fruit buds, but the fruit buds are found as well on the longer shoots as on these spurs.

The vast number of varieties of the apple make it a very difficult fruit to dogmatise about in the matter of detailed pruning. The varieties differ so much in habits of growth that what is excellent for one may be bad for another, within, however, the general rules of good pruning. Thus, some of the kinds usually make very strong young growth, and for these, of which Blenheim Orange is typical, severe pruning is not advised, as it leads them to form a mass of strong young shoots, not needed by the tree, which take all its vigour. These varieties should be lifted at

two years old and re-planted, to check their over-vigorous root action. They will then need little but the cutting out of over-crowded shoots. When young they are best checked for their first season by tipping the shoots and removing any flowers before fruit is formed. This will rest the plants for their first year.

The opposite tendency to this is shown by another class, of which Bismarck is the type. This kind has a tendency to spend all its early strength on the production of fruit, leaving insufficient nourishment for the formation of healthy young wood. The result is early crops of small fruit, and a dwarfed and stunted tree. The remedy for this is simply the removal of all fruit formed the first season, and the limiting of the crop to a very small one in the second. By this means a well-grown tree may be secured. A few apples—for example, Lady Sudely—bear fruit on the ends of the young wood. In such cases the tree should be pruned with a view to encouraging healthy side shoots, as by cutting these back in the autumn to six good leaves and in the spring to two or three buds, good healthy young wood may be secured all over the tree.

**Pruning the Pear.**—The varieties of the pear do not differ in their habits to anything like the same extent as do apples. This makes them simpler to deal with. They should be kept to their regular number of well-spreading branches, each branch kept thin like a cordon, with the side shoots shortened in the autumn to five or six leaves, and at the spring pruning cut back to two or three buds. Where the fruit spurs are too numerous for the tree to mature all the crop, or where the fruit is too crowded, some of the spurs should be cut right out. Where spurs have aged and become weak they should also be cut clean away, as fresh ones will spring from their bases. Where the pear is grown as a pyramid or as a trained tree it will require lifting every two or three years to check rampant growth, or the tree will run to wood. Vigour is needed, but it must be directed into the proper channels. Old espalier pears may be cut right back to within a couple of buds of the main stem, and allowed to make new growth for the first following year. Cut back in the next spring they will again make healthy new leaders together with fruit buds on the two-year wood. This operation, perhaps, comes more properly under the section of "Renovating Old Trees." The fruit buds of the pear are smaller than those of the apple, while its wood buds are smaller still, and darker in colour.

**Pruning the Plum.**—The plum is a vigorous grower, and gives the pruner plenty of choice of shoots. It has the habit of producing an intermediate kind of shoot, neither quite a shoot nor quite a spur, which is generally called a "stub." The shoots proper, those which extend the framework of the tree, usually bear no fruit buds, and are found in great quantity on young trees. The pruner should select from among them those which he needs to form his tree. Where this is already well shaped and filled, the shoots may be left untouched, as they will then merely lengthen, but where the tree is thin and "unfurnished," the tips of some few selected ones should be cut back, that they may break sideways and fill the vacant places. The useful growths in a plum-tree are the stubs which do not make long wood. A tree which produces these in number is a good bearer, and they should be touched as little as possible, although they are apt to detract from the neat appearance of the tree. The mere process of keeping the tree open usually secures a good supply of healthy ripened wood, and this will produce fruit-bearing spurs spontaneously.

**Pruning the Cherry.**—The cherry is a tree which is very intolerant of the knife, and the less cutting it has the better for its constitution, within reasonable bounds. Much cutting causes the tree to "gum," and for this reason it is best, wherever possible, to form the young tree carefully and then confine all pruning to summer stopping of shoots with the finger and thumb, aided by the knife when absolutely necessary. In the case of the cherry, summer pruning when the tree is full of sap is less likely to cause "gumming" than pruning in the winter. Any further pruning that is found needful should be done not later than October, when the sap is still in the wood. The cherry should be kept thin, and should it show a tendency to use up its energy on the formation of luxuriant wood and no fruit buds, it should be lifted and replanted, the check thus given to the root action being usually enough to remedy the bad habit. The cherry easily forms good fruiting spurs, and when the tree has a sufficient number of these to secure a good but not exhaustive crop, it should be let alone as much as may be. The Morello cherry in particular will not stand cutting about. It may quite safely be left to look after itself when once formed into a fairly regular and well-balanced tree. The Morello bears largely on the side shoots, and the more of these it is allowed to make the heavier its crop will be. The general effect may be untidy, but should be endured. The tendency of the cherry to produce fruit spurs

spontaneously will be found to act as a natural check on the over-formation of wood.

**Pruning the Apricot.**—The apricot is a tree which flourishes best trained as a fan. When it is well established, with its main branches well proportioned and spaced, it will be found quite simple to manage. It will tend to produce spurs, which contain both wood and fruit buds, fruit buds proper borne on short growths not unlike spurs, and true wood buds, good shoots from which should be trained in between the main branches of the fan as the ends of the main branches tend, as they grow, to diverge from each other. If the laying in of good young wood is neglected the tree will obviously become thinner and more sparse as it grows, and space will be wasted. All side shoots from this young wood should be cut back in the summer to encourage them to bear fruit buds and spurs. All shoots which push out forwards from the wall should be removed.

**Pruning the Peach and Nectarine.**—The peach and nectarine are so closely related that the one description will cover the pruning of them both. They need careful treatment, and bearing their fruit mainly on the young wood the beginner will often be confronted with the apparently insoluble problem of how to remove a sufficient quantity of the old wood after the year's crop, while at the same time leaving enough of it to bear the young shoots for next year, as it does this mostly at the ends of the fruiting shoots. The novice is apt to err on the side of leniency, and consequently his tree, after four or five years, will be found nearly barren, except at the extreme ends of its branches. This may be prevented by the simple method of leaving, when the shoot is disbudded as the spring growth starts, a good wood bud at the base of the shoot as well as one at the top. It is well to leave an "extension" bud at the upper end of the shoot, as it serves a useful purpose in helping to draw up the sap, and thus ensures a full supply of nourishment to the fruit buds on the intermediate part of the branch, but the top bud should be cut off with the old wood after fruiting and the lower one left to make the new wood. It will be readily seen that in this way the young wood may be kept in its proper place throughout the tree, and good fruit will be borne all over the fan. The young shoots should not be disbudded too violently and suddenly. The buds should be removed at intervals, so that the growth may not be too severely checked. The cutting out of the old wood may be done at any time after the fruit is removed. The

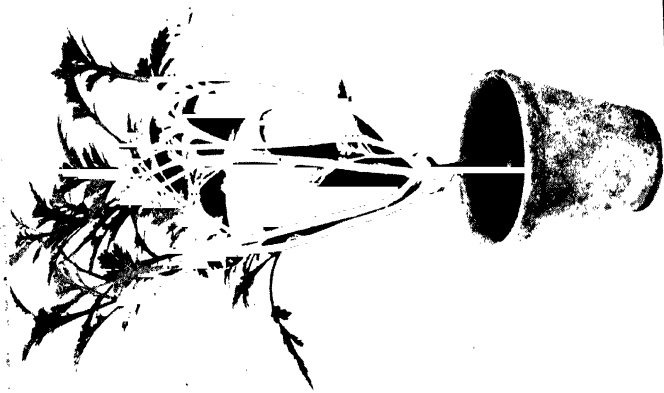


1. Plant, before disbudding.

2. The same, after disbudding.



No. 28. MARGUERITES



1. Healthy bushy plant and good blooms.

2. Pinching back to make bushy plant.

disbudding—an important process—is done in the spring, as soon as the buds are recognisable. All wood buds which push forward from the wall should be rubbed out, and with them all those which obviously will not easily be made to fill a convenient space in the tree. As soon as the young shoots are long enough to handle they should be placed in position and secured. It is at this time that the habit of the tree should be controlled. A tree which makes much wood and bears little should not be disbudded too severely. If a good deal of strong young wood is laid in the tree will soon cease to produce wood buds as freely as before, and a good crop will result. On the other hand, a weakly tree should be sternly dealt with. The thinning of the leaves and fruit comes perhaps under this heading. It is essential, in a fruit so delicate and dainty as the peach, that each fruit should be as perfect as possible. To this end it should be exposed to air and sunshine from the time it first shows as a fruit. It will then have fine flavour and a good colour, while the peach which has been shaded from the sun, though perhaps as fine a fruit, will lack the flavour and the rosiness of the former. A fruit which has been shaded until a late stage in its career and then has been exposed to the sun will very often burn, and its appearance be spoiled. It is best to thin out the fruit as soon as it is the size of a filbert, leaving three or four peaches to every square foot of wall space, and all leaves which seem to shade the fruit too much should be removed.

**Pruning the Filbert Nut.**—The filbert loves a well-drained, gravelly soil and a mild climate, as it is an early flowerer, and depends largely on the air for the dispersal of its pollen and the consequent fertilisation of its fruit. It flowers in February, and should this month be wet and cold few nuts will be produced. The catkins of the filbert are long and of a downy yellow appearance. These are the male flowers, the female being small, reddish pink and brushlike, borne on the same or older wood. Filberts really only need pruning to keep them in some kind of order in the garden, but whatever cutting is done must be done judiciously and in moderation. The male flowers are borne on the last season's wood, the female mostly on the older wood and the lower few inches of the young. It is consequently well not to cut the tree at all until the male flowers have shed their pollen, or there is a great likelihood that the female flowers will not be fertilised. As soon as the pollen is shed, however, pruning may be begun, and the young wood may, where necessary, be taken off to within a few inches of its base. When planting a filbert

plantation a site should be chosen which is sheltered from east and north-east winds. A shrubbery or hedge of evergreens will do this quite satisfactorily.

**Pruning the Quince.**—The quince does best in a moist, rich, rather light soil, and enjoys an open situation. It is a native of Persia, and although it does well in our southern counties, where indeed few old orchards are without one or two specimens, in the more northern parts it seldom ripens its fruit. Its natural habit is that of a rather low, twisted tree, and it is difficult to persuade it to make a good straight standard. It is much used as a stock for the pear. The fruits of the quince should not be gathered until the end of October, unless the autumn is unusually frosty. When gathered they should be stored in a cool place on layers of straw on a shelf by themselves, until they have turned yellow, when they are fit for use. The quince stock is used in growing pears with the object of dwarfing the growth of the tree and rendering it more productive, whilst the fibrous, shallow, spreading roots of the quince make it suitable for light, shallow soils, for damp positions, and sites where there is an unsuitable sub-soil. The quince and the pear are very closely related, and they require much the same kind of pruning. The quince should be judiciously thinned as to the main branches, and all unproductive or straggling wood cut out.

**Grafting.**—From very early times gardeners have been accustomed to take advantage of the fact that it is possible to transfer a bud or branch of some variety of tree which it is desired to multiply to another and more vigorous tree of an allied kind, and to effect a real vital union between the two. In this way the variety which it is desired to propagate is enabled to benefit by the robustness of the stock on to which it is grafted. This process has been spoken of as "ennobling," the branch which is transferred being spoken of as the "scion," and the tree to which it is attached as the "stock." The scion becomes, as it were, parasitic, upon the stock, and by carefully removing all branches which spring from the stock below the point of union, gardeners are enabled to divert to the scion all the energy produced by the roots of the stock. It is only possible to graft a scion on to a stock of a nearly allied species. Thus quinces, apples, pears, and medlars can all be mutually grafted on to one another, as also can plums, peaches, apricots, and almonds, but it would be quite impossible to graft an apple on to an oak or a plum on to a willow. The operation of grafting is performed for various

reasons ; principally for the multiplication of a desirable variety which cannot be reproduced by seed. For this purpose it is rapid and economical. A single specimen of a new variety having been produced by hybridisation, it is clearly possible to obtain a very large number of cuttings or scions or grafts, and by transferring them to suitable stocks, to have, in a very few years, a large number of reproductions of the original in a flowering or fruit-bearing condition. New varieties of apple and most other fruits are almost exclusively multiplied in this manner. There are, moreover, many species, especially of firs and spruces, which are found very difficult to increase by means of seeds, although, of course, such seeds as are produced are true to kind. In these cases, also, the process of grafting is often employed. Another purpose for which grafting is employed is for the altering of the habit of a tree. Thus, pears and apples are dwarfed by grafting them respectively on the quince and the paradise stock, and dwarfed weeping trees are converted into tall standards by attaching a scion from the weeping variety to a tree with a tall, upright trunk. In the selection of a suitable stock attention should be paid not only to the readiness with which connection is able to be established between the scion and the stock, but to the soil in which the trees are to be grown. Thus, for example, in light soil, plums grown on their own roots rarely do well, but when grafted on the peach they usually thrive. *Vice versa*, peaches on their own roots rarely do well in heavy soils, and may often be made to succeed by grafting them on the plum. Again, on chalky soil, where the peach usually does badly, it can often be made to grow and fruit by grafting it on the mountain ash. It is certain, also, that in some cases the flavour of fruit can be modified by the stock on which the variety is grafted. Apples occasionally become more acrid by being grafted on to the crab, and the Angoulême pear is improved by being grafted on the quince.

Grafting is also occasionally employed to bring about the development of flowers or fruit from parts of a tree otherwise lacking in them. Sometimes, again, it is made use of for the purpose of restoring an exhausted tree ; and lastly it is employed to bring together on one stock the two sexes of monœcious plants—that is to say, plants which bear their male and female flowers on different trees—and so to facilitate their fertilisation and consequent fructification.

Grafting is a somewhat mysterious process, and many classical authors with great horticultural reputations evidently studied it and composed their works in their studies rather than their

In order to effect a successful union by grafting it is necessary that the sap should be flowing in the portions of the wood used for the operation, and it is therefore possible to graft in the open between the first signs of growth in the buds at the beginning of spring until about midsummer, when the sap has risen fully. Under glass the time is somewhat earlier, being possible any time from January to March, and again from July till September. The operations of budding and grafting are not unlike, being, indeed identical in theory, but whereas in budding a bud only of the current year's growth is employed, in grafting whole branches are used, while their buds are still dormant or nearly so. The time for grafting trees will, therefore, vary with the time of their breaking into leaf, those kinds which bud early being the first to be dealt with. Cherries are generally the first to be ready, next peaches, followed by plums, pears, and apples in this order; but as the time of leafing varies with certain varieties the order is not without exceptions.

