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Wm. W. Wilson

PLAIN
INSTRUCTIONS IN GARDENING;

WITH

A CALENDAR OF OPERATIONS AND DIRECTIONS

FOR EVERY MONTH IN THE YEAR.

BY MRS. LOUDON.

Eleventh Edition.

LONDON:
JOHN MURRAY, ALBEMARLE STREET.
1874.

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THE MEMORY OF

F.L.S. H.S. Z.S., ETC. ETC.

TO WHOM THE AUTHOR OF THE FOLLOWING PAGES OWES ALL
THE KNOWLEDGE OF THE SUBJECT SHE POSSESSES),

This Work is Dedicated

BY HIS AFFECTIONATE WIDOW,

J. W. L.

296671

PREFACE.

As the rapid sale of the previous editions of this work affords the surest proof that it has met the wants of those for whose use it was designed, it may be asked why I have now made so many alterations and additions. My answer is, that I have done so in order that my book may keep pace with the improving spirit of the times. For this reason, I have rewritten the chapter on manures, and made various other alterations to meet the present views of scientific men as regards chemistry when applied to horticulture. It is true that, in most cases, the results are the same as practice has long dictated; but it is pleasant to find theory and practice agree, which was not always the case formerly. In fact, the most interesting feature in the new doctrines is, that they explain scientifically why practices succeed, which formerly appeared quite at variance with theory.

The other alterations are of minor importance, but they are numerous; and, in fact, every page has been carefully read over, and improved to the utmost of my power.

J. W. LOUDON.

BAYSWATER, *Jan.* 20, 1851.

CONTENTS.

	Page
INTRODUCTION	1

CHAPTER I.

Stirring the Soil	3
-----------------------------	---

CHAPTER II.

On Soils and Manures; including the Formation of Hotbeds	20
---	----

CHAPTER III.

Sowing Seeds.—Planting Bulbs and Tubers.—Trans- planting and Watering	35
--	----

CHAPTER IV.

Modes of Propagation by Division; viz. Taking off Suckers, Making Layers and Cuttings, Budding, Grafting, and Inarching	58
---	----

CHAPTER V.

Pruning, Training, Protecting from Frost, and Destroy- ing Insects	95
---	----

CHAPTER VI.

	Page
The Kitchen-Garden.—The Management of Culinary Vegetables	115

CHAPTER VII.

The Management of Fruit Trees	166
---	-----

CHAPTER VIII.

The Flower-Garden, and the Culture of Flowers	205
---	-----

CHAPTER IX.

Management of the Lawn, Pleasure-Grounds, and Shrubbery of a small Villa	251
--	-----

CHAPTER X.

Rockwork, Moss Houses, Rustic Summer-Houses, Rustic Baskets, and Fountains	272
--	-----

CHAPTER XI.

Window Gardening, and the Management of Plants in Pots in small Greenhouses	289
---	-----

CHAPTER XII.

Calendar of Operations	323
----------------------------------	-----

GARDENING FOR LADIES.

INTRODUCTION.

It is scarcely possible to imagine any person more completely ignorant of everything relating to botany and gardening, than I was at the period of my marriage with Mr. Loudon; and as I found all his family and friends thoroughly acquainted with both subjects, it may be easily conceived that I was soon heartily ashamed of my ignorance, and anxious to remove it as rapidly as possible. Botany appeared too difficult for me to attempt; but I thought I might easily learn a little of gardening and of plants; and as my husband's time was very much occupied, I endeavoured first to teach myself from books. This, however, I soon found was no easy task. Good books on gardening are generally written for professed gardeners, who are supposed to know all the elementary parts beforehand; and most of the books for beginners contained only arbitrary directions, for which no reasons were given, and which, as they did not apply in all cases, only seemed to bewilder me. In this dilemma I was obliged to apply to my husband, and though, of course, he was as anxious to teach me as I was to learn, we found unanticipated difficulties at

every step; and we both soon discovered the truth of the apparent paradox, that it is not enough to know any art or science to be able to teach it, and instead of wondering that I had not obtained all the information I wished from books, it seemed strange that I had found them of any use at all.

It is so very difficult for a person who has been acquainted with a subject all his life, to imagine the state of ignorance in which those are who know nothing about it, that a professional gardener has rarely patience to teach anything to an amateur. It is necessary to be a full-grown pupil, as I was myself, to understand the wants of those in a similar situation; and it requires to have an able and never-wearied instructor, such as I had, to explain the reasons for every rule, to make rules generally applicable.

In the following pages I have endeavoured to embody the substance of the instructions I received from my husband; but as these instructions were given now nearly twenty years ago, and as gardening is a progressive science, I cannot say I have confined myself to them. On the contrary, I have endeavoured to make my readers acquainted with every improvement that has taken place; always, however, explaining, as far as I have found it possible, why the changes I mention have been adopted.

CHAPTER I.

STIRRING THE SOIL.

DIGGING.—Every one knows that the first operation of the gardener, whether a new garden is to be made, or merely an old one replanted, is to dig the ground; though but comparatively few persons are aware why this is so essential. When a piece of rough ground is to be taken into cultivation, and a garden made where there was none before, the use of digging is obvious enough; as the ground requires to be levelled, and divided by walks, and thrown up into beds, to give it the shape and appearance of a garden, which could not be done without stirring the soil: but why the beds in an old garden should be always dug or forked over before they are replanted, is quite another question, and one that it requires some consideration to answer.

When any soil, except sand or loose gravel, remains unstirred for a length of time, it becomes hard, and its particles adhere so firmly together as not to be separated without manual force. It is quite clear that when soil is in this state, it is unfit for the reception of seeds; as the tender roots of the young plants will not be able to penetrate it without great difficulty, and neither air nor water can reach them in sufficient quantities to make them thrive. When a

seed is put into the ground, it is the warmth and moisture by which it is surrounded that make it vegetate. It first swells, and the skin with which it is covered cracks and partly peels off: then two shoots issue from the vital knot (a point easily discoverable in large seeds), one of which descends and is called the root, while the other ascends to form the leaves, stem, flowers, and fruit.