Grafting needs a certain amount of previous preparation, and unless this has been well and carefully done, the success of the graft will be doubtful. For grafting, the stock or tree which is to receive the graft should be cut back or beheaded at about the end of January. Where the frosts are still very hard it is well to defer the operation till the weather loosens a little, but no risk must be run of movement having begun in the sap. The object of the preparation of the grafts and scions beforehand is that the last year's ripened sap should still be in them, to supply life to the severed scion until union has been effected, and to this end the scions should be cut before there is any chance of movement, while the buds are still absolutely dormant. To preserve them in this condition until the time has come for the graft to be effected the scions, when cut, should be placed in moist soil or damp sand in a cool place such as the north side of a wall, their stems three-parts buried, until wanted. When the weather is so mild as to appear likely to cause movement of the sap the scions should be pulled up occasionally, and left exposed to the air for a little while in order to check growth. The scions should be cut at about the same time as the stock is cut off. This latter process consists in removing from the

stocks, which should be three-year-old plants, all the side branches together with the tops, and cutting down the main stock to within about seven or eight inches of the soil. Where older plants are used as stocks, as in the case of grafting on mature trees, these should be cut back throughout to within from three to six feet from the stock, according to the size of the tree. Enough wood should always be left to allow of the removal of a further portion, as this will be necessary when the actual grafting is proceeded with. If this cutting back is not done until the actual time of grafting the junction is seldom so good, and where the trees employed are stone-fruit trees—particularly liable to this accident—gumming is very likely to result, with consequent weakening of the trees. The time of grafting varies according to the stock used. It should be ascertained with accuracy that the sap is really rising, and it is better for that reason to be a little too late than too early, when there is a chance that it has not yet begun to move. Usually May will be found the best time for grafting on mature trees, and April for those which are only in their third year.

**The Process of Grafting.**—Grafting is a process based on the knowledge that two similar plants will effect a complete union under certain conditions, the two parts becoming for all practical purposes one. To effect a union the inner edges of the inner bark of the two parts must meet and remain in contact, this inner layer of bark being the only portion of the wood which is capable of uniting. The process consists in cutting the bark of the two portions so that this inner layer shall be in contact when the two pieces are pressed together, and in keeping them together and excluding air which might dry the tissues by means of wax or clay and ties of thread and wool. When grafting is to be undertaken, all materials should be got in readiness beforehand. The stocks and grafts should be prepared and at hand, together with a few tools such as a strong knife for cutting back the stocks, a saw, chisel, and mallet, a small knife with a narrow blade for fine operations, woollen thread and soft string for tying, and the wax or clay required. Opinions differ as to whether wax or clay is the most satisfactory for grafting, clay being preferred by some people, who think that it keeps the scion cooler than does wax. The clay, however, needs careful preparation, and should be obtained some weeks before it is required for use, and beaten up into the consistency of mortar with water. This moistening and beating should be repeated every day for a fortnight, and a day before it is to

be used it should be mixed with one-third of its own bulk of cow manure and about the same amount of hay. The hay should be cut up into lengths of about three inches, and thoroughly mixed into the other ingredients, and will prevent the clay from cracking off as it hardens, as well as materially assisting in keeping it moist.

It is simplest for the amateur to buy a good grafting wax than to prepare it for himself, but should he wish to do this he should obtain good burgundy pitch, and mix this with ninety-eight per cent. spirits of wine, in the proportion of one part of the spirits of wine to two parts of pitch. It is mixed by dissolving the pitch in a saucepan over a slow fire, and when quite melted adding the spirit gradually, stirring all the while. It should be allowed to boil for a minute or two, still stirring briskly, and when cold is used with a small brush. The operation is, however, rather troublesome, and the amateur is advised to obtain some such good cold grafting wax as Masti l'Homme Lefort, an excellent French cold wax.

The method of grafting employed depends largely on the size and other conditions of stock and scion. Where the stock is a young one, and about the size of the finger, the kind known as tongue grafting is the most suitable. In this the scion is prepared by taking a well-ripened one-year-old shoot, and selecting a place on it where two good buds come on opposite sides of the shoot, one a little higher than the other. Beginning just below the upper of the buds, make a clean cut at one sweep through the wood in a downward slope, coming out just below the lower bud. It is essential that there should be a good bud just above the cut at each end. Now, beginning at the top of the cut just under the top bud, with a perfectly sharp knife cut a hollow curve in the wood, sloping the cut from the inner end of the curve down in a straight line to the tip of the cut by the lower bud. The bottom of the shoot, seen sideways, should now have a section like the letter J turned upside down. It is important that these cuts should be made firmly and without unevennesses, or the scion will not fit closely to the stock, and its chance of a perfect union will be lessened. Having prepared the scion, attention should be turned to the stock. This, as will be remembered, was cut back in January to about eight inches from the soil. Selecting a good smooth place about six or seven inches from the surface of the ground, cut the stock cleanly off just above a good healthy bud. This bud's chief function will be to draw up the sap into the top of the cut parts while they are healing together, just as do the buds on the scion.

but while the latter are allowed to grow and, indeed, become the real tree, the former should not be allowed to outlive its utility, and when perfect union has taken place it should only be allowed to grow two or three leaves, and then should be stopped out. Having cut down the stock, its top should be carefully measured against the scion, and cut in a curve corresponding with the curve at the top of the scion. Where the scion has a long "tail," the tail of the "J" shape, a strip of wood and bark should be peeled from the side of the stock, with the greatest care to fit it, so that the stock and scion, when placed together, may fit with accuracy. The tail of the scion will be found to fit on to the peeled strip of the outside of the stock, though, owing to the different angle of the section, a narrow strip of the inner bark of the stock will show round the edge of the scion when applied. The important thing to arrive at is that the cut surfaces of the inner bark of both stock and scion should touch as much as possible. If it is found impossible to make these layers of bark meet on both edges, make them meet perfectly on the one. The tail of the scion should not in any case come below the end of the peeled piece of the stock, if either it should err on the other side.

When both scion and stock fit perfectly, a further security should be obtained by making a small upward cut in the tail of the scion, in order to obtain a slip projecting towards the stock. In the stock itself, opposite this slip, should be made an incision into which the slip will exactly fit, thus holding stock and scion together during the operations of tying and covering with wax. This slip should be thin, or it may cause the junction to bulge, and the scion to be pushed away from the stock. When these two latter are fitted closely together, and it is found that their layers of inner bark are fitting closely and neatly, the junction should be made firm by tying with raffia, woollen thread, or soft string, the ligature being made firm enough to prevent movement but not tight enough to prevent the proper circulation of the sap beneath the bark. The last process is the secure covering of the whole junction—scion, stock, and ligature—with grafting wax or clay, and the graft is complete. The label should always be attached to the stock, not to the scion, as otherwise there would be an added risk of the scion being caught accidentally and pulled off before a union has been effected.

Saddle-grafting is a kind much used for stocks of about the thickness of a broom-handle, the scion in this case being cut with two tails, that below the upper bud being shorter than



that below the lower bud. The whole of the inner part of the wood below the buds is removed, and at the top the cuts are ended by a cross-cut beginning just behind the upper bud and sloping slightly upwards. The scion will now have two tails of unequal length, the shorter one having a bud at its upper extremity, and the longer one having a bud midway up its length. The stock should then be taken, and its top cut to slope slightly, at an angle corresponding with that of the cross-cut of the scion. A slip should be peeled corresponding with the long tail of the scion, and the latter laid over the stock, saddle-wise, the long tail fitting its peeled slip, and the top angle of the stock fitting into the top angle of the cross-cut. The short tail of the scion will be found to cross the top of the stock and project a little. A slip should be cut off the side of the stock to fit this projecting piece of the tail, which should then be bent down on to it, and the graft is ready for tying and waxing. This system has the advantage that the scion unites on both sides of the stock, and is therefore not so liable to an accidental break during the healing process. The covering wax or clay should be left in position until the young shoots on the grafts are about six inches long. At this period the wax should be removed, and the ligatures untied, retying with fresh material, and again taking care not to tie too tightly. Although the wax or clay is sometimes left on the tree until it falls off or wears away, it is a questionable practice, as the growth of the wood is steadily going on underneath, and the ligature is certainly injuring the bark and cutting into the wood. When the wrappings are removed, the stock and scion must be secured by tying them to a stout stick firmly fixed in the ground. Both stock and scion should be secured separately.

The wax may be found difficult of removal and in such a case care is required in order to get it off without damaging the junction. It is best done by placing a block of wood or some other firm thing on one side of the lump of wax, and lightly hitting the other side with a hammer, no unnecessary force being employed. The wax will crack off and may be removed with ease.

These methods of grafting are both employed for young stocks, but others must be used in the case of mature trees, where the branches are usually too large for either of the systems described—Cleft-grafting, Crown- or Rind-grafting, and Notch-grafting. The first system is not to be recommended, as it results in a crack being left right across the top of the stock, in which rain, insects, and fungi are apt to lodge and injure the



LILY OF THE VALLEY.



tree. Notch-grafting is rather difficult, but is excellent when well done. In this method the stock is first cut clean across, as in the other ways, and then pointed wedge-shaped incisions are made in the bark and wood, beginning at the cut edge of the bark and sloping downwards and outwards. The scions are prepared by making sloping cuts on two sides of the wood, making an angle corresponding with that of the wedge-shaped incision in the stock, so that the scion, when fitted into the stock, fills the space closely, the outer layer of the bark of the scion being slightly lower—because thinner—than that of the stock. The best way of doing this is to make the first cut in the stock with a widely-set saw, and then sloping the sides of the cut slightly outwards with a sharp knife. The angle of the cut in the stock should not be quite so wide as that of the scion, as the latter will in this way be held tighter in the slit. The scion, when properly shaped, should be set into the cut and hammered lightly down into position with a small wooden mallet. It should then be tied and waxed as described.

Crown-grafting is the most popular and the easiest method of grafting on to mature trees. In this system the scion is prepared much as for tongue-grafting, but the curve at the top is replaced by a sloping cut. The tail is quite thin, too much wood often being left by beginners when preparing scions for grafting. The stock should be cut off cleanly, and with a sharp knife a slit should be made in the bark of the same length as the tail of the scion. While the knife is still in the cut the blade should be gently pressed from side to side, so as to loosen the bark in the immediate neighbourhood of the cut, and on withdrawing the knife the scion is slipped in between the wood and the bark, and pressed down until the surface left by the cross-cut at its head lies on the top of the stock. Any number of scions from two to four, should be placed on each branch treated, as the more scions there are the better and more strongly will the sap be drawn up, and the quicker and better will the stock heal and effect a junction. When the grafts are growing well they should be supported by being tied to sticks fastened securely to the branches of the stock. Until the grafted tree has developed a good head of new grafted wood it is a great mistake to remove all the shoots and twigs of the old stock. A number of these should be allowed to grow for a long time, or the circulation of the tree will be impaired, and its health affected.

**Budding.**—Budding is another method of improving or altering the nature of the fruit and flowers borne by a given tree, and

it is based on the same principles as those which govern grafting. It is superior to the latter inasmuch as it produces a more perfect union, a proportionately larger surface of the inner bark coming in contact with that of the stock. In budding no wood at all is left on the bud employed, only the bud itself and a surrounding surface of bark being left on the "bud" when prepared.

A spell of showery or dull weather should be chosen for the operation of budding, as then the bark separates freely and easily from the wood, but if the year is very dry and hot, the stocks to be budded should be given a good soaking of water for a day or two before the operation. The best time for budding is between the early part of July and the end of September, and if the buds do not start until the next spring so much the better. New wood of the current year's growth is usually the best for budding upon, but young growths up to two or three years may be used, if otherwise more suitable. Fruit trees are best budded in July and August, while roses do best from the middle of July till early in September.

In this operation, unlike grafting, the bud and stock are prepared on the spot, not beforehand, and a time should be chosen when the sap is rising freely both in stock and bud. The tree should be looked over, and the best shoot selected for the cutting of the buds. If they are not to be used at once the shoots should be put in water, or the bark will dry slightly and be more difficult to work. A good shoot having been chosen, the leaves should all be removed from it close to the leaf-stalk, only a piece of the latter being left on. If the leaves are left on they will draw and pass out the moisture from the bark and the bud, shrinking the latter. With a sharp knife the bud is then cut out of the wood, the knife making a curve behind it, leaving the bud midway on a thin strip of bark and wood. The knife should enter the wood some distance above the bud, and leave it an equal distance below it, leaving a piece of bark of the shape of a long shield, whence the name of "shield-budding" sometimes given to the operation. The woody part of this must now be removed, and in order to do this the piece is held by the leaf stalk and bud, starting the bark away from the wood at the top end with the tip of the knife, and then giving a sharp pull, when the bark should peel cleanly off the slip of wood. Occasionally, and generally when the bud is too forward when cut, the wood, when it pulls away, will leave a small hole in the bark behind the bud, as if it had pulled out a little bit of the inside of the bud with it. When this has occurred the bud is spoilt, and will shrivel and die before it has

time to build up new cells to replace the missing ones. Such a bud should be thrown away and a fresh one, less developed, taken.

The bud being ready, the stock must next be dealt with. A clean, smooth spot on the stem is chosen, and with the budding knife a cut about an inch and a half long is made, only just sufficient pressure being employed as will pierce the bark without penetrating the wood beneath. At the top of this a cross-cut should be made with equal precaution, and the bark on either side of the first cut raised from the wood by means of the blade of the knife, or its thin handle, slipped in between bark and wood. The point of the "shield" containing the bud is then inserted at the cross-cut, and gently pushed down under the bark until the bud is well down below the level of the cross cut. The easiest way to do this is to hold the shield between the finger and thumb of the left hand, by the leaf-stalk, while holding the bark open with the knife held in the other hand. When the bud is well down the projecting tip of the shield it should be cut off with a cut exactly on a level with the cross-cut in the stock, so that the tip of the shield fits inside the bark. The whole is then bound round with soft material—raffia, worsted or matting. As much rapidity as is consistent with thoroughness should be used, as much of the success of the operation depends on the moist condition of the bud and stock when brought into contact.

In selecting buds for this purpose, particularly in the case of fruit trees, care must be taken to make sure that the buds are wood buds, from which a shoot will start, and not fruit buds, which will not make wood. These two kinds of bud are more easily distinguished in some kinds than in others, but as a general rule it may be taken that the wood buds are more pointed than are the fruit buds. The buds of some fruit trees, most usually in dry seasons, are troublesome to peel away from their wood, the wood very frequently pulling out the middle of the bud with it, as described above. When this is very marked, it is a good plan to pierce the wood just behind the bud with the point of the knife, so as actually to cut it away from the bud at that point, before beginning to peel it from the bark.

After the budding process is completed the stock should be left untouched, neither leaves nor any other part being cut away until about November. At this time the top of the stem which bears the bud may be cut back to about three inches above it. When the bud shoots in the spring—or possibly before—this three inches should be reduced to one.

## CHAPTER VIII.

### SHRUBS AND DWARF TREES.

**Shrubs.**—Shrubs are little bushy trees ; that is to say, they are plants of varying sizes less than that of a tree, but with woody stems. The distinction is purely artificial, but it has conveniences. This class of plants has been much abused in gardens. Shrubs have been used merely as fill-gaps and have been planted in crowded masses where no individual has room for proper development or the exhibition of its natural grace and form. Consequently the shrubbery has but too often been a mere shapeless green mass, devoid alike of grace and interest.

Yet, in almost every garden, small or great, but especially, of course, in the latter, shrubs have a very important part to play. As individual plants, often of considerable beauty, as providers of shade, as interesting backgrounds for smaller plants, as instruments for the division of a garden into its several parts, shrubs serve purposes the importance of which it is difficult to overrate. The variety which is now available of flowering and of evergreen shrubs is enormous. Yet to look at many gardens, one would think that the privet and the laurel and the rhododendron constituted the whole race.

Certain general rules are applicable to the cultivation of almost all shrubs, as indeed of other plants. In the first place, the ground should, in advance, be deeply dug or trenched, enriched with well-rotted old manure and leaf-mould, and sufficient space should be allowed to each individual plant for the free and full development of its own peculiar habit of growth.

As a general rule, plants of medium size for their kind should be planted rather than fully-grown specimens. They more readily take root, and the proportion of losses is much smaller. Where there is no hurry and planting is done with an eye to an effect which is to be produced several years later, it is often wise to plant even younger bushes. Usually the best time to plant deciduous shrubs is from the middle of October to the

middle of November, and everything should be in readiness before the new plants are unpacked and their roots exposed to the air. Evergreens are best planted from six weeks to two months earlier. The holes in which the bushes are to be planted should be of a sufficient diameter to allow the roots to be laid out horizontally, and of such a depth that the main stems will be about half an inch lower in the ground than was previously the case, as shown by the mark on the stem. The bottom of the hole should be pressed moderately firmly, though not too hard, before placing the roots thereon. The roots should be well spread out, and should then be covered with some fine soil, preferably from some old, spent hot-bed or similar source. This should be trodden firmly, as the work of covering-in proceeds. The hole should be filled in with the ordinary soil which has been previously removed from it and the ground then thoroughly soaked with water. Any damaged roots are better cut off with a clean knife. In the case of deciduous shrubs it is usually wise, at the time of planting, to reduce the length of the branches by about one-third. It is often recommended, and it is good advice, that the roots of shrubs about to be planted should, on being unpacked, be placed in a vessel of water for the minutes that intervene between the unpacking and the planting.

The arrangement of shrubs naturally varies according to the purpose which they are to fulfil. If they are to serve as individual specimens on a lawn or similar situation, clearly no "arrangement" is required. If planting in groups it is usually desirable that several plants of a kind should be placed together, though even here full space should be allowed for each individual to develop. As backgrounds to borders too great a regularity is usually to be avoided, and their fronts should not present a straight, forbidding line. Rather should they afford projections and bays, now pressing out into the border, now forming recesses into which vigorous plants from the border may find welcome shade and shelter. Of course, where a definite hedge is required, something will have to be sacrificed to the necessity of continuity and much of the beauty of individual plants must be given up to the utility which is the hedge's primary function.

In almost all shrub plantings bulbs should not be forgotten. Few sights are more beautiful than bulbous plants sending up their leaves and stems and flowers amidst groups of deciduous shrubs or in early spring about their base. Snowdrops and crocuses and scillas in spring, and lilies in summer and autumn, planted in irregular groups in this manner, produce an effect



altogether more pleasing than any yielded when they are planted in formal beds or borders. And this applies to the whole of decorative gardening. Whilst individual plants and the beauty of individual plants should always form the units in our gardening calculations, yet it is in the relation of these units that the true gardener shows his skill, and gardening reaches its highest point.

No decorative gardening can be considered satisfactory in which the beauty and grace and interest of the individual plant is sacrificed to some vague general "effect" but, on the other hand, a mere collection of perfectly grown specimen plants, however individually beautiful, is, unless there be harmony and a sort of over-ruling unity, no garden, but a sort of living museum.

**Deciduous Shrubs.**—It is but necessary to name the holly and the myrtle to remind us that many evergreen shrubs have a great beauty of flower and fruit as well as of foliage. But it is, on the whole, to the great class of deciduous shrubs that we mainly look for grace and beauty and fragrance of flower. The earliest to flower of all our deciduous shrubs is the Hamamelis, or Wych hazel. The old species, *Hamamelis virginica*, though interesting enough, is certainly not the most showy. The finest variety is undoubtedly *H. Japonica arborea*, which often reaches a height of fifteen to twenty feet, the whole plant being in good seasons studded with clusters of beautiful yellow and purple flowers.

December is barely out when the curious spider-like flowers with their yellow petals and dark red calices appear on their leafless stems. The Wych hazels are hardy, and easy to grow anywhere, and their leaves take on a rich colour in autumn. At about the same time appear the fragrant brownish-yellow flowers of the Winter-sweet, *Chimonanthus fragrans*. The little bell-shaped flowers generally appear thickly along leafless shoots and are curiously marked with purple. This shrub should have the protection of a wall facing south or west. Better still, and this applies to most of the winter-flowering shrubs, is to drive a few strong stakes in the ground around the bushes, and to protect by a screen of stout tiffany or other material when wind or other threatening weather occurs. Much protection against severe frost can also be given by branches of evergreen or bracken carefully and firmly tied to stakes so as to form a protective screen. *Chimonanthus*—and this applies to all winter-flowering plants—should not be pruned in spring or

summer or autumn, but in late winter, immediately the flowering is over.

Probably the best known of all the winter-flowering shrubs is the winter Jasmine, *J. Nudiflorum*, which bears its yellow flowers on walls or over old tree stumps often throughout December, January, and February. In March the strongest shoots that have flowered during the current season should be tied in, and the others should be cut out. From the shoots thus tied in new shoots will arise, on which next year's flowers will be borne, and these new shoots should be left untouched until after the flowering season.

In January appear the handsome scarlet flowers of *Pyrus Japonica*, the Japan Quince. These flowers, which continue to be produced almost every month in the year, are followed by very fragrant green fruits. The earlier flowers are best produced when the plant is grown against a wall, though the *Japonica* is an excellent plant for covering trellis or bank. It does well in towns. There are white and pink varieties, but the species and the Knaphill Scarlet variety are the best and most attractive kinds to grow.

In February the yellow jasmine-like flowers of *Forsythia suspensa* and *F. viridissima* begin to show themselves. This plant likes full exposure to sunlight, though it does very well in towns. The shoots are pendulous and long. They should be cut back after flowering to about an inch from the old wood.

A little earlier than the *Forsythia* appear the fragrant flowers of the *Corylopsis*, arranged in catkins not unlike hops. They are somewhat tender, and should only be grown in mild localities and in sheltered situations. *C. spicata* and *C. multiflora* are the kinds best worth growing.

In February or March, or sometimes a little earlier, the winter-flowering honeysuckles, *Lonicera Standishii* and *L. fragrantissima*, begin to flower. The flowers are pale creamy white in colour. These shrubs are easy to grow, but require a little protection in cold or exposed districts.

In March or sometimes in February, the flowers of the common almond, *Prunus communis*, show themselves. In towns the delicate pink flowers of the almond, which flourishes in town and suburban gardens, is generally the first harbinger of spring.

Spring is the season when deciduous shrubs yield their greatest harvest of blossom. There is the whole race of *Barberries*: *Berberis Thunbergii*, a dwarf kind bearing red and pale yellow flowers along its slender arching stems in April; *B. aquifolium*, yellow, *B. vulgaris*, the common Barberry—too robust a grower

for small gardens—producing short racemes of yellow flowers throughout the spring; the beautiful orange-flowering *B. Darwinii*, which blooms in May, and *B. Chinensis*, which bears racemes of yellow flowers in May and early June. In May and June also appear the fragrant brown flowers of the Carolina Allspice, *Calycanthus floridus*,<sup>c</sup> which likes partial shade and abundance of moisture at the roots. Another species is *C. Occidentalis*, the California Allspice, which is more hardy and of larger growth. Its flowers appear in summer and autumn.

Through late spring and summer the various Brooms afford a continuous supply of colour and interest. In April the large golden yellow flowers of the dwarf-growing *Cytisus ardoini* show themselves in the axils of the leaves. Often this shrub does not grow more than five or six inches in height. The common English broom, *C. Scoparius*, with its bright yellow flowers from April to July is well worth growing where there is plenty of space. In April, also, appear the pale yellow flowers of the slender-growing *C. Praecox* and the golden yellow and crimson blossoms of *C. Scoparius Andreanus*. The white Portugal broom, *C. Albus*, bears its profusion of small white flowers in May. All the family of brooms grow easily in light soil, preferably sandy in character.

The *Daphnes* are a small family, but they include some very useful members, amongst them the *Mezereon*, which is among the earliest of our flowering shrubs. In February or March it shows its sweet-scented, rosy flowers, which give place later to pretty, red berries. This is the common kind. There are varieties of it, also valuable, among them the *Autumnale*, flowering, as its name implies, in the autumn, with rose-red flowers; *Atropurpureum*, with blossoms of a fine purple, and *Flore Albo*, with white flowers and golden yellow fruits. There is also a very pretty Japanese *Daphne*—*D. Gwanka*—which has lilac flowers in clusters, which are borne on the bare branches in early April and March, before the leaves appear. All the *Daphnes* are fragrant, the only English native species bearing clusters of small green, very sweetly-scented flowers in early March and February, even earlier in mild seasons, but this species only does well in a few positions and soils.

The flowering currants are almost too well known to need description, and their fine colour and good, bushy growth make them very useful in the garden. There are many varieties of this *Ribes* family, among the best of them still being the old *R. Sanguineum*, with its drooping racemes of crimson flowers. There is a white or nearly white variety with which this may



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be grouped with good effect, while the double kind, although its flowers are coarsened by doubling, as is nearly always the case, flowers later than those previously mentioned, thus prolonging the flowering season.

When we come to the months of real early summer our only trouble is that of selection among the hundreds of lovely flowering shrubs given us to choose from. Two old favourites we must have, the true Syringas, commonly known as the Lilacs, and the family usually called Syringas, really Philadelphus, the Mock Oranges. The Lilacs may be roughly divided into three kinds, the Common, the Persian, and the Chinese. The best of the white lilacs is perhaps Marie Legerange, whilst of the coloured, if only one is chosen, it should be Souvenir de L. Spath, one of the most richly coloured of all. The double kinds have the advantage of lasting longer than the single, but this does not compensate for their loss of grace. The small Persian lilac is one which should be grown, as it is very distinct in habit from most of the others, as well as making a small compact bush. Its flowers are of so pale a lilac as to be almost white, and are borne in small clusters. All the lilacs should be grown on their own roots, as if grown on the privet the latter plant often kills the scion. The Mock Oranges need a good supply of sunshine, and without it will only produce a very poor show of bloom. They make beautiful groups on grass, planted with plenty of room for the full development of each plant. There are many varieties, all beautiful, the one commonly grown in gardens being P. Coronarius. The flowers are extremely sweetly and strongly scented, so that when in full flower they perfume the air for some distance, and are almost too strong for indoor use. A well-grown bush of Philadelphus in full flower is one of the most beautiful of garden sights.

All through the early summer the flowering shrubs fill our gardens with beauty. The Plums, the Cherries, the many beautiful varieties of Thorn, with Lilac and Mock Orange, the Snowballs, Crab Apples, and Rhododendrons follow each other in succession, while earlier, in late April and May, the Magnolias give us their lovely lily-like blooms.

**Autumn Coloured Shrubs.**—In planting trees and shrubs it is well worth while to consider their appearance not only in the spring and summer, but in the late and early autumn also, for when the garden is at its most sombre, trees and shrubs may be made to give notes of cheerful and striking colour. Not only those shrubs which have decorative fruit, such as the Guelder

rose, the various thorns, and the Japanese and other single roses, but such trees as the Maples, of which there are many beautiful varieties, the North American Thorns, of which the best varieties are perhaps *Crataegus prunifolia*, with leaves shaded with orange, purple, and brown; *C. splendens*, *C. aubatifolia*, and *C. ovalifolia*, which turn to beautiful scarlets and reds, one—with purple blotched leaves, which hang till late in the season—*C. coccinea*: all these are most useful autumn shrubs. Many of the flowering currants are lovely in autumn, turning many shades of red and rosy pink, *Ribes aurantiacum* being one of the most decorative of them. The white Ash and the yellow-barked Ash are both lovely in autumn gardens, while among our native shrubs the Spindle trees are conspicuous, and the White Beam—perhaps hardly a shrub—makes a lovely mass of varied colour, with its clusters of red berries and its silver-backed leaves. It would be too long a task to give a complete list of the best of the autumn-tinted trees and shrubs for garden use, but enough has been said to show the variety both of colour and form which can be secured during the comparatively flowerless months of autumn. A careful use of the light and dark evergreens as relief for the brighter-coloured deciduous trees will give some very beautiful effects, and where the colour of the bark and the shapes of the trees themselves are taken into account the beauty will last throughout the winter. No one who has seen, in the chalk counties, a winter copse-wood with groups of silver-stemmed young ash-trees relieved against a mass of dark yews, with the foreground again diversified by masses of the crimson and purple-stemmed dogwoods, decorated, perhaps, with wreaths and festoons of the silver feathers of the Old Man's Beard, can ever say that colour and beauty need be lacking in the garden and shrubbery throughout the year.

**Shrubs for Town Gardens.**—One of the chief things to be borne in mind in the selection of shrubs and plants for town gardens is, as far as possible, to select those whose leaves are moderately smooth, or even glossy. The clogging of the pores by soot and smoke is a great danger to the town plant; and one which bears a leaf having a surface which does not catch the dirt, and is smooth enough to be washed clean by a fairly heavy shower or by a good dousing with a syringe or garden hose, has a far better chance of a healthy life than one without this advantage. This rule holds good especially in the case of the evergreen shrubs, which have to keep their leaves in working

order throughout the smoky town winter season. As far as possible, therefore, choose shrubs for town use with glossy or smooth leaves. Some of the best are Barberry, Privet, *Laurus-tinus*, Box, Aucubas, *Cononeasters*, *Quercus Ilex*, *Crataegus Pyracantha*, and others; of the thorns, *Euonymus* and the ever-beautiful Laurels. We have a wider choice among the non-evergreen plants, and can choose amongst Laburnum, *Syringas* of all kinds, *Ribes*—the flowering currant—the Almond, the Plane, *Cytisus*, *Weigela*, Guelder Rose, Lime, Sycamore, Hibiscus, Poplar, and the old town favourite, Virginia Creeper.