This is what is meant by the germination of the seed, and this may be effected by the aid of heat and moisture alone, as is done with mustard and cress, when raised on wet flannel in a saucer. But plants raised in this manner cannot be of long duration; as, though they will live for a short time on the albumen contained in the seed (on which they feed, as the chicken does on the nourishment contained in the egg), this is soon exhausted, and the plant will die if not supplied with fresh food, which it obtains principally by means of the root. Thus, the root is necessary, not only to form a base to support the plant and to keep it upright, but to supply it with food; and nature has given it a tendency to bury itself in the ground, not only to enable the plant to take a firm hold of the soil, but to preserve the root in a fitting state for absorbing food, which it can only do when it is kept moderately warm and moist, and secluded from the light.

The manner in which the root is fitted for the purposes for which it was designed affords an admirable illustration of the care and wisdom displayed by the Great Creator in all his works. In nature nothing is superfluous, and yet every-

thing has been provided for. It has been already observed, that the two principal uses of the root are, to give the plant a firm hold of the ground, and to supply it with food. For the first purpose, the root either spreads so widely through the surface soil as to form a sufficient base for the height of the plant, or it descends a sufficient depth into the earth to steady the part above ground; and in either case the growth of the plant is wisely and wonderfully proportioned to the strength of the support which the root affords it. For the second purpose, that of supplying the plant with nourishment, the root divides at the extremity of each shoot into numerous fibres or fibrils, each furnished at its point with a spongiole or spongy substance, which affords the plant the means of absorbing the moisture necessary for its support. It is thus quite clear, that everything that tends to nourish and increase the growth of the root must contribute to the health and vigour of the rest of the plant; and that no plant can thrive, the root of which is cramped in its growth, or weakened for want of nourishment. This being conceded, it is evident that the first step towards promoting the growth of any plant is, to provide a fitting receptacle for the root; and this is done by pulverising the ground in which the seed is to be sown, so as to render it in a fit state for the roots to penetrate it easily. Thus they will neither be checked in their growth for want of room, nor be obliged to waste their strength in overcoming unnecessary obstacles; such as twining themselves round a stone, or trying to force their way through a hard clod of

earth. The second point, that of affording the root abundance of nourishment, may also be attained by pulverising the ground ; as pulverisation, by admitting the air freely, and allowing the rain to percolate slowly through the soil, affords an equable supply of proper food to the spongioles, without suffering the surplus water to remain so long around the roots as to be in danger of rotting them.

These, then, are the reasons why it may be laid down as a general rule, that all ground should be stirred before seeds are sown in it ; but there are other reasons which operate only partially, and are yet almost as necessary to be attended to. When manure is applied, the ground is generally well dug, in order to mix the manure intimately with the soil : and when the soil appears worn out, that is, exhausted of its nutritious properties, it is trenched ; that is, the upper or surface soil is taken off by spade-fuls and laid on one side, and the bottom or sub-soil is taken out to a certain depth previously determined, and laid in another heap. The surface soil is then thrown into the bottom of the trench, and the subsoil laid on the surface, and thus a completely new and fresh soil is offered to the plants. Trenching is also useful to land that has had lime applied to it, and to sandy soils that have been mixed with clay ; as both the lime and the clay have a tendency to sink downwards, and to form layers below the surface soil, which is thus deprived of the benefit which it was expected to derive from the mixture, till they are again brought to the surface by trenching. The saline properties of a

soil, also, are frequently washed down by repeated rains, and require bringing again to the surface.

The uses of digging having been thus explained, it is now necessary to say something of its practice, and particularly of its applicability to ladies. It must be confessed that digging appears at first sight a very laborious employment, and one peculiarly unfitted to small and delicately-formed hands and feet; but, by a little attention to the principles of mechanics and the laws of motion, the labour may be much simplified and rendered comparatively easy. The operation of digging, as performed by a gardener, consists in thrusting the iron part of the spade, which acts as a wedge, perpendicularly into the ground by the application of the foot, and then using the long handle as a lever, to raise up the loosened earth and turn it over. The quantity of earth thus raised is called a spitful, or spadeful; and the gardener, when he has turned it, chops it to break the clods with the sharp edge of his spade, and levels it with the back. During the whole operation, the gardener holds the cross part of the handle of the spade in his right hand, while he grasps the smooth round lower part of the handle in his left, to assist him in raising the earth and turning it, sliding his left hand backwards and forwards along the handle, as he may find it necessary.

This is the common mode of digging; and it certainly appears to require considerable strength in the foot to force the spade into the ground, in the arms to raise it when loaded

with the earth that is to be turned over, and in the hands to grasp the handle. But it must be remembered that all operations that are effected rapidly by the exertion of great power, may be effected slowly by the exertion of very little power, if that comparatively feeble power be applied for a much greater length of time. For example, if a line be drawn by a child in the earth with a light cane, and the cane be drawn five or six times successively along the same line, it will be found that a furrow has been made in the soil with scarcely any exertion by the child, that the strongest man could not make by a single effort with all his force. In the same way, a lady with a small light spade may, by repeatedly digging over the same line, and taking out only a little earth at a time, succeed in doing, with her own hands, all the digging that can be required in a small garden, the soil of which, if it has been long in cultivation, can never be very hard or very difficult to penetrate: and she will not only have the satisfaction of seeing the garden created, as it were, by the labour of her own hands, but she will find her health and spirits wonderfully improved by the exercise, and by the reviving smell of the fresh earth.