**Japanese Dwarf Trees.**—The art of dwarfing forest trees is of great antiquity. In Japan it has been long fostered as an aristocratic accomplishment, with its expert teachers and its special schools. The object is to produce in miniature, that is, in a form and size enabling it to be presented in a china pot, the shape and outline of a great forest tree. The method of bringing about this dwarfing is not so utterly unnatural as it at first sight appears to be. Similar results, though far less in degree, are produced quite naturally, as may be seen in pines and other trees growing in exposed places, half starved on a mountain side and among rocks. Many an old pine-tree growing on thin soil, with its head repeatedly battered by wind and storm, presents much that same twisted, knotted, deformed appearance so characteristic of many of the dwarf pot-grown trees of Japan.

When raised from seed, the latter is selected from the poorest specimens of its kind, and is sown in poor soil in small pots. When the young plants appear the central shoot is pinched off just above the two cotyledons. Two lateral shoots result, the more vigorous of these is again pinched off. Only sufficient water is given to keep the plant alive. As soon as it becomes long enough this shoot is bent or trained in a serpentine or twisted manner, and often abnormal development is produced by the tying of tight strings round it at intervals. Buds and branches are, where it is necessary to the appearance aimed at, nipped off. The principal roots are also cut and mutilated, and the plant is only repotted at intervals of several years, and then only into a pot a fraction larger than the previous one.

Instead of raising these plants from seed it is sometimes possible to find on mountain or cliff sides naturally stunted and deformed specimens which, when all but the barest necessary roots have been removed, can be transferred to pots and treated in such a manner as to just keep the plant from dying. In cultivating Japanese dwarf trees in England many people make



the mistake of attempting to grow them indoors. As a matter of fact they should for the most part be grown in a partially shaded position out of doors, and should only be brought into the house for occasional use. Every spring, at least, they should be hard pruned and unnecessary buds should be nipped off as they appear. Every three or four years the soil may be changed and the plant replaced either in its old pot or in another but a little larger. The soil should, as a rule, be a mixture of loam, leaf-mould, and peat, in equal parts. In repotting, as much of the old soil as can easily be removed should be rubbed off, a little fresh soil being placed at the bottom of the pot, the plant being replaced and the sides filled in with fresh soil, firmly pressed with a stick. The plant should then be well watered.

**The Garden Bed in Winter.**—Where the garden is laid out in formal beds, filled in spring and summer with bedding plants, a very melancholy and depressing effect is produced in winter by the sight of the empty beds, with their bare earth, in the leafless garden. To avoid this emptiness in winter it is a good plan to keep in the reserve garden or a nursery plot a number of evergreen shrubs, preferably in pots, with which to fill the beds when the summer bedding plants are removed. This plan, of course, is not feasible where the beds are filled with bulbs for spring blooming, but a mixture of the two may be employed with most charming effect, the evergreens planted in well-arranged groups forming a pleasant green background for the spring blossoms. The evergreens are best in pots for two reasons: first, they are much easier to handle, the pots merely requiring to be plunged; and, secondly, the plants, being restricted as to root room, will remain for a longer time of a convenient size for grouping. Evergreens growing freely in garden soil would soon make such free growth as to become too big for easy use as bedding shrubs. The plants should be placed in their beds as soon as the last of the summer flowers are removed, and only taken back to their summer quarters when their place is required for the next season's flowering. They will summer very well plunged in soil or ashes, and should be watched to see that they do not get too dry.

A number of the Conifers are useful for this kind of winter bedding, and many of the hard evergreen shrubs. Among the former are the Irish yew, the Norway spruce, the *Retinosporas* and the *Biotas*. Among the best of the latter are the Hollies, the Box, the Yew, the Laurel, the Barberries of various kinds, the Tree Ivies, the *Laurustinus*, and the *Aucubas*.

**Hardy Ferns.**—The great variety found among ferns, both as regards size and appearance and the conditions under which they flourish, makes them one of the plants most useful to the gardener. These plants are found all over the world, and vary in size from the tiny moss-like specimens found on walls and in cracks of rocks to the gigantic tree ferns of the New World. There used to be an idea that ferns would only do really well in a warm temperature, but this has been found untrue of many even of the exotic kinds. Of course, our own hardy ferns provide a good variety of beautiful kinds, but there are many foreigners which may be made to succeed equally well out of doors in our English climate.

Ferns are used in many ways by the gardener, and the subject divides itself naturally into sections under these several headings. They are grown as part of the scheme of decoration of a garden, clothing rocks or growing in masses in some shaded cool part of the garden or shrubbery. Or they may be grown in some place devoted to them alone, and most charming fern gardens may be made in parts of the garden where nothing else flourishes, as most of the hardy ferns will do well with practically no sunlight. They may be grown in greenhouses of every temperature, and are admirable and most deservedly popular for indoor decoration and pot culture generally. They are used in window-boxes, and in indoor ferneries called Wardian Cases, though these are now seldom seen.

In growing hardy ferns, as in growing all other plants, to ensure success a study must be made of the habits of the plant when growing in its natural home. The British ferns can be seen and observed, but there are now many varieties of hardy ferns which come to us from North America, together with some from Japan. These last are fairly hardy, but will sometimes die in a very hard winter if no protection is given. The hardy ferns, as a general rule, like a sheltered and shady position, where their roots can get at plenty of water. Where they grow naturally they are accustomed to a certain amount of protection from frost provided by their own dead fronds, and sometimes by the fallen leaves of trees and bushes growing near them. They also get a good supply of water during the winter months whilst they are dormant. These conditions should, to ensure success, be imitated as closely as may be in the garden. They should not be sodden with water in the winter, but if grown where they do not receive the natural rainfall, they should always have a sufficient supply to keep the roots cool and fresh, and to help to make good strong growths when they begin to sprout in the spring.

Ferns like a good deep soil, with a good deal of leaf-mould in it, and although kept moist, it should be well drained, as ferns will not tolerate a water-logged soil. There are just a few which will flourish only in boggy and marshy places, but even these prefer their water supply to be in the form of a running stream or moving pool. Among these water-loving ferns is the well-known and popular *Osmunda Regalis*, the Royal Fern, which may be found in warm and sheltered stream-banks and under wet cliffs in the southern counties. The ferns which grow in cracks of walls and rocks, and therefore apparently exist in dry conditions do not do so in reality. Their fibrous and spreading roots penetrate the cracks in all directions and find coolness and supplies of water in the hottest weather. Ferns grown on an artificial rockery do the same thing, so that it is not sufficient to give them rocks to creep amongst; they must also be able to find good soil and a supply of moisture under and among them. The hardy ferns do well in borders, grown in masses, and for this purpose there are many lovely kinds, varying in height from a few inches to eighteen inches or even in fine specimens, to three or more feet. In planting ferns together they should be arranged with a certain amount of care, that the evergreen and the deciduous kinds may be fairly distributed about the space occupied, so that no one patch may be bare and uninteresting throughout the year. The *Athyriums* are fine native hardy ferns, deciduous, and therefore only seen well in summer, but well worth growing. Amongst them used to be included the Lady Fern, but this is now placed among the *Aspleniums*. The best varieties of the *Athyriums* are *Kalotrix plumosum* and *pulcherrimum*. They are all hardy, but sometimes require a little protection to the young fronds in spring. The Hart's-tongue fern, *Scolopendrium vulgare*, is a very well-known native kind, and looks very beautiful lining a hollow bank or ditch with its long, shining, strap-shaped fronds. It has a great many varieties, all of which are evergreen and succeed best under cultivation on steep banks in shade, on a light, loamy soil. A native kind, *S. v. crispum*, is a pretty variety, with broad, undulating fronds with a crinkled and fringed edge. Some of these ferns, such as *S. v. Kelwayii*, form little bulbils on the margins of the fronds, which may be carefully removed and treated as seedlings, when they will soon make strong young plants.

The Hard fern is another good British hardy fern, being evergreen, with pinnate or divided fronds. It enjoys shade, and grows naturally in deep hollows and dells where the soil consists chiefly of leaf-mould and dead leaves, with a good

loam beneath. The Polypody is well known in its wild state, many of its numerous varieties growing freely on old tree stumps and roots. Of its varieties, *P. cambricum* is one of the prettiest and at the same time one of the oldest. These ferns do well in gardens, liking fibrous loam, peat, leaf-mould, and a little sand as a mixture in which to grow. They may be propagated by division, and this is the best way if the strain is wanted to keep true to its characteristics. It is evergreen and, unlike many ferns, bears sunlight well. It does not prefer it, however, and flourishes best in, at least, partial shade. The Oakfern is related to the foregoing, being really *P. dryopteris*. It is a very pretty fern, of a beautiful pale green colour, and is deciduous. It likes a very sheltered position, where its pretty three-partate fronds flourish well. The Beech-fern, another of the same family, *P. phegopteris*, is like the Oak-fern, but differs slightly from it in the arrangement of its fronds. It likes plenty of moisture when dormant, otherwise its treatment is like that of the Oak-fern. The Shield fern, *Polystichum*, has several varieties, of which the Soft-shield fern, *P. angulare*, is the best for general use. These are evergreen and many of the varieties in cultivation are crested and plumose. They like a sheltered position, but do fairly well anywhere, their chief demand being for a rich loamy, well-manured soil. *P. aculeatum* is much like *P. angulare*, except that it has a more shining surface. Its habits are quite similar.

Another *Polystichum*—*lonchitis*—is known as the Holly fern, and grows in high places. It is, as its name implies, a prickly fern, and is of a rather delicate nature, calling for care in the matter of watering. If it is allowed to get too moist when dormant, or if it is planted in too warm a spot the plant is likely to die.

The *Lastreas*, *filix mas*, the Male fern, and *pseudo-mas*, are both good species. The first is, perhaps, the best known of all British ferns, and does very well in town conditions, growing in great clumps and masses in smoky suburban gardens. It is deciduous, but owing to its habit of keeping its fronds very late in the autumn and shooting out very early in the spring, it is very nearly as useful as some of the evergreens. It will grow practically everywhere, shade suiting it, perhaps, better than full sunlight, but it is quite happy in partial sun. When planting these ferns they should be put in deeply, the crown being only just above the surface of the ground. *Pseudo-mas* is an evergreen, with a few pretty crested forms.

*Pteris aquilina* is the common Bracken, too well known to

need any description. It likes a peaty, sandy soil, and is best raised from seed, as the old roots or rhizomes are apt to do badly when replanted. The Bladder Fern is a pretty deciduous fern, doing well in many places where most plants would fail, though it is not good for culture in pots.

Among the hardy ferns introduced from North America the best for garden culture is, perhaps, *Adiantum pedatum*. It is a deciduous fern, and makes fine big clumps if well grown. When the clump is in good condition and strong when planted, fronds as much as two feet long are often produced in the first season, increasing in size as the plant becomes established. It resembles *Lastrea filix mas* in keeping its fronds very late and renewing them very early. *Polystichum acrostichoides* and *P. grandiceps* are both good imported rockery ferns, and there are many others which do well. Most of these ferns like protection from early morning sun, and should be looked to and perhaps protected during late spring frosts. All hardy ferns do best in a situation in which they get the direct sunlight, if at all, in the late afternoon only.

**Climbing Plants.**—Climbing plants have their place in almost every garden. Even the smallest cottage or villa garden calls for sweet-peas and honeysuckle and rambling rose and clematis or jasmine, whilst in gardens of larger size climbing plants should form one of the most interesting and most decorative features. The beauty of the English hedgerow is in large part attributable to those beautiful climbing plants which are native to our country. Traveller's joy and honeysuckle, ivy and bryony, all in due season garland the copse and hedge. In our gardens, wall and trellis and arch overhung with the lovely climbers which are now available, may be among the loveliest features.

Climbing plants are often given but crude treatment, yet if they are to thrive and be truly luxuriant and beautiful it is scarcely possible to spend too much attention in the preparing and enriching of the soil in which their roots are to grow. Only too often one sees stunted climbers which have been turned straight out of the pots in which they were bought and planted in poor, unprepared soil, or worse. The ground in which climbing plants are grown should be thoroughly dug to at least three feet in depth, and a liberal amount of farmyard manure, fibrous loam, and leaf-mould should be incorporated with the original soil. It is well to do this some little time before the actual planting. In planting climbers that have been grown in pots the outer roots should be spread out carefully, but the ball of

earth should be as little disturbed as possible. They should then be planted to about the same depth as was previously the case ; that is to say, the top of the ball of earth should be only just below the general level of the soil. The soil about them should be firmly pressed or trodden in. In the case of non-potted plants the roots should be well spread out, and the soil firmly pressed about them as before. The necessary supports should be at once afforded, and the plants should be attached thereto by some form of tie. Except in wet weather water should at once be given and continued daily.

For growing climbing plants other than those which, like ivy, attach themselves by means of roots against walls, wooden trellis is on the whole the most satisfactory framework. Stretched galvanised wires form another convenient support for such plants. Or, again, plants may be attached to the walls by nails and shreds of cloth, or by patent nails with soft metal tops which can be twisted round the stems. Iron or other metal is too subject to changes of temperature to make good supports for climbing plants.

Pergolas and arches should be of as simple a construction as possible, larch poles with joining crosspieces being as satisfactory for the purpose as any.

The most valuable of our garden climbing plants are perennials, but annuals also furnish us with a number of beautiful climbing plants which by their quick growth and easy culture are often of the greatest value. As in most other cases, the ground in which annual climbing plants are to be grown should be deeply dug and well enriched a few months before actual sowing or planting. Plenty of room should be given to each plant, so as to allow for full and graceful development. Among annual climbers, perhaps the most beautiful of any is the common nasturtium ; the canary creeper, the sweet pea, and the climbing convolvulus are also beautiful and highly desirable plants. They may all be grown from seed sown in March in an unheated frame or in the open about the middle or end of April. Besides the hardy annuals there are a number of beautiful half-hardy annuals which need usually to be sown under glass and to be gradually hardened off before being finally planted out, though in mild districts many of these also may be sown in the open about the beginning of May. The several varieties of Ipomoea are vigorous and produce flowers of considerable beauty, as also do the varieties of *Eccremocarpus*. The Japanese hop is one of the most rapidly growing of climbing plants raised from seed, and in a very short while it will cover a great space of wall or

trellis. The ornamental gourds, again, are easy to grow, and their fruits present the greatest variety in form and size. Nor should *Cobea Scandens* be forgotten, with its bell-shaped, blue flowers. This also flowers the same season as it is sown.

It is, however, to the class of evergreen and deciduous climbers that we must chiefly look for coverings for our walls and trellises. Of all, perhaps the most generally grown is the Virginian Creeper, especially the species with self-clinging habit known as *Ampelopsis vitii*. Another variety which has the self-clinging habit is *A. Muralis*. The old-fashioned, large-leaved variety, *A. quinquefolia*, though it has not the self-climbing habit, yet, by its vigorous growth and large leaves, which, like all the other members of this genus, turn to beautiful shades of red and orange in the autumn, it merits a place in our admiration. The same may be said of another species, *A. aconitifolia*, with finely-divided leaves. The colour of all these Virginian Creepers is more brilliant in autumn when the plants are grown in somewhat dry soil. They may be grown from seed, but are more readily propagated by cuttings. All the species of *Ampelopsis* strictly belong to the genus of the vine, but commonly that term is reserved for certain other plants more closely allied to the ordinary grape-vine. These species of *Vitis* are among the most beautiful of all deciduous climbers, their handsome leaves, the grace of their habit, and the beautiful colours commonly assumed in autumn all contribute to their value in the garden. Of them all, perhaps the most attractive is *Vitis Cignetiae*, though *V. Thunbergii*, *V. lanata*, *V. heterophylla humulifolia*, and *V. candicans* are all graceful and interesting. Another deciduous climber which has long been a favourite in English gardens is the *Wistaria*, whose racemes of drooping purple flowers form so conspicuous a feature of cottage walls in many English villages. The *Wistaria* is easily grown, and may be readily multiplied by means of layers. The white variety is not so generally valuable as the purple form, *W. chinensis*.

The winter-flowering yellow Jasmine, *Jasminum nudiflorum*, which bears its gay flowers in the very early months of the year before the leaves have begun to appear, and the sweetly-scented, white-flowered *J. officinale*, which blooms in summer, are also among our oldest favourites. Both are easy to grow, and are easily propagated by cuttings or layers. A number of honeysuckles also rank with the best of our hardy trellis or wall plants. Among the climbing species are the sweet-scented, yellow-flowered *Lonicera Caprifolia*, the fragrant yellow and

purple *L. Etrusca*, and the reddish-flowered *L. Japonica*. Nor must we forget the common honeysuckle and its varieties. Most of these honeysuckles do better growing over an arch or trellis than against a wall, where they are liable to the attacks of green-fly.

The perennial peas, again, though without the fragrance of the annual or Sweet Pea, are very useful climbers, and possessed of a grace and beauty of their own. The broad-leaved Everlasting pea, *Lathyrus latifolius*, is a very vigorous growing plant, and has several purple, white, and pink-flowered varieties. *L. grandiflorus* has larger flowers, which are of a rose colour. A less hardy species, which may, however, in warm localities be grown in sheltered situations, is *L. pubescens*, which has beautiful pale-blue flowers. Most of the perennial peas are easily raised from seed.

The *Convolvulus*, and the various species of *Calystegia*, with their large pink and white bell-shaped flowers, are graceful climbing plants which, however, rather take possession of the ground in which they are planted. The same may be said of *Ipomea pandurata*, and that beautiful climbing plant, the common Hop, *Humulus lupulus*. None of these rampant climbers should be grown close to other plants which resent disturbance, for, except by vigorous digging in their neighbourhood, it is almost impossible to keep them within bounds.

Several of the brambles are interesting and beautiful climbers. Among these are the double-flowered forms of the common Blackberry, *Rubus fruticosus*; the parsley-leaved bramble, *R. laciniatus*; the less vigorous *R. Australis*, with its pink and white flowers, needing the protection of a wall in all but the warmest localities; *R. Phoenicolasius*, the Japanese Wineberry, with its hairy stems and scarlet fruit; *R. biflorus*, the white-washed bramble, with white stems and white flowers; and *R. rosifolius coronarius*, with double white flowers. Nor should we forget the Flame Nasturtium, *Tropeolum speciosum*, with its brilliant scarlet flowers and beautiful leaves. It should be planted in April, in moist soil containing peat, preferably in a shady situation. It needs liberal supplies of water throughout the summer. This plant is not likely to be seen to its full advantage until its second season.

Another very handsome climbing plant, not often seen, is *Mutisia decurrens*, which has long leaves ending in tendrils, and large orange-coloured flowers. It does best in a soil containing peat, sand, and a little limestone, and likes a reasonable amount of shade.



Not many of our hardy climbing plants are evergreen, but we have what many people consider the most beautiful climbing plant in the world growing wild in every wood and hedgerow. The ordinary ivy, *Hedera helix*, has many varieties, all of which are easily grown. When grown against walls which require to be kept more or less neat, ivy should be clipped back fairly early in March. The clipping should under these circumstances be vigorously and even severely performed, the bare appearance thus produced being quickly hidden by a new growth of leaves. Where neatness is not essential and a rapidly-growing variety is wanted, the Irish ivy, *H. h. canariensis*, may be selected. It has large leaves, and a loose habit of growth. Other large-leaved kinds are *H. H. dentata* and *H. H. roegneriana*. There are other varieties, too numerous to mention here, including *H. H. digitata*, with deeply-cut leaves, and the little *H. H. minima*, which grows well over rocks or stumps.

In mild localities the Passion flower, *Passiflora caerulea*, and its white variety, *Constance Elliott*, are evergreen climbers. They do best against a sunny wall. They are easily grown from cuttings which readily root over a little bottom heat. The Glory Vine, *Clianthus puniceus*, is a very ornamental evergreen climbing plant, which, however, can only be grown in the open in mild and favoured localities. It bears brilliant scarlet flowers, and does best in an ordinary garden soil, to which a good deal of leaf-mould has been added. With a little protection against wind the evergreen *Smilax aspera* and *S. rotundifolia* with their fresh and dainty leaves and slender stems, are desirable plants. They do best in a light soil. Another handsome climbing plant for warm districts is the orange-flowered *Bignonia capriolata*. This does best in a peaty soil, and is easily propagated by cuttings, which may be struck over heat in the spring. The most important climbers of all, the Clematis and the Roses, are dealt with elsewhere in this book.

But of all hardy annual climbing plants, probably the *Nasturtium* and Sweet Peas are the most generally valuable. Both are of very easy culture in an ordinary deeply-dug garden soil; the chief feature of successful cultivation consisting in thin sowing. Sweet Peas are dealt with elsewhere in this book.

**The Clematis.** With the possible exception of the rose, no genus of climbing plants can compare in variety and beauty with the Clematis. No one who has seen our common native Clematis, the Traveller's Joy, *C. Vitalba*, with its graceful festoon, decorating the copses and hedgerows, needs to be told of the

grace and beauty of these plants when given freedom for development and natural growth. Nearly every colour is represented in the flowers of this beautiful race, whilst by the careful selection of species and varieties clematises may be had in flower from quite early spring to late autumn. They are for the most part easy to grow, though some small knowledge of their several requirements in the matter of pruning is necessary. The soil, as with most other climbing plants, should be deeply dug and generously enriched some little time previous to planting. Most clematises do best in a soil containing chalk, and should the soil not be naturally calcareous it will be wise to add a little chalk or lime annually. The soil also should be rich in humus, and it is scarcely possible to add an excess of leaf-mould. During the primary preparation of the soil thoroughly rotten farmyard manure should be liberally incorporated, and every year a further top dressing should be added.

Whilst the clematis needs sunlight for its healthy growth it is desirable to shade the lower parts of the stems by means of other plants. If one observes the manner in which clematises grow in their native habitat it will be found that only the upper parts are free and exposed to full sunlight. This condition should be imitated in garden cultivation.

As has been said, there are many species with very varying habits, and yielding flowers widely differing in size and colour. But it is not only on the species that the gardener need rely, valuable though nearly all these are. There are in addition hybrids almost innumerable, many of them of the greatest beauty.

Clematises may be propagated in many ways. Commercially, they are most commonly multiplied by grafting on the roots of some tree-growing species such as *C. flammula*; the grafting being effected early in the year, and the young plants brought on in moderate heat. For this purpose the roots are lifted, cut up into parts, split open, and young shoots of the varieties to be propagated placed in the clefts and tied in with wrapping. A simpler method for those who wish to propagate a comparatively small number of plants, and who do not mind waiting a year or so for results, is by means of layers, pegged down and allowed to root in the open ground. Cuttings also can be taken, and will readily strike if potted in a light soil and kept in a warm frame. Many species can also be raised from seed sown in light soil in spring in moderate heat, the seedlings being pricked out into small pots when large enough to handle. In any case the best times to plant clematises in their permanent quarters are

from September to November, and from February to May, plants coming from heat being planted out in the latter months.

The species and varieties are very numerous. In spring we have *C. Florida*, white, with its varieties, *Duchess of Edinburgh*, a fragrant double white; *John Gould Veitch*, a double lavender; *Beauty of Woking*, a double silvery grey; *C. Montana*, bearing white anemone-like flowers in May and June, with its varieties *Calycina*, with dark evergreen leaves and purple-spotted creamy-yellow flowers in February, and *C. M. rubra*, with purplish stems and rosy red flowers in May; *C. Patens*, blooming in May and June, with its varieties *Miss Bateman*, white with dark brown stamens; *Mrs. S. C. Baker*, white with claret stripes; *Lady Londesborough*, silver grey, and *Miss Crawshay*, pink. In summer and autumn we have *C. Jackmanii*, whose violet or purple flowers are perhaps the best known of all clematis blooms, with its darker flowered variety *C. J. superba*; *C. J. alba*, white, *C. J. Fortunii*, double white, *C. J. Gypsy Queen*, a beautiful dark velvety purple, *C. J. Smith's snow-white*, a free flowering pure white, *Red Jackmanii*, deep velvety red, and *C. J. Madame Edouard André*, very bright red; *C. Viticella*, with its large purple-flowered variety, *C. V. Grandiflora*, *C. V. Alba*, white, *C. V. rubra Grandiflora*, a large flowered red. *Willisonii*, with enormous flowers, lavender, shaded with blue, *Ville de Lyons*, carmine red, and *Ville de Lyons Paris*, pale flesh colour; and *C. Lanuginosa*, blue, with its varieties *Beauty of Worcester*, violet, with white stamens, *Fairy Queen*, pale flesh colour with pink stripes, *Henry the Second*, creamy white, *Lady Caroline Nevill*, lavender with mauve markings, *Louis van Houte*, dark purple, *Madame van Houte*, white, *Princess Beatrice*, silvery lilac, and *La France*, deep violet with dark stamens. In summer also bloom *C. Flammula*, a very fragrant and very hardy white-flowering kind; *C. Coccinea*, brilliant scarlet, with its varieties *Duchess of Albany*, with a curiously cup-shaped brilliant rose-coloured flower, shading off to lilac at the edges. *Grace Darling*, red, *Lady Northcliffe*, lavender, with purple bars and white stamens, and the *Countess of Onslow*, scarlet. Of these several groups *C. Flammula* and *C. Viticella*, with, of course, our native *C. Vitalba*, are the hardiest and most vigorous. The *Jackmanii* group with its larger flowers and free blooming habits, is a little less hardy. The *Lanuginosa* varieties, also, are very hardy, and bear flowers often of enormous size. *C. Patens* and *C. Florida*, on the other hand, do best with some little shelter, or with the protection of a wall.

Pruning should generally take place in February. In the case of *Patens*, *Florida*, *Lanuginosa* and *Montana* groups, all of which flower on the old wood, little pruning is required, but superfluous, weak, and straggling shoots may with advantage be removed. *C. Viticella* and *C. Jackmanii*, on the other hand which bear their flowers on the young wood, may be cut back to within six inches of the ground in November for spring flowers, or a little less severely in spring for autumn blooming.

## CHAPTER IX.

### MISCELLANEOUS ITEMS.

**Paths and Edgings.**—The enjoyment of a garden is greatly increased, as also is its utility, by the provision of good and well-kept paths. The essentials of a good path are that it should be in appearance harmonious with the rest of the garden, and that it should afford a dry surface in wet weather. Cement, concrete, and asphalt are sometimes employed for the purpose ; but in general we may say that the three most suitable surfaces for garden paths are afforded by gravel, bricks, and broken paving stones. In any case, having decided on the direction and width of the paths to be made, the first thing is to dig out all good soil lying within the chosen area, and to lay at the bottom of the trench thus formed rough stone and broken brick as a foundation. In most situations this will afford adequate drainage, and the trench should be then filled up with stone and coarse gravel, leaving but a few inches for the final facing of brick or gravel or paving stones. The whole should be rammed thoroughly at every stage in the packing, and when the path is to be gravel the finished path should be rolled and rolled repeatedly, until a perfectly hard and cohesive surface has been produced. The centre of the path should, in this case, be somewhat higher than the sides, so as to allow water readily to run off. Paths may be edged either with materials such as tiles or wood or blocks of stone, or with living plants, such as box or thrift or mossy saxifrage. Box edging should be planted very thickly, and should be planted firmly. It should be kept cut a few inches from the ground. In any case it should not be clipped in late autumn. Where suitable stones can be obtained the most interesting borders of all are afforded by irregular blocks of stone with Alpines growing between and over them.

**To Make a Lawn.**—To make a lawn takes a considerable time. It is possible to obtain a covering of grass in a single season,

No. 29. MARIGOLDS



1. A clump of marigold seedlings, before thinning. 2. The same, after thinning

No. 30. CARNATIONS



1. Cutting a shoot. 2. Shoot pared for layering, showing a cut through a joint. 3. Pegging down the cutting.

but anything that could reasonably be called a lawn is a work of years. Of course a grass plot on which one may walk almost at once may be prepared by transplanting blocks of turf from a neighbouring field, common or hillside, and rolling into place. But more and more gardeners have come to the conclusion that a perfect lawn of uniform colour and even surface, free from plantain and other weeds, can only be obtained by careful preparation of the soil, and by sowing carefully-selected grass-seed mixture. Where there is any choice of situation a northern aspect is to be preferred to a southern one, especially where the water supply is limited. A fairly moist soil is indeed essential to a good lawn, though it is equally necessary that the soil should be well drained. Deep drainage is not necessary, seeing that the roots of grasses do not penetrate far below the surface. The soil itself should be a good loam, rich in humus, the ordinary soil excavated in making the foundations of a house, which it is often desired to convert into a lawn, being altogether unsuitable. Where suitable soil is not already *in situ* it should be obtained, and used to replace at any rate the top foot of the existing earth. In introducing soils from outside it is, however, important to remember that it is likely to contain the seeds of many weeds which would be fatal to a satisfactory lawn. A certain time should therefore be allowed to elapse in order to afford opportunity for these seeds to germinate, and the resulting weeds to be destroyed before any grass seed is sown. In the alternative the introduced soil may be burned, and then enriched with a liberal dressing of manure. In any event, a good dressing of farmyard manure, say thirty cartloads to the acre, should be incorporated with the top spit of soil. All this preparation should be made in the autumn, and the ground should be allowed to lie fallow through the winter. In the spring the surface should be made as fine as possible by repeated rakings and thorough rollings. The sowing itself is best performed early in April or about the middle of September. The sowing should take place on a day when there is no wind, and great evenness should be aimed at, two sowings being made at right angles to one another. A very light raking is then desirable, just cover with sifted soil, and afterwards the ground should be rolled over. As soon as the grass is above ground regular cutting with the scythe and rolling must be begun. The scythe must continue to be used for several months until the plants are sufficiently secure in the ground to bear the mowing machine, which has a tendency to pull them up by the roots. About five to six bushels per acre, 1 lb. to fifty square yards is the quantity of seed to sow, and



special seed should be obtained for the purpose from a first-rate firm of seedsmen. No economy should be attempted in this important matter.