The first point to be attended to, in order to render the operation of digging less laborious, is to provide a suitable spade; that is, one which shall be as light as is consistent with strength, and which will penetrate the ground with the least possible trouble. For this purpose, the blade of what is called a lady's spade is made of not more than half the usual breadth,

say not wider than five or six inches, and of smooth polished iron, and it is surmounted, at the part where it joins the handle, by a piece of iron rather broader than itself, which is called the tread, to serve as a rest for the foot of the operator while digging. The handle is about the usual length, but quite smooth, and sufficiently slender for a lady's hand to grasp, and it is made of willow, a close, smooth, and elastic wood, which is tough and tolerably strong, though much lighter than ash, the wood generally used for the handles to gardeners' spades. The lady should also be provided with clogs, the soles of which are not jointed, to put over her shoes; or if she should dislike these, and prefer strong shoes, she should be provided with what gardeners call a tramp, that is, a small plate of iron to go under the sole of the shoe, and which is fastened round the foot with a leathern strap and a buckle. She should also have a pair of stiff thick leathern gloves, or gauntlets (see *fig. 8*, in p. 70.), to protect her hands, not only from the handle of the spade, but from the stones, weeds, &c., which she may turn over with the earth, and which ought to be picked out and thrown into a small, light wheelbarrow (*fig. 1.*), which may easily be moved from place to place.

A wheelbarrow is a lever of the second kind, in which the weight is carried between the operator, who is the moving power, and the fulcrum, which is represented by the lower part of the wheel. If it be so contrived that the wheel may roll on a plank, or on firm ground, a very slight power is sufficient to move the load

contained in the barrow; particularly if the handles be long, curved, and thrown up as high

FIG. 1. LADY'S WHEEL-BARROW.

as possible, in order to let the weight rest principally upon the wheel, without obliging the operator to bend forward. When, on the contrary, the handles are short and straight, the weight is thrown principally on the arms of the operator, and much more strength is required to move the load, besides the inconvenience of stooping.

All the necessary implements for digging being provided, the next thing to be considered is, the easiest manner of performing the operation. The usual way is for the gardener to thrust his spade perpendicularly into the ground, and then, using the handle as a lever, to draw it back so as to raise the whole mass of earth in front of the spade at once. This requires great strength: but by inserting the spade in a slanting direction, and throwing the body slightly forward at the same time, the mass of earth to be raised will not only be much less, but the body of the operator will be in a much more convenient position for raising

and turning it, which may thus be done with perfect ease.

The time for digging should always be chosen, if possible, when the ground is tolerably dry; not only on account of the danger of taking cold by standing on the damp earth, but because the soil, when damp, adheres to the spade, and is much more difficult to work (as the gardeners call it) than when it is dry. The ground in fields becomes very hard in dry weather; but this is never the case in a garden, the soil of which is well pulverised by the constant digging, forking, hoeing, and raking it must undergo, to keep the garden tolerably neat. Every lady should be careful, when she has finished digging, to have her spade dipped in water, and then wiped dry; after which it should be hung up in some warm dry shed or harness-room, to keep it free from rust; as nothing lessens the labour of digging more than having a perfectly smooth and polished spade. Should the earth adhere to the spade while digging, dipping the blade in water occasionally will be found to facilitate the operation.

The purposes for which digging is applied in gardening are: simple digging for loosening the soil in order to prepare it for a crop; pointing; burying manure; exposing the soil to the action of the weather; trenching; ridging; forming pits for planting trees and shrubs, or for filling with choice soil for sowing seeds; and taking up plants when they are to be removed.

In simple digging, as well as in most of the other kinds, it is customary to divide the bed to

be dug, by a garden-line, into two parts: a trench, or furrow as it is called, is then opened across one of these divisions or halves of the bed, the earth out of which is thrown up into a heap. The digging then commences by turning over a breadth of soil into the furrow thus made, and so forming a new furrow to be filled up by the soil turned over from the breadth beyond it; and this is continued till the operator reaches the end of the first division, when the furrow is to be filled with the earth taken from the first furrow of the second division; after which the digging proceeds regularly as before, till the operator reaches the last furrow, which is filled with the ridge of earth thrown up when the first furrow was made. As few ladies are strong enough to throw the earth from the heap where it was laid from the first furrow, to fill the last, the best way is to put it into a small wheel-barrow, which may be wheeled to the place required, and filled and emptied as often as may be found convenient; or the ground may be divided into narrower strips. It must also be observed, that as a spadeful of earth taken up obliquely will be seldom found to loosen the soil to a proper depth, a second or even a third should be taken from the same place before the operator advances any further along the line; or the whole of each furrow may first be made shallow, and then deepened by successive diggings before proceeding to the next furrow.

It is obvious that the great art in this kind of digging is to keep the furrows straight, and not to take up more earth in one place than in

another, so that the surface of the ground, when finished, may be perfectly even. To keep the furrows straight, the first ought to be marked out with the rod and line, and every succeeding line should be frequently and carefully examined. It is more difficult to keep these lines straight than can be at first sight imagined and in proportion as the furrow is allowed to become crooked, it will become narrower, and be in danger of being choked up; or, if kept as wide as before, the surface of the ground will be rendered uneven, and the last furrow left without earth enough to fill it up. In digging each furrow also, care must be taken to carry it quite up to the line of demarcation; as, otherwise, what the gardeners call a baulk or piece of firm land would be left there, and, of course, the bed would neither look well, nor would the object for which it was dug be fully attained. Great care must also be taken to keep the surface of the bed even, and this it is extremely difficult for a novice to do. It is, indeed, very provoking, after watching the ease with which a gardener digs a bed, and looking at the perfectly smooth and even surface that he leaves, to find how very hard it is to imitate him: and yet it is absolutely necessary to be done; for, if there are any irregularities in the surface, the hollow places will collect the moisture, and the plants in them will grow vigorously, while those in the raised places will be speedily dried by the sun and wind, and will look poor and withered. Practice is certainly required to render digging easy; but, as the principal points, of keeping the furrows straight

and the surface even, depend on skill more than strength, the art of digging well may be acquired by any one who thinks it worth while to take the trouble. Very little strength will, indeed, be necessary, if the rule of thrusting in the spade obliquely, and aiding it by the momentum of the body, be always attended to.