When sowing a lawn care should be taken to see that the seed sown is suitable for the soil and the situation. Grasses vary just as other plants do in their tastes, and careful selection will do much to secure a permanently satisfactory lawn. Certain of the grasses do well in almost any soil and situation, amongst them *Festuca ovina tenuifolia*, *Cynosurus cristatus*, and *Poa nemoralis sempervirens*. On all but badly drained soils *Festuca duriuscula* is useful, together with *Festuca rubra*, which likes a dry soil. *Lolium perenne* Suttoni is a fine kind of rye grass, quick growing, and good for rapid covering of a large area. *Poa trivialis* is the best grass for moist shady situations—it is the best for growing under trees, while an ordinary light rich soil suits *Poa pratensis*.

**Lawns from Turf.**—In preparing a piece of ground for turfing the soil should be well dug to a depth of about nine inches, and a light dressing of well-rotted manure may with advantage be incorporated with it. The soil should then be well rolled and levelled, any hollows being filled with soil and again rolled. The turves should be cut in slabs three feet long, one foot six wide, and one and a half inches thick. They should be fitted very close together, should at once be well watered and then thoroughly rolled. Water should be given daily for some time, and rolling should be almost constant. Turves may be laid either in spring or autumn. For the first three weeks the grass should be cut twice a week with the scythe, after that time they should be cut at least once a week with the machine.

**To Improve Old Bad Lawns.**—Where a lawn has become poor and exhausted it is a good plan in October to top press it with an inch or two of equal parts of wood ashes, fibrous loam and well-rotted stable manure, subsequently well rolling it. Weeds such as plantains, dandelions, and docks, should be continually removed by means of the daisy lifter, and mossy parts should be watered through a watering pot with a rose with a solution of two pounds of iron sulphate to four gallons of water to every thirty square yards. The mossy area should again be watered with this liquid in three days' time, after which the moss can easily be swept away. A little good soil should then be added, and sown with good lawn-grass seed, the roller being kept frequently at work.

The two methods of lawn mowing, mowing by machine and by the scythe, are best done at different times in the day. The mechanical lawn-mower works best and most quickly when the grass is dry, but for cutting with the scythe the early morning, when the dew is still on the grass, is the best and easiest time. In the cool of the morning the grass is fuller of moisture, and stiffer in the stem, thus standing up more firmly against the scythe.

**Of Insects Injurious to the Lawn.**—The daddy-long-legs, or, more properly, crane-fly, is most destructive to grass, when grown either as a hay crop or on a lawn. It also attacks strawberries, peas, and beans, but its chief mischief is done to lawns. A mixture of soot and lime applied to the surface is the best dressing for affected grass land, while in the case of strawberries the mixture should be hoed in lightly between the plants. The insects emerge about dusk, and where they have attacked a lawn the latter should be rolled thoroughly every evening about that time. By this means many of the insects are destroyed before their eggs are laid.

**Some Golden Rules of Gardening.**—Spare no labour in preparing the soil by digging or trenching and manuring before sowing or planting a single plant.

Select suitable plants for each situation and soil.

When sowing or planting have everything that will be wanted ready before starting.

Sow seed thinly, remembering that if reliable seed has been bought, from fifty to eighty per cent. of the seeds will develop into plants.

Buy good strong tools, and always keep them clean and bright; and put them away in a dry shed when finished with for the day.

In summer do any planting or watering in the evening, so that the water may not evaporate too quickly, and the plants may have a chance of establishing themselves before the sun's heat plays on them. It is well, for a week after moving plants, to give them shelter during the hottest part of the day.

Few people give water to their plants with judgment and discretion. Water is of the first necessity to almost all plants, yet stagnant water is, in nearly all cases, injurious. The great rule is, when you water at all water thoroughly, so that the soil about the roots below becomes thoroughly wet. According to the soil and to the requirements of special plants, water may be given more or less frequently, but when given it should

always be given thoroughly. Water should not be left in the saucers of pot plants.

In summer do any weeding in the morning, so that the up-rooted weeds may be destroyed by the heat of the sun on their exposed roots.

Cut the flowers of annual plants when they begin to fade, so as to cause the plants to produce more flowers in their constant efforts to ripen seed.

Do not cut the leaves of bulbous plants till they are nearly dead.

Keep the surface of the ground between plants frequently roughed with the hoe, especially during the summer, as this checks evaporation, and thus helps to keep the soil moist.

**Garden Mats.**—Good quality is imperative. The best garden mats are made of bast, strips of the inner bark of the lime-tree. Inferior mats are made of straw, but these rapidly become untidy, and as the straw decays it harbours fungi and insect life. Garden mats of some sort are almost indispensable in a garden of any size and scope, for protection of tender plants and trees, and for covering frames when shade is necessary.

**Damping Off.**—The disease known to gardeners as “damping off” is due to the attacks of a fungus, and is very deadly to seedling plants. As its name implies, it is largely helped by damp, either in the soil or the air, too thick sowing and too frequent watering, over-shading and insufficient air and light, being the predisposing causes among the seed beds. The seedlings first go a bad pale colour, then droop over, the attack of the fungus first touching the stem at or just above the soil line. As soon as these signs are noticed the affected seedlings should be at once removed and burned, and steps taken to remedy the bad conditions to which the disease is so largely due. Where it is allowed to gain ground, the whole of the seedlings in a pan will be found to be covered with the white thread-like mycelium of the fungus. Where a batch of seedlings has been destroyed by damping off the same patch of soil should not be used for the same purpose in the following year, as the spores of the fungus survive in it throughout the winter.

**Eelworms.**—Eelworms are very difficult of detection by the inexperienced gardener, as they are extremely small, and almost transparent. They occur in large numbers together, and all fresh supplies of potting soil, or new soil from any source should

be carefully examined for them, as this is a common method of introduction. The eelworm attacks the roots of the plants on which it feeds, penetrating them and sucking their juices. Many plants are liable to attack, among the commoner victims being strawberries, carnations, tomatoes, vines, clover, melons, and cucumbers. Onions are another garden crop which is very frequently attacked by eelworms.

The nature of the apparent injury varies with the species, both of plant and eelworm. Sometimes the plant, as is often the case with tomatoes, cucumbers, and melons, simply dies, no reason being apparent until the roots are lifted and carefully examined. Vines often show a peculiar appearance just below the soil, while just at the roots the bark may be gone. Most often the roots of plants affected by eelworm have small warty growths and nodules upon them, showing the points of attack.

The only thing to be done where plants are once really infected with eelworm is to dig up and destroy the plant, removing the soil all around it and burying it deeply, replacing it with fresh soil, sterilised by having had boiling water poured over it. The pest is comparatively easy to eradicate when it appears within-doors, but in the garden it is a far more difficult matter. In cases where kainit can be used it will be found useful, and should be forked into the affected soil, in combination with twice its weight of basic slag.

Where there is any fear of eelworm all new soil should be either lightly baked or scalded with boiling water before use.

**Earwigs.**—Besides his traditional habit of entering people's ears and piercing their brains, a great deal of other mischief is put down to the earwig, of which he is probably equally innocent. So far from doing damage in the garden, it appears, from observation of his habits when in captivity, that he prefers a diet of flies, larvæ, and small insects to a vegetable one, only taking to the latter under pressure of famine. The earwig is therefore in all likelihood more useful than he is harmful in the garden.

Earwigs are easy to trap, owing to their propensity to hide in anything sheltered during the day. Thus a handful of straw, shavings or hay pushed lightly into a flower-pot and stuck on a stick will be found full of earwigs in the morning. Crumpled paper, hollow stalks—all such things make effective earwig traps.

**Aphides.**—The common name for all the many species of aphid is "Greenfly," probably from the brilliant green of the

**Ants.**—Ants thrive greatly in the warm sheltered atmosphere of the greenhouse, and when once established they are by no means easy to eradicate. The best and, indeed, often the only method is to trap the workers in the early spring, when all the young brood is hatched, and food is greatly in demand. Old pieces of sponge should be dipped in any thick syrupy liquid, and laid about the house, the traps being taken up at set times and plunged into boiling water. When the dead bodies have been removed the traps should at once be set again, and the process repeated until all the worker ants have been killed. On this the other members of the colony will come out to take

**Bees and Wasps.**—The bees and wasps may be divided each into two classes, the solitary and the social. Among the wasps the social are great pests in the garden, piercing and sucking the ripening fruit, and spoiling more than they eat. The solitary kinds, on the contrary, are the gardener's friends, as they live chiefly on caterpillars, of which they lay up large stores in their nests for food for their young as they hatch out. These solitary wasps can be distinguished from the social kind by their smaller size, their slimmer and more pear-shaped body and their curiously long stalk-like waist connecting the abdomen with the thorax. Among the bees, on the other hand, the social kinds are the most useful in the garden, while certain of the solitary species, for example, the two-leaf cutter bees, are definitely harmful, though it is true that much damage is attributed by gardeners to bees, which is really due to quite other sources. The leaf-cutter bee, however, is really guilty, as she—it is the female which builds the nest—cuts neat rounded segments out of the leaves of roses and the petals of scarlet geraniums to line her nest. The pieces are cut out with extraordinary neatness, and are always of one size.

**Grafting Wax.**—In the operation of grafting a prepared wax is used to cover the cut surfaces and edges, and to keep out air and moisture, till union has been effected. A good substitute for grafting wax is the quick-drying varnish called "knotting." This is, as I have said, very quickly dry, and is impervious to wet and weather. It is applied with a brush over the part to be protected.

**Protection.**—Wherever tender and delicate plants and shrubs are grown, even such English flowers as roses, the question of protection is sure to crop up. If the garden is very much exposed to certain prevalent winds, belts of trees or dense-growing shrubs must be planted to break its force, and to protect the tenderer plants in the borders. Where the garden is walled this protection is, of course, not needed, as the walls, as well as helping to ripen the fruit grown on them, will make a most efficient protection against wind. Against cold weather and frosts

individual protection of the more tender plants will be required, and there are many ways of affording this, varying with the plant. Dwarf roses, especially teas, are best protected by a small mound of clean dry straw, cocoanut fibre or some similar material heaped round them for a few inches above the ground. This will protect the vital part of the plant, and even should the more exposed wood be injured during the cold weather there will always be a sound beginning for new growth. The taller roses, standards and half standards, should have dry bracken fronds tied in among their heads, these affording a great protection against frost. The ordinary garden mat is the most useful thing for tying round other tender shrubs, and for covering frames during hard weather. They may be tied into a cone shape, and supported on small sticks like a "wigwam" over small plants, or spread over trees trained against walls. In the early spring protection is chiefly needed for the blossoms of early flowering fruit trees, such as the peach and apricot during the period when there is risk of night frosts. This is best done by means of cheap calico, netting or garden tiffany.

**Garden Syringes.**—A garden syringe is an indispensable weapon in the garden. Without it no effective fight can be maintained against blight, mildew or insect pests, nor, at any rate, in the neighbourhood of towns, can plants be kept in a state of proper cleanliness. The garden syringe should be strongly made, and should have two or three interchangeable nozzles, of differing degrees of fineness, as well as one which sends out a single jet. The syringe is useful in keeping the walls and floors of greenhouses in a sufficient state of dampness, as well as in washing and spraying plants.

**Leaf Sweeping.**—Of all the kinds of broom and besom for sweeping lawns and walks the best is the old-fashioned birch besom, with the long natural twigs. If skilfully used this will pick up all odds and ends, while disturbing the surface as little as may be. When sweeping up fallen leaves or light rubbish the worker should always work in the same direction as the wind is blowing. The latter will then help him instead of hindering.

**Injurious Plants.**—Very few of our English plants are seriously injurious to anyone handling them, with the well-known exception of the nettle. There are, however, several garden plants which the gardener would be wise to handle carefully. Besides the plants, such as *Primula obconica*, which are provided with

irritating hairs which raise on many people a troublesome and painful skin eruption, there are several, such as the Euphorbias, the Oleanders, the Poinsettias, and the Mancineel apple, which may cause real harm if they come into contact with a cut or an abraded surface. Nearly all the species of Rhus are extremely poisonous, and have been known to cause swellings of the arms and hands merely through being handled.

**Watering Pots.**—Watering pots are an important part of the gardener's outfit, and their shape and qualities need consideration. A watering pot should be lighter for greenhouse and indoor work than for general use about the garden, as it is nearly always necessary at some stage in the work to reach a plant on a level with or above the operator's head, and a light, well-balanced watering pot becomes a necessity. These pots should have long spouts, with such a slope as to cause the water to rise and then gently fall. With a fine rose attachable to such a spout watering of both established plants and newly-sown seeds can be carried on. In these light indoor watering pots the handle runs in a curve from the front of the pot at the top to its base at the back, enabling the worker to hold it at any desired angle with ease. For heavy work about the garden a larger pot should be used, those with a well-braced short spout and a handle across the top being as good as any.

Where a good supply of water is laid on, and extensive watering is required, it is of course a great economy of time and labour to employ hose pipes and water sprinklers. Where a large garden has to be dealt with the water should be taken to several spots, and short stand-pipes fixed to which flexible hose can be attached. The extra expense of conveying the water in the first instance will be balanced by the lessened wear and tear of hose, long lengths of which are very liable to damage, as well as unhandy to deal with.

**Manures.**—Where it is available stable manure is perhaps the most valuable, for ordinary garden purposes, of all manures. For not only does it directly add to the soil constituents needed for the healthy life of plants, but also through the fermentation which it undergoes, and the acids produced thereby, it liberates from the soil itself plant foods which would not otherwise be available. By its texture, and by the gases produced in the process of its fermentation, moreover, it tends to lighten the soil and keep its texture open. For similar reasons there is considerable value in such manurial substances as leaves, lawn



cuttings, road sweepings, and vegetable refuse. All organic waste, indeed, has some manurial value. It is very great in the case of such substances as cow manure, fowl manure, pig manure, and night soil. Wood-ashes and soot are also useful, the former largely on account of the potash it contains, the latter for its ammonia. But often organic manures are unobtainable, and we must then resort to the so-called artificials. Briefly, we may say that the three classes of manurial elements which most commonly require to be added to the soil, are potash, phosphates, and nitrates. The first of these is conveniently applied in the form of a mineral substance known as kainit, phosphates are usually provided as superphosphate of lime, or in the form of divided bones, whilst nitrogen is most often given as nitrate of soda or sulphate of ammonia. Different crops have naturally different manurial requirements. Thus potatoes and tomatoes, for example, have special need of potash, whilst leguminous plants, such as peas and beans, and certain roots such as turnips, are particularly influenced by the addition of phosphates. Where, however, there are no special indications, a useful proportion of artificial manures is two pounds of superphosphate of lime, and two pounds of kainit per square rod, to be dug into the soil in the autumn, three pounds of nitrate of soda being distributed over the surface in three doses in the spring.

Basic slag is a chemical manure much used of late years, consisting largely of lime, phosphoric acid, and various iron oxides. It contains other constituents as well as these, but in small proportions. Its effects are much those of superphosphate, but almost twice the quantity is required to produce a given result. It does not succeed mixed with ammonia salt, as it sets free the ammonia and wastes valuable material, but is useful with nitrates. It is most useful on soils which are deficient in lime, or are too wet and stiff; but to obtain the full advantage the soil must already be fairly well provided with organic matter. As a manure it is good for flowering shrubs, roses, fruit trees, lawns, and pastures.

Where chemical manures are applied to trees and plants which have made full root growth, so that the soil is filled with roots, the best plan, in order to avoid injury to the plants, is to scatter the manure where it is required, and then lightly to "point it in" with a small fork, only placing the manure just under the surface of the ground. In this way the manure is protected from loss by wind or rain, while the delicate roots are not liable to suffer, as they are if the manure be dug in with a spade.

**Mulching.**—By mulching is meant the covering of the surface of the ground with manure or litter, the object being two-fold. In the first place, it is often a convenient way of enriching the surface soil in which the fine roots of trees and other plants are ramifying. In the second place it helps to limit the evaporation of water from the soil, and so keeps a certain degree of moisture available for the plants. This latter end may be attained also by a layer of loose soil or stones, and it is with this in view that gardeners often hoe or fork the surface of the ground, especially when it has become baked and hard.

**To make a Hot-Bed.**—Take stable manure, and lay it in a heap. Turn it, and shake it well out every second day for about ten days. Mix with it an equal bulk of leaves collected during winter and kept well trodden down. Then arrange the mixture in a heap, three feet wider and longer than the frame which is to be used. It should be beaten firmly with a fork, and should, when finished, be from four to five feet high in the front, and from five to six feet at the back. Lastly about six inches of leaves should be used to cover it. The frame should then be put on, and the lights closed. When the night temperature is from sixty to seventy degrees the bed is ready for sowing.

## CHAPTER X.

### A GARDENING' CALENDAR.

*[In studying the following pages, readers south of the Equator should bear in mind the difference in the seasons, i.e., in Australia, for example, May is equivalent to November in England.]*

#### NOVEMBER.

**General Operations.**—Of all the months of the year, November is, perhaps, the best in which to begin the cultivation of a garden or to take over and re-model a garden already existing, and for that reason it becomes really the first month of the year from the gardener's point of view. All ground not in actual occupation should be deeply dug or trenched, and, except in the case of very light soils, should be well manured. Very light soil is best manured in the spring. The value of autumn preparation can hardly be exaggerated, especially where the ground is intended for vegetable growing. Where the soil is exceptionally heavy it is well to throw up the surface in rough ridges so that it may more readily be played upon by rain and frost, and so be capable of a finer tilth in spring.

Now also is a good time to re-make paths or create fresh ones. The importance of providing thorough drainage, by means of coarse stones, broken pots and the like, should be borne in mind. On this rough foundation should be arranged stone, less and less coarse and at least two or three inches of gravel over all.

**The Fruit Garden.**—This is the month in which the greater part of fruit planting and transplanting should be performed. This applies not only to apples, pears, plums, cherries, and other large trees, but also to gooseberries, currants, and raspberries, and also to vines. Mild days should be chosen for the purpose; frosty weather being avoided. It is also a good month for

pruning. Remember that in the case of peaches, nectarines, morello cherries, and black currants, the fruit is borne on the young wood, whereas in apples, pears, sweet cherries, and red and white currants the fruit is borne on the older wood. Both newly-planted and old-established fruit trees may with advantage be given a mulch of manure.

**The Vegetable Garden.**—Apart from the preparation of the soil for spring sowing, November is not a very interesting month in the vegetable garden. Rhubarb and sea-kale, as well as asparagus, should be freed from their old leaves, and any weeds. The crowns of the two former should be covered with sand or leaves. Roots intended for forcing may now be lifted. In sheltered situations under a wall facing south, a sowing of early Mazagan or early Longpod beans may be made in light soil. As soon as growth shows the bed should be protected by bracken or straw. A small sowing of early peas may also be made in the same circumstances.

**The Flower Garden.**—In the flower garden, also, there is plenty of work to be done. Herbaceous borders may be prepared, and roses may now be planted; tulips and hyacinths, as well as any other bulbs which should have been planted a month or two earlier, must now be got in. Flowering shrubs should be planted in this month. Dahlia tubers, if they have not already been lifted, should not be left in the ground any longer. They should be thoroughly dried, and then stored away in dry dust or sand out of reach of frost.

**Greenhouse and Room Plants.**—Give plenty of air to the chrysanthemums and begonias, which should now be giving a good display. Give water sparingly, and, in the case of plants in rooms where no artificial heat is afforded, only just enough water to keep the earth from absolute dryness.

## DECEMBER.

**General Operations.**—The work of digging and trenching may be continued, though the month is not so suitable as November for these purposes, as the ground is apt to be wet and cloggy. On mild days planting, transplanting and pruning may still be carried on. This is a good month in which to overhaul the tools, labels, flower-pots, seed boxes, and garden appliances generally. Any outhouses, frames, etc., may be repaired.

Dead leaves and stems may be collected and allowed to rot down for subsequent use as manure. The value of such material, as also that of fallen tree leaves, cannot be exaggerated. All available manure which has not yet been dug in should be wheeled on to the soil on frosty days, to be incorporated with the soil when the latter is in a tillable condition.

**The Fruit Garden.**—The pruning of fruit trees may be continued until the end of this month, but frosty days should be avoided for this purpose. The trunks of fruit trees may be sprayed with an insecticide. Planting and mulching may be continued on mild days.

**The Vegetable Garden.**—The ground between growing crops of cabbages and other green vegetables should be hoed on fine days. It is well to bend over the leaves of broccoli to protect the heads from frost. Potato-onions may be planted in drills about four inches deep unless the ground is very wet. Shallots may also be planted, though it is better to leave them to the end of February or March.

**The Flower Garden.**—The tidying-up of borders may be continued, and a surface dressing of leaves or light littery manure may be laid on the soil between plants, especially such as are at all tender. Any untidiness which this might cause may be avoided by sifting a little fine soil on top of the mulch. Hand-lights should be placed over Christmas roses, as only thus can the flowers be saved from splashings of mud. Lawns should be kept swept, and path making and mending may be continued.

**The Greenhouse and Room Plants.**—The advice given last month as to watering applies with equal force to this month. Chrysanthemums and begonias are not yet over. Window and room gardeners should not forget the beauty and utility of hardy ferns and early-flowering bulbous plants.

## JANUARY.

**General Operations.**—Though digging, trenching, and planting should have been completed before Christmas, still it will be better to do them without delay than to leave them undone. Outdoor work is, as a rule, not easy in this month, owing to

the alternation of frost and heavy rain. Plants against walls should be nailed up, vegetable refuse and leaves should still be collected and stored in heaps. Lawns and paths should continue to receive attention.

**The Fruit Garden.**—Any trees which have been left unpruned should at once receive attention. Indeed, this is a very good month in which to prune raspberries, though other fruits should certainly have been done earlier. Trees intended to be grafted should now be cut back, and the scions for grafting should be cut and heeled in the ground for subsequent use. The surface of the ground between strawberry plants should be hoed, and a dressing of manure applied.

**The Vegetable Garden.**—In protected situations a few more early peas and broad beans may be sown in fine warm soil under a south wall. It is well to sow these early seeds much more thickly than would later be desirable, as a great number will certainly fail to germinate. In frames a few onions, leeks, carrots, radishes, lettuces, and cauliflowers may be sown in gentle heat. Between cabbages and onions already growing, the surface of the ground should be disturbed by the hoe. The mushroom beds may be made up, and spawn planted. Where the soil is light and the situation warm, a good dressing of manure may be laid on asparagus beds.

**The Flower Garden.**—All bulbs and roots should now be in, and no more digging or hoeing of flower borders containing bulbs is permissible until the bulbs show above the surface, otherwise much damage is sure to be done. A few seeds of snapdragons, petunias, and verbenas may be sown in gentle heat. A little protection by bracken or similar material should be given to young shoots of all but the hardiest herbaceous and bulbous plants now showing. The flower garden should now be beginning to be interesting. The earliest snowdrops, winter aconite, Christmas roses, iris reticulata, as well as the yellow jasmine and the wintersweet may be expected before the month is over.

**Greenhouse and Room Plants.**—Primulas and cyclamens and early-flowering bulbous plants of all kinds will now be in flower. Tulips, hyacinths, narcissi, crocuses, snowdrops, and scillas, as well as various herbaceous plants such as primulas, auriculas, and violets are within the reach of every one who has a frame or the simplest glasshouse.

**FEBRUARY.**

**General Operations.**—Herbaceous plants, bushes, and fruit and rose trees may still be planted. Indeed, in cold situations and heavy soils, February is a very good month for these operations. There should now be no vacant land left weedy and unturned. Although bare, the whole garden should be neat and tidy. Hedge and wall plants may now be trimmed.

**The Fruit Garden.**—Strawberries may now be planted if the weather is favourable. The ground should have been well trenched, and when dry trodden firm.

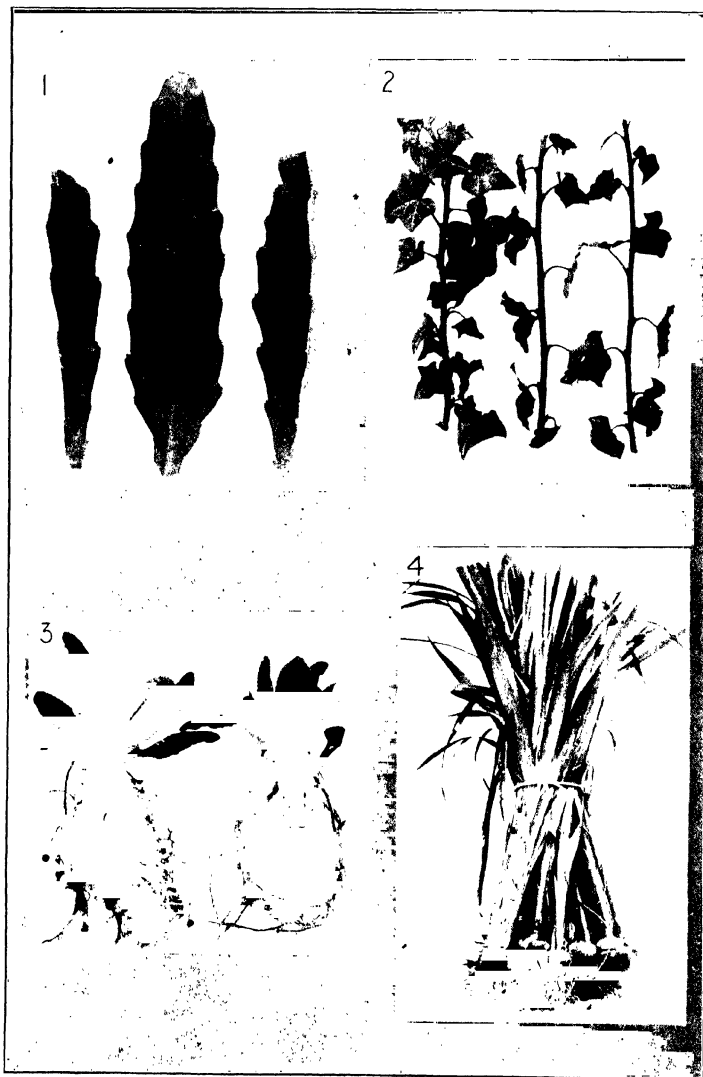
**The Vegetable Garden.**—On warm borders with a southern aspect sowing may be made of early carrots, radishes, early peas, lettuces, spinach, turnips, and broad beans. In severe weather protection may be given by bracken or light litter. In frames or houses in gentle heat a few seeds of celery, tomatoes, and cucumbers, as well as quick-growing varieties of cabbage, may now be sown. Divide clumps of chives, planting the roots about three inches deep, giving them, where possible, a sunny situation. Plant horseradish, Jerusalem artichokes, garlic, and shallots. Plant, in the warmest situation available, a row or two of early potatoes, sprouting them before planting.

**The Flower Garden.**—Box edgings as well as all other live edgings, such as thrift and pinks, may now be planted. Ranunculus tubers should be set in drills about two inches deep and four or five inches from tuber to tuber. They should receive some protection by bracken or litter. Monthly roses should be pruned this month by cutting out the weaker growths, leaving the best shoots almost their full length. Herbaceous borders may be given a light top dressing of some littersy manure, if this has not already been done. A few seeds of snapdragons, lobelias, petunias, verbenas, and begonias may be sown over gentle heat. Cuttings of pelargoniums, heliotropes, fuchsias, and calceolarias may be inserted, and will quickly root in a warm frame. Tubers of begonias, dahlias, and gloxinias may be started in moderate heat.

**MARCH.**

**General Operations.**—Ground which has been dug up rough or left ridged through the winter may now be levelled and prepared

No. 31. CACTUS, IVY, POLYANTHUS & GLADIOLI CUTTINGS



1. Cactus cuttings prepared for potting. 2. Ivy cuttings prepared for planting. 3. Division of Polyanthus, ready for planting. 4. Gladioli bulbs, lifted in autumn.





during fine weather for seed sowing. Grass seeds for lawns should now be sown, allowing seed at the rate of four bushels an acre. During this month the gardener will be kept busy all his time. He will realise the importance of having prepared and manured his soil during the autumn and winter months.