Pointing, as it is called by gardeners, is in fact shallow digging, and it consists in merely turning over the ground to the depth of two or three inches. In spring, or in the beginning of summer, when the sun has only warmed the soil to the depth of a few inches, and when the seeds to be sown (as of annual flowers for example) are wanted to germinate as quickly as possible, pointing is preferable to digging; because the latter operation would bury the warm soil, and bring that up to the surface which is still as cold as in winter. Pointing is also used in stirring the ground among trees and other plants, in order that the spade may not go so deeply into the ground as to injure their roots.

Burying Manure.—There are two ways of digging the ground for the purpose of burying manure. According to the first method, the manure is spread evenly over the whole bed, and then the gardener proceeds to dig as though the manure were in fact a portion of the surface of the soil; and, according to the second method, the manure, having been first brought to the spot, and thrown into a heap, is deposited, a small portion at a time, at the bottom of each furrow as it is formed, and the earth from the next furrow thrown over it. In both cases, the manure should be buried as

speedily as possible; as, if left long exposed in small quantities to the air in hot dry weather, it loses a great part of its nutritious qualities by evaporation.

Ridging.—Digging for the purpose of exposing the soil to the action of the weather, trenching, and ridging on a large scale, are operations too laborious to be performed by any one but a gardener's labourer. To be done well, the earth in all these cases should be removed in large spadefuls at a time, and turned over without breaking; on which account these operations are best performed in moist weather, when the earth is in an adhesive state. Ridging on a small scale is, however, very useful even in a flower-garden, to mix air with the soil, where it is hard and unproductive. This kind of ridging is performed by opening a trench, and throwing up the loose earth out of it in the form of a ridge; and then opening another trench, and forming another ridge in the same manner. The whole garden is thus thrown into a series of ridges and trenches, which should be suffered to remain all the winter, and be levelled in spring. It is obvious that this mode of ameliorating the soil can only be practised where the garden is not likely to be visited during winter, as it destroys all beauty, and has a peculiarly desolate and forlorn appearance. It is thus a remedy only to be resorted to in extreme cases; but fortunately there are very few flower-gardens in which the soil is in so bad a state as to require it.

The *other kinds of digging* are, to form pits

for receiving plants, or for filling with choice soil, and to remove plants. In the first case, a hole of sufficient size to receive the plant is dug, and the earth thrown up beside it, to be filled in round the roots of the plant; and in the second case, the common garden earth is thrown out of a pit a foot or eighteen inches deep, and about the same in diameter, and its place supplied by peat, or whatever other kind of earth may be required. In removing a young tree or shrub, the ground is generally first dug out on one side, so as to form a small trench, and then the spade is driven perpendicularly into the ground, below the depth to which the roots descend, and the whole mass is raised like a spadeful of earth. Small plants are raised by the spade at once, without making any trench; and large trees require all the skill of a professed gardener.

Forking.—A broad-pronged garden fork may be defined as an implement consisting of a number of small sharply-pointed spades, united by a shoulder or hilt, to which is fixed the handle; and forking differs from digging, principally in its being used merely to stir the soil, and not to turn it over. In shrubberies, and among perennial herbaceous plants, which are not to be taken up and replanted, forking is very useful; as it loosens the hard dry surface of the soil, and admits the warm air and rain to the roots of the plants. This is very necessary, not only to admit the particles of air, which are required for the nourishment of the plants, but also to admit warmth, as the earth is a bad conductor of heat; and, where

the surface of the soil is become so hard as to exclude the air from the roots of the plants, the ground in which they grow will be nearly as cold in summer as in winter. Besides, when the surface of the ground is hard, the rain, instead of soaking gradually into it, runs off, or evaporates, without being of any service to the roots. The operation of forking consists merely in thrusting the fork a little way into the ground by the application of the foot to the hilt, and then pulling back the handle as in digging, so as to loosen the earth without raising it. The ground may thus be roughly pulverised to a considerable depth, without dividing the roots of the plants; which would have been inevitable if the operator had used a spade.

Hoeing. — There are several different hoes which are used for getting up weeds, for loosening the soil, for drawing it up round the stems of growing plants, and for making a shallow furrow or drill for sowing seeds: but all these kinds belong to one of two great divisions, viz. the draw hoe (*fig. 2.*), and the thrust hoe (*fig. 3.*), and may be seen at any ironmonger's shop.

FIG. 2. DRAW HOE.

FIG. 3. THRUST HOE.

Either kind may be used for destroying weeds; as the weeds may either be loosened or lifted

out of the soil by the thrust hoe, or torn out of it by the draw hoe. Both kinds may also be used for pulverising the soil, or a draw hoe with two prongs may be substituted. In all these operations, the thrust hoe is best adapted for a lady's use, as requiring the least exertion of strength, and being most easily managed ; but the draw hoe is best adapted for making a drill or furrow for the reception of seeds, and also for the last and most important use of hoeing, viz. the drawing up of the earth round the stems of growing plants.

The operation of hoeing up, though very commonly practised, is only suitable to some kinds of plants ; and it is intended to afford additional nourishment to those which require abundance of food, by inducing them to throw out more lateral fibres from their main roots.

The plants which will bear to be hoed or earthed up are those that throw out fibrous roots above the vital knot, like the cabbage tribe, &c. ; or that are annuals with long bushy stems, and very weak and slender roots, like the pea. Ligneous plants should never be earthed up, to avoid injuring the vital knot, which forms the point of separation between the main root and the stem, and which gardeners call the collar, crown, neck, or collet. This part in trees and shrubs should never be buried ; as, if it be injured by moisture so as to cause it to rot, the plant will die. A deciduous tree may be cut down close above the collar, and it will throw up fresh shoots ; or the roots may all be cut off close below the collar, and if that part be uninjured fresh roots will form ;

but if a tree be cut through at this vital part it never can recover.

A trowel is another instrument used in stirring the soil, but of course it can only be employed in boxes of earth in balconies, &c.; or in large pots, or tubs.

Raking is useful in smoothing the soil after digging; and in collecting weeds, stones, &c., and dragging them to one side, whence they may be easily removed. An iron-toothed rake is generally used for the ground, and a wooden one for collecting grass after mowing. When it is wished that the teeth of the rake should enter the soil, the handle should be held low; but if the object be only the collection of grass or weeds, the handle should be held high. Dry weather is essential to raking the ground, as the principal use of the operation is to break the clods left by the spade; but raking together grass or weeds may be performed in wet weather.

The degree of strength required for raking depends partly upon the breadth of the head of the rake, and the number of its teeth, but principally upon the manner of holding it. If the rake be held low, it is obvious that greater strength will be required to drag it through the ground, than if it be held high, in which case very little labour will be required to overcome the resistance it will meet with.

CHAPTER II.

ON SOILS AND MANURES ; INCLUDING THE
FORMATION OF HOTBEDS.

THE art of cultivating hardy plants consists in improving their size or quality, by giving them more food than they could have obtained in a state of nature ; but the plants of hot countries, when they are to be grown in a cold climate, require in addition artificial heat and shelter.

To know how to supply plants with food, we must remember that they are organised beings, composed principally of carbon, oxygen, hydrogen, and nitrogen ; and that they require a constant supply of these elements to enable them to live and grow. They also require certain mineral or earthy substances, which differ according to the nature of the plant. The elementary substances required for the nourishment of plants are derived partly from air and water, partly from the soil, and partly from substances occasionally added to the soil, which are called manures. Manures are also used to create artificial heat.

Carbonic acid gas and nitrogen gas are found in the atmosphere ; and the plant possesses the power of absorbing them by its roots, as well as its leaves, if air be permitted to have access to its spongioles. The plant takes up oxygen

and hydrogen also by its roots, through the medium of water ; and, as plants cannot be maintained in a healthy condition unless they are supplied freely with these elements, no soil can be fitted for growing plants in that is not sufficiently open to admit air, and allow water to percolate through it.

Carbon, and the elementary gases, are also found more or less abundantly in the different kinds of soil, by which they are yielded to the plants ; and soils supply certain portions of inorganic or earthy matter, which, though found in plants in very small quantities, are absolutely necessary to complete the process of vegetation.

All the different kinds of soil found on level ground consist of two parts, which are called the surface soil and the subsoil ; the subsoil being what may be considered the natural rock of the particular district ; and the surface soil being compounded of dust crumbled from the subsoil, and mixed with other mineral substances, and various animal and vegetable matters in a state of minute subdivision or decay.

It would be useless to attempt to give an account of all the various kinds of subsoil ; and, in fact, such an account could only be given in a work on geology. It will be sufficient for my present purpose to mention that the principal rocks which enter into the composition of subsoils are the quartz rocks, which form the basis of the siliceous or sandy soils ; clay, on which lie the argillaceous or clayey soils ; and limestone, which forms the basis of calcareous or chalky soils.

In fields and uncultivated places, the surface soil is almost as hard and as coarse in its texture as the subsoil on which it rests; but in gardens which have been long in cultivation, the surface soil becomes so thoroughly pulverised by frequent diggings, and so mixed with the manure and decayed vegetables which have been added to it from time to time, that it is changed into the soft, light, fine, powdery substance, called garden mould. If the subsoil be naturally porous or well drained, this mould, however rich it may be made by the addition of decayed vegetable matter or animal manure, will always continue friable; and, as long as it does so, it will be fit for the growth of plants: but if no vent be allowed for the escape of the water, and it be continually enriched with manure, it will be changed in time into a black slimy substance, and become what the gardeners technically term sour.

Surface soil is called peat earth, when it is composed principally of vegetable matter partly decayed, but the decomposition of which has been stopped by its immersion in water. As this kind of earth cannot exist without abundance of stagnant moisture, it is almost always found on a clayey subsoil, which prevents the water which falls upon it from escaping. Peat earth has a spongy elastic feel when trodden upon, arising from the quantity of water that it holds, and it can only be rendered fit for cultivation by draining, or by depriving it in some other manner of its superabundant moisture. In its elastic state it is what is called in Scotland a moss, and in England a peat bog.

Should the water, instead of being afforded a vent by drainage, be suffered to accumulate for many years, till it completely liquefies the peat, the soil becomes what is called a morass, or quagmire ; and it can no longer be trodden on, as it will engulf any substance resting upon it. A still further accumulation of water will, in the course of years, cause the bog to burst its bounds, and overflow the surrounding country ; as the Solway Moss did many years ago, and as bogs in Ireland have done frequently. An excess of vegetable matter on a sandy or gravelly subsoil differs from the common black peat in being more decayed, as it retains less water ; and in being mixed with a portion of the primitive earth, which, from its loose texture, becomes easily detached from the subsoil, and mingles with the surface soil, and in this state the peaty matter forms what is called heath mould.