**The Fruit Garden.**—About the end of March, apples, pears, cherries, and plums which were cut back in January may be grafted. The grafts should have been taken at least a month previously. Any wall fruits, such as peaches, apricots, or nectarines, coming into blossom, should be protected from frost by means of canvas, netting, or bracken, fixed amongst the branches. The surface of the ground round dwarf fruit trees should be hoed.

**The Vegetable Garden.**—Sowings should be made this month of cabbages, broccoli, cauliflower, brussels sprouts, broad beans, leeks, lettuces, onions, parsley, carrots, turnips, parsnips, beetroot, peas, spinach, radishes, and kale; choosing the most sheltered and warmest situations available. Jerusalem and Chinese artichokes may now be planted, as also may asparagus, rhubarb, sea kale, and early potatoes. The hoe should be freely used among growing crops. Celery, celeriac, tomatoes, melons, cucumbers and marrows may be sown in gentle heat.

**The Flower Garden.**—The surface of the ground of herbaceous borders may be carefully broken with a fork and transplanting may still be performed. Early flowering shrubs and wall plants may be pruned hard back as soon as they have finished flowering. Clematises should also be pruned this month. March is a good month for planting pansies and violas. Seeds of hardy annuals may be sown in the open towards the end of the month, and half-hardy annuals may also be sown in gentle heat. Carnations layered last year may now be planted out for flowering, and out-door chrysanthemums may be planted out. Ranunculuses may still be planted, and Montbretias may be planted in sheltered positions.

**Greenhouse.**—Begonias and gloxinias should now be starting into growth. Balsams and petunias may now be sown.

## APRIL.

**General Operations.**—All unoccupied ground should have been prepared long before this, but, if any has been overlooked, no more

**The Fruit Garden.**—Grafting should be finished early this month. Pruning and planting should have been done. But April is the best month in which to prune the fig. Strawberries should be mulched. Apricot, peach and nectarine trees in blossom should be protected by hanging canvas or netting in front of them at a sufficient distance not to rub against the flowers. Slugs and snails should be looked for and destroyed. Towards the end of April disbudding should be done gradually. Take care that the soil at the roots of wall trees does not become dry. Indoor vines that have set their berries should now be thinned.

**The Vegetable Garden.**—Now is the time to make new asparagus beds, either by sowing or by putting in new plants. Do not spare labour in preparing the bed, for a properly-made asparagus bed should last ten years. Globe artichoke suckers may now be planted. Almost all kinds of vegetable seeds may now be sown in the open. Peas, broad beans, French beans, beets, broccoli, brussels sprouts, cabbage, cauliflower, carrots, cardoons, celery, chicory, lettuce, leeks, endive, salsify, scorzonera, spinach, sorrel, turnips, kale, and all kinds of herbs may be sown; and, in frames, melons, marrows, and cucumbers may be sown in pots. The second early crop and the main-crop potatoes should be planted about the first half of the month. Tomato seedlings should be pricked off, one or two in a pot, keeping them close to the glass. Remember to sow all seed thinly, and further to thin out seedlings as soon as they get their second leaf, the aim being that each single plant shall have full opportunity for healthy development.

**The Flower Garden.**—The principal sowing of all hardy annuals should be made this month, and about the end of the month half-hardy annuals may also be sown in the open air. Auriculas in pots should be given plenty of air, but while in flower should be carefully protected from sun and rain. Wallflowers, stocks, hollyhocks, carnations, sweet-williams, and other hardy plants should be planted out early in the month. Cuttings may now be made of verbenas, petunias, fuchsias, heliotrope, and most

other plants. They should be planted in pots, partly filled with light soil, the top of the pot being covered with a piece of glass and the pot itself being plunged in moderate warmth. Gladiolus corms may now be planted, and pansies and violas may be planted out in beds or borders. Roses should now be pruned, as also should many varieties of clematis, and shrubs of numerous kinds. Hardy perennial plants may be divided and replanted.

**The Greenhouse.**—On hot days shade should be given. Plants that have become too big for their pots should be repotted, and given more space. More water will now be needed. Climbing plants should be trimmed and nailed up where necessary.

## MAY.

**General Operations.**—This is the last month in which extensive planting and sowing can still be done, and the gardener will be kept hard at work thinning seedlings, hoeing between growing plants, and planting out. By the middle of this month many tender plants which up to now have been in frames, under glass or in houses, may be removed to the open air. In dry weather watering may have to be begun, but it should be put off as long as possible.

**The Fruit Garden.**—The disbudding of peaches and nectarine trees should be completed. After about the middle of the month no further protection will be needed. Keep a sharp look-out for insect eggs. Examine the under side of gooseberry leaves and remove the eggs of the gooseberry moth. The leaves may be dusted with hellebore powder. Pinch back new apricot shoots. Thin out raspberry suckers, leaving from four to six to each stool. Cut off any strawberry runners not required for making young plants. Place strawy litter or clean straw between the strawberry plants, so that the fruit may rest on it as it forms.

**The Vegetable Garden.**—Almost all seeds that have been named for sowing in March and April may still be sown. In any case it may be well, where there is room, to sow small successional crops of most kinds. A few late potatoes may still be planted. The supply of salads should be maintained by successional sowing of lettuce and mustard and cress. In cutting asparagus shoots, cut them carefully just below the surface. All shoots

should be cut as they reach about six inches high. It is a mistake to pick out only the thick shoots. Tomatoes intended for out of doors should be planted out against walls or fences facing south about the third week in the month. Give them plenty of room, and support them by stout stakes, at least four feet high. 'See that they are adequately tied' every few days. The central stems should not be touched until the early flowers are set and about fifteen or more fruits are visible. Then they should be pinched to the height of the stake. Fruiting branches should be pinched back to just beyond the fruit.

**The Flower Garden.**—Half-hardy bedding and other plants will be planted out this month. 'It is generally well to leave this work to about the middle of the month. Annuals should be thinned out, and, where necessary, transplanted. Sub-tropical plants had better not be placed in the open until next month. Dahlias may be planted. Annuals may still be sown, and many of them will flower in the autumn. Pansy cuttings may now be taken. Gladiolus corms may still be planted.

**The Greenhouse.**—Sow seeds of cineraria and primulas. Watch plants that need repotting. Give plenty of air, and shade when necessary. Keep a sharp look-out for insect pests. Cuttings of most plants may now be taken.

## JUNE.

**General Operations.**—Hoeing between growing crops is now of the utmost importance, and water must not be spared. Remember that sprinkling the surface of the soil is practically useless, and where water is given at all it should be given generously. Evaporation can be materially checked by mulching and by keeping the surface of the ground ruffled. Weeds now grow apace, and must be fought continuously. Remove the remains of any crops which have been gathered.

**The Fruit Garden.**—Thin peaches and apricots if necessary. Thin out and stop all superfluous growths on fruit trees of every kind. In the case of young trees keep a sharp look-out for over-vigorous shoots, which, if unchecked, will spoil the shape of the tree. Deal with green fly, and apply insecticides where necessary. The ventilation of vinerias is very important. Air should be

admitted before the sun has sent up the heat. Mulch round trees of all kinds. Strawberries need plenty of water. It is well to pick some green gooseberries where the crop is heavy. Those that remain will ripen better and be of larger size.

• **The Vegetable Garden.**—A sowing of late kidney beans should be made about the middle of the month, as also should some cabbages and coleworts. The small growing kinds should be chosen. Endive and lettuce may be sown at fortnightly intervals. A last sowing of peas may be made. Sow them thinly, and give water if necessary. About the end of the month the main sowing of turnips may be made. Early in the month outdoor cucumbers may be sown on ridges. Asparagus should not be cut after the middle of the month, as time must be given for sufficient growth to mature to help the plants to manufacture a crop for next spring. Celery should be planted out, for which showery weather, shade, and abundant water are necessary. Broccoli, brussels sprouts, and borecole should now be planted out, as also may tomatoes against a warm wall or fence.

**The Flower Garden.**—Bedding out, if not already completed, should be finished as early in this month as possible. Biennials and perennials of all kinds may now be sown, as also may some of the quick-growing annuals. Half-hardy annuals should be raised in frames and then planted out. Carnations will now require staking, remembering to tie loosely. Violas should be pegged down where necessary. Seedlings of all kinds should be kept thinned, so as to allow of individual development. Towards the end of the month roses may be budded. Water freely where necessary.

**The Greenhouse.**—Give abundance of air at all times. Fumigate and syringe for insects. Move on plants that require more pot-room.

## JULY.

• **General Operations.**—Weeding, hoeing, and watering must be carried on all through this month. The ground will be nearly all occupied, so that there will be little digging or manuring to be done, but the value of top-dressing round the bases of fruit trees and between growing plants should not be forgotten.

**The Flower Garden.**—Pick dead flowers before their seeds develop. Stake plants that need support. Take cuttings of hardy plants, planting them under hand-lights. Carnations should be layered. Plant out seedlings of all kinds. Snapdragons and other perennial and biennial plants may still be sown. Towards the end of the month some annuals may be sown for flowering in the early spring. Bud roses. Attend to hoeing, mulching, and watering.

## AUGUST.

**General Operations.**—Watering, hoeing, and mulching still remain the chief work in the garden. Dead flowers and decaying remains of vegetables must be removed as they show themselves.

**The Fruit Garden.**—Wall fruit, as indeed all ripening fruit, will need to be protected from birds and wasps. Trap earwigs. Summer pruning should be continued. Fruit trees may now be budded. All runners that are not needed for new plants should now be removed from strawberries. Pears, plums, and apples should be thinned where the crops are heavy. Raspberry canes, as soon as their fruit has ripened, should be cut down, and the young growth should be thinned down to four or six. Remove all unnecessary growth from the vines, and leave the fruit fully exposed.

**The Vegetable Garden.**—Cabbages, spinach, onions, turnips, brussels sprouts, cauliflowers, endive, and radishes may be sown.

Earth up early celery, and plant out the later crops. Leeks also should be earthed up, and the necks of onions should be bent down. Onions that are ripe may now be harvested.

• **The Flower Garden.**—Roses may now be budded. Cuttings may now readily be struck of all kinds of hardy plants and bedding plants. Layer carnations and pinks. Attend to the staking of dahlias. Annuals of all kinds may be sown for spring flowering. Spring flowering perennial plants may now be divided and replanted. Evergreen hedges may be clipped and trimmed.

## SEPTEMBER.

**General Operations.**—The garden will need constant attention this month, if it is to be kept tidy. Dead flowers and stems will need picking, and pea-haulm and other vegetable refuse must be collected, laid in a pit, and lightly covered with earth to rot down. Various seeds will need to be collected and dried, and ground which has become vacant may be turned and manured. Lawns will need frequent sweeping if they are to be kept free from leaves, and grass seed should be sown for making fresh lawns.

• **The Fruit Garden.**—Various apples and pears will ripen and will need to be gathered. Trees that need root-pruning may now be attended to. Strawberry runners may still be planted. The ground may be prepared for planting fruit trees next month. Remove unnecessary growth from outdoor grapes if they shade the fruit from the sun.

**The Vegetable Garden.**—Frequent hoeing between growing crops is still important, both for the retention of moisture and for the keeping down of weeds. Cabbage, cauliflower, lettuce, and endives should still be planted out. In the case of lettuce, choose a sheltered spot. Tomato plants should have any leaves which shade the fruits from the sun removed. If their fruits are too thick they should be thinned, these green fruits being useful for chutney and preserves. Celery will need earthing up. Potatoes should be lifted as soon as the haulm decays. Prickly spinach may be sown the first week in the month, as also may Tripoli onions. Ripe onions should be drawn, dried and stored in a dry place. Mushroom beds should now be made up. Cover



them with hay or straw to maintain a proper temperature, and to prevent undue evaporation.

**The Flower Garden.**—Cuttings of petunias and lobelias should be struck early in the month, as should cuttings of all bedding plants. Many hardy annuals may now be sown in somewhat poor soil in a sheltered situation for flowering in the early spring. Almost all herbaceous plants and shrubs may now be transplanted. Rose cuttings may be taken, and planted in sandy soil. Box edgings may be replanted. Narcissi, snowdrops, scillas, and crocuses may be planted. Collect and stack peat, leaf-mould, and any other soils that are likely to be wanted.

**Greenhouse.**—Attend to climbing plants, trimming any that have finished flowering. Many sub-tropical plants that have been out during the summer will now need to be placed under glass. All kinds of hardy and half-hardy plants may now be potted for room or conservatory decoration throughout the winter.

## OCTOBER.

**General Operations.**—Leaves will now be falling fast, and paths and lawns will need constant sweeping. Gravel paths should be rolled and mended if necessary. All vacant soil should now be got ready for planting. The likelihood of frost should be borne in mind, and tender plants should be got indoors or protected.

**The Fruit Garden.**—Towards the end of the month planting may be begun. Strawberry runners in pots may be planted out in their permanent situation. Prepare ground intended for planting fruit trees next month, adding plenty of fibrous loam from pastures, if obtainable. Gooseberries and currants may be pruned towards the end of the month, and raspberry canes should be planted. Most apples and pears which have not previously ripened will be ready for picking some time this month. Fruit intended for storing should be most carefully handled, and stored in a moderately dry room, where they will not be exposed to variable temperatures. At the end of the month fruit trees may be transplanted or lifted and their soil replenished.

**The Vegetable Garden.**—Carrots, parsnips, and beet should be lifted carefully when their tops fade; the roots should not be

damaged in any way, but should be carefully buried in a wide trench, and covered with earth. Parsnips should not be raised until they have been exposed to frost. Any remaining potatoes should now be lifted. Celery and leeks will need earthing up. Cabbages, lettuce, and endive should still be planted out. Hoe between spinach and other growing crops. Thin seed beds of onions, turnips, and other crops. Keep a sharp look-out for slugs.

**The Flower Garden.**—Almost all spring bulbs which have not yet been planted may now be put in. Herbaceous plants of all kinds may now be divided and replanted. Attend to paths and edgings. Plant all kinds of spring-flowering things in the situations they are to occupy. All kinds of biennials should now be planted in their permanent quarters. Now is a good time to manure beds and borders, and make new ones.

**The Greenhouse.**—Pot roses should be got under cover. All kinds of hardy and half-hardy plants may still be potted for indoor flowering. Begin to water more sparingly, watering in the morning. The temperature will want watching as the nights are apt to be frosty.



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