There are few things which appear more incredible to those who have not studied the subject, than the great variety of earths which enter into the composition of plants ; and yet there can be no doubt of the fact, for when different kinds of plants have been burnt, and their ashes analysed, as many as eleven different kinds of earths have been found in the ashes. These earths vary in different plants, but the most common kinds in garden vegetables are potash, soda, lime, sulphur, phosphorus, silica, magnesia, alumina, and a very small quantity of iron. Some of these earths are only found in plants in combination with oxygen or chlorine, and the same earths are

not necessary to all plants ; but all the earths I have enumerated have been found in the ashes of the cabbage, the parsnep, and other common garden vegetables. It is, therefore, not surprising that the most productive soils are those which contain the greatest variety of substances. Of all the primitive earths found in garden vegetables, lime is the most abundant, and hence one of the best soils for gardening purposes is generally allowed to be a calcareous loam on a chalky subsoil ; as this sort of soil is composed of nearly equal parts of lime, sand, and clay, enriched by depositions of decayed animal and vegetable matters. The next best soil is a sandy loam, composed of clay and sand, also mixed with decayed animal and vegetable matters ; and the worst soils are loose sand, moist black peat, and stiff clay. The first of these soils can only be rendered fertile by the addition of clay ; and the peat and clay are improved by the help of lime or sand. A gravelly or sandy subsoil is generally better than a clayey one ; but in dry seasons the plants are soon burnt up, while those on a clayey subsoil remain fresh and green. A poor sandy soil is necessarily a barren one, as, from the looseness of its particles, it will not retain moisture enough round the spongioles of the roots to keep them in a healthy state ; and a stiff clay is unfertile, from the closeness of its texture not admitting air to the roots, which also waste their strength in the efforts they make to penetrate its adhesive clods.

Manures.—When the soil in which plants are to be cultivated is deficient in any of the

substances which those plants require for food, it is necessary to supply the deficiency by artificial means; and this is in fact the theory of manures, for any substance may become a manure if its addition is required to render the soil suitable to the plants which are to be grown in it. As, however, certain elements are oftener required by plants than any other, those substances in which these elements abound are so much the most frequently used as manures, that few people think of any others. I shall, however, say a few words of all the kinds in common use, dividing them into the three heads of animal, vegetable, and mineral.

Animal Manures.—The most common animal manure, and that which is most useful, is undoubtedly *horse-dung*, as it is not only rich in all the elements required for vegetable food, but it evolves so much heat in decaying, that it can be made to supply an artificial climate, when necessary, to those plants which are natives of climates warmer than our own. During the process of decay, it also throws off a quantity of ammoniacal gas, of so caustic a nature as to destroy any plants subjected to its influence. This the gardeners call burning the plants; and in fact the leaves look black and shrivelled, as though they had been burnt by fire. To avoid the danger of injuring plants in this manner, horse-dung, when procured fresh from a stable, must be laid in a heap, and turned over several times to allow the caustic gases to escape, till its fermentation is sufficiently abated to allow of its being safely applied to the plants. As, however, some of

the valuable parts of the manure may be washed away by the rain that falls on the heap while the horse-dung is fermenting, a liquid manure tank may be made to receive them. Where practicable, it is, however, better to use the remains of an old hotbed, or old celery trenches or mushroom-beds, for manuring a garden, than to procure fresh dung; as a great deal of manure, and also of time and labour, will be saved.

It must be observed, that in using stable dung as a manure, there is one particular period in the process of decay when the manure is more efficacious than at any other; and this the practice of gardeners has decided to be the moment when the mass is sufficiently decayed and amalgamated to be cut with a spade. Professor Solly observes, that organic matters undergo four distinct changes in their progress towards decomposition: and these are fermentation, putrefaction, decay, and mouldering; and it is when decay has begun, that stable manure is in the most fitting state for being applied to the soil. During the first process (fermentation), stable manure is totally useless as an agent of cultivation; and during the second process (putrefaction), it is principally used in the form of hotbeds; but when the process he calls decay has commenced, the elements become separated from each other, so as to form new compounds, till at last all the gaseous products being dispersed, the residuum moulders into dust.

To facilitate the process of decay, it is absolutely necessary that the manure should be ex-

posed to the action of the air; because if the manure is exposed to the action of water and not to air, an intermediate change takes place between putrefaction and decay, to which Professor Solly gives the term mouldering, but which is, in fact, analogous to that which takes place in vegetable matters when they become changed into peat, and during which the elements of which they are composed are prevented from flying off and forming new combinations, and are thus quite useless as vegetable food, the manure being changed into a black slimy mass, totally unavailable for any purposes of cultivation. This change often takes place in the gardens of small suburban houses which are badly drained, and yet constantly watered; and which, being over manured with stable dung imperfectly decayed, have their soil changed into the black slimy substance that I have before described, which is quite incapable of maintaining vegetable life. The soil in flower pots is often found in this state, from frequent watering, and suffering the water to remain in a stagnant condition in the saucers.

Formation of Hotbeds. — Though several kinds of manure may be used occasionally for hotbeds, the only materials in common use in gardens are, stable manure, dead leaves, and tan. The first of these, which is by far the most general, consists partly of horse-dung, and partly of what gardeners call long litter, that is, straw moistened and discoloured, but not thoroughly decayed. The manure is generally in this state when it is purchased, or taken

from the stable, for the purpose of making a hotbed.

The necessary quantity of manure is procured, at the rate of one cart-load, or from twelve to fifteen large wheel-barrowfuls to every light (as the gardeners call the sashes of the frames), each light being about three feet wide; and this manure is laid in a heap to ferment. In about a week the manure should be turned over with a dung-fork, and well shaken together; this operation being repeated two or three of more times, at intervals of two or three days, till the whole mass is become of one colour, and the straws are sufficiently decomposed to be torn to pieces with the fork.

The size of the hotbed must depend principally on the size of the frame which is to cover it; observing that the bed must be from six inches to a foot wider than the frame every way. The manure must then be spread in layers, each layer being beaten down with the back of the fork, till the bed is about three feet and a half high. The surface of the ground on which the hotbed is built is generally raised about six inches above the general surface of the garden; and it is advisable to lay some earth round the bottom of the bed, nearly a foot wide, that it may receive the moisture that will drain from the manure in the bed. As soon as the bed is made, the frame is put on, and the sashes kept quite close till a steam appears upon the glass, when the bed is considered in a fit state to be covered three or four inches deep with mould; observing, if the bed has settled unequally, to

level the surface of the manure before covering it with earth. The seeds to be raised may either be sown in this earth, or in pots to be plunged in it.

The proper average heat for a hotbed intended to raise flower seeds or to grow cucumbers is 60° ; but melons require a heat of 65° to grow in, and 75° to ripen their fruit. This heat should be taken in the morning, and does not include that of the sun in the middle of the day. When the heat of the bed becomes so great as to be in danger of injuring the plants, the obvious remedy is to give air by raising the glasses; and if this be not sufficient, the general heat of the bed must be lowered by making excavations in the dung from the sides, so as to reach nearly to the middle of the bed, and filling up these excavations with cold dung which has already undergone fermentation, or with leaves, turf, or any other similar material which will receive heat, but not increase it. When the heat of the bed falls down to 48° or lower, it should be raised, by applying on the outside fresh coatings of dung, grass, or leaves, which are called linings.

When hotbeds are made of spent tanner's bark or decayed leaves, a kind of box or pit must be formed of bricks or boards, or even of layers of turf or clay, and the tan or leaves filled in so as to make a bed. Where neatness is an object, this kind of bed is preferable to any other; but a common hotbed of stable manure may be made to look neat by thatching the outside with straw, or covering it with bast mats pegged down to keep them close to the bed.

Cow-dung is what is called a cold manure, as it gives out scarcely any heat while decaying. It is never used for making hotbeds; and though when dug into the ground it yields nitrogen to the plants, it is in a much less degree than horse-dung. Cow-dung is seldom used in gardens, except in cultivating bulbous plants, in which case it is useful from the slowness with which it decays.

Liquid animal manure from stables and cow-houses, or the drainings of dunghills, is a very strong, and, in some cases, useful kind of manure. It is, however, seldom, if ever, used for gardens; but a kind of liquid manure may be formed on a small scale, by pouring water over cow-dung or rotten stable manure, and then using it for beds or borders.

The other animal manures are generally too strong to be used safely in gardens. Pigeons' dung is a hot manure, only used in composts for auriculas, and seldom employed except by commercial florists. Guano is the dung of the sea-fowls which frequent the Guano Islands on the coast of Peru; which, after having lain almost unknown for centuries, was, a few years since, brought into notice, and almost into general use. It is now, however, seldom used for gardens, as it is very strong, and requires great care in its management. Pigs' dung is soft and cold, and possesses the properties of cows' dung, but in a less degree. Bone dust is principally useful in agriculture for grass land and for turnips, from the great quantity of phosphate of lime and gelatine which it contains, and which make the crops raised on it very

nourishing to cattle. It is seldom used in gardens; but, when it is, it is very lasting in its effects. Poudrette is a manure prepared in Paris by drying night-soil, and generally adding to it either gypsum or lime. It is a very strong manure, and abounds in nitrogen. Taffo is a manure imported from China, which consists of dried night-soil mixed with clay.

Vegetable manures consist chiefly of decayed leaves, the refuse of culinary vegetables, tan, and charcoal. Decayed leaves and tan are used for hotbeds, from the heat they evolve in fermenting; and decayed leaves and other vegetable refuse also form a good, though not a strong, kind of manure if properly turned over and occasionally watered while they are undergoing the process of decay. Burnt weeds and the ashes of burnt wood are also very efficacious manures: the latter especially, as it abounds in potash, which is found upon analysis to be the most important element in the inorganic matters contained in most garden vegetables. Green crops of weeds or other vegetable matter dug into the soil before they have been allowed to seed, are also found to act admirably as manure. In many parts of Italy and Piedmont, lupines are sown on purpose to be ploughed in, and they are always followed by a rich crop. When vegetable matter in a green state is buried in the ground, but not so deeply as to be out of reach of the air, it decomposes rapidly, and affords the plants grown in the same soil after it, an ample supply of food. In like manner, in the same countries, the tops of potatoes and beans, and the cuttings of vines, &c., are advan-

tageously buried at the roots of the plants from which they were taken. It may seem strange that growing a crop on land and then burying it should produce any good effects, as it appears to be only restoring to the soil what the crop had taken from it; but the fact is, the crop buried derived a great portion of its nourishment from the air, and these nutritious matters are more equally distributed through the soil by the operation of digging the crop in, than they can be in any other way.

Green crops are, indeed, much better manure than decayed leaves; as the latter, when they have been suffered to ripen and fall naturally, are found to abound in saline and earthy matters, but not to contain much of the other elements necessary to vegetable life.

Charcoal and soot are excellent manures in some cases, as they abound in potash; and they are particularly efficacious when applied to some of the kitchen crops, such as onions and all the cabbage tribe. When thus applied the charcoal should be in a powdered state; but it may also be most advantageously used in pots broken into small pieces and mixed with chopped turf; as in this state it keeps the earth open, and allows of the passage of the air in a state of minute subdivision to the roots.

Chopped turf is an excellent kind of manure, especially for peach and other fruit trees, as the roots of the grass keep the ground open for the passage of the air.

Mineral manures are more used in agriculture than in gardens, but lime may be employed advantageously when the ground has

become soured by stagnant water. It is also frequently applied to grass; but, when this is the case, it generally sinks through the soil without mixing with it, so as to form a distinct stratum two or three inches below the surface. This may be seen in several places, where grass fields have been cut through to form railways; particularly on the Midland Counties Railroad near Leicester, where the white line formed a little below the surface by the lime is very conspicuous, from the deep red of the sandstone which forms the subsoil. Quicklime, when it is laid on land, and allowed to remain within the influence of the air, absorbs carbonic acid gas from the atmosphere, and thus becomes of great service to plants in supplying them with carbon.

Nitrate of soda is a mineral which has been lately extensively introduced from South America, where it is found in a natural state in great abundance. It is a powerful manure, abounding in nitrogen, but its action is very uncertain. Where it has its proper effect, its presence may be traced by the richness of vegetation which it produces, and by the dark green which it gives to the leaves; but it does not appear to act favourably in the production of seeds, fruit, or grain. Nitrate of potassa, or saltpetre, is more certain, though less powerful, in its effects.

The following is a Summary of the Rules to be observed in applying Manure to Gardens.—To remember that the best and safest manure for all soils is rotten horse-dung, such as the remains of an old hotbed, when it is wished to

produce an immediate effect ; but if the effect is wished to be more gradual, and prolonged for a considerable space of time, half-decayed stable manure is best, buried in trenches, or bone dust, which is the most durable of all manures. To observe that green crops of vegetables, dug into the ground, produce the quickest effect on sandy soil. To remember that, when ground has become soured by stagnant water, the best remedy is draining and adding lime. Never to apply fresh stable manure to growing plants without fermenting it, nor liquid manure from a dunghill without diluting it with water. To be very cautious in the use of new manures, as most of those recently introduced are so strong as to be dangerous in inexperienced hands. To mix loam or some other earth with decayed leaves, as they are so rich in saline matters as to be sometimes injurious when they are used alone. To remember that composts, or mixed manures, are generally more efficacious than any simple manure, and that mixed soils are always the most fertile ; and never to forget that the air is full of nutritious food for plants, and that it should be always permitted to have access to the roots, provided it be in a state of such minute subdivision as to be in no danger of drying the roots.

CHAPTER III.

SOWING SEEDS. — PLANTING BULBS AND
TUBERS.—TRANSPLANTING AND WATERING.

Sowing Seeds.—The principal points to be attended to in sowing seeds are, first, to prepare the ground, so that the young and tender roots thrown out by the seeds may easily penetrate into it; secondly, to fix the seeds firmly in the soil; thirdly, to cover them so as to exclude the light, which impedes vegetation, and to preserve a sufficiency of moisture round them to encourage it; and, fourthly, not to bury them so deeply as either to deprive them of the beneficial influence of the air, or to throw any unnecessary impediments in the way of their ascending shoots.

The preparation of the soil has been already described in the first chapter, when speaking of digging (see p. 3), and the reasons why it is necessary have been there given; but why seeds should be firmly embedded in it seems to require explanation. It is well known that gardeners, before they either sow a bed in the kitchen-garden, or a patch of flower-seeds in the flower-garden, generally “firm the ground,” as they call it, by beating it well with the back of the spade, or pressing it with the saucer of a flower-

pot; and there can be no doubt that this is done in order that the seeds may be firmly embedded in the soil. When lawns are sown with grass seeds also, the seeds are frequently rolled in, evidently for the same purpose. The only question, therefore, is, why is this necessary? and the answer appears to be, that a degree of permanence and stability is essential to enable nature to accommodate the plant to the situation in which it is placed. When there is this degree of permanence and stability, it is astonishing to observe the efforts that plants will make to provide for their wants; but, without it, seeds will not even vegetate. Thus we often see large trees springing from crevices in apparently bare rocks, or from the walls of neglected buildings; while not even a blade of grass will grow among the moving sands of a desert.

The reasons for the second and third points, of covering the seeds and yet not covering them too deeply, appear more obvious; and yet they also require a little explanation. The seeds are covered to keep them in darkness, and to retain round them a proper quantity of moisture; not only to make them swell and begin to vegetate, but to enable the roots to perform their proper functions; since, if too much exposed to the air, they would become dry and withered, and lose the power of contracting and dilating, which is essential to enable them to imbibe and digest their food. Burying the seeds too deeply is obviously injurious in impeding the progress of the young shoot to the light, and in placing it in an unnatural position. When a seed

vegetates too far below the surface, a part of the stem of the plant must be buried; and this part, not being intended to remain under ground, is not protected from the dangers it is likely to meet with there. It is thus peculiarly liable to be assailed by slugs and all kinds of insects, and to become rotten by damp, or withered by heat. It is also very possible to bury a seed so deeply as to prevent it from vegetating at all. The ground has more of both warmth and moisture near the surface than at a great depth, as it is warmed by the rays of the sun, and moistened by the rain; but, besides this, seeds will not vegetate, even when they are amply supplied with heat and moisture, if they are excluded from the influence of the air. Every ripe seed in a dry state is a concentration of carbon, which, when dissolved by moisture, and its particles set in motion by heat, is in a fit state to combine with the oxygen in the atmosphere, and thus to form the carbonic acid gas which is the nourishment of the expanding plant. For this reason, seeds and newly sprung up plants do not want to be supplied with manure, and air is much more essential to them: they have enough carbon in their cotyledons, or in the albumen contained in the seed, and they only want oxygen to combine with it, to enable them to develope their other leaves; and this is the reason why young plants raised on a hotbed are always given air, or they become yellow and withered. Darkness is not essential to germination, but it is found to promote it. Light absorbs the oxygen from plants, and occasions a deposition of the car-

bon; and when seeds germinate, they want to absorb oxygen and to disperse their carbon. Thus seeds and very young seedlings do not require much light; it is, indeed, injurious to them, as it undoes in some degree what warmth, moisture, and air have been doing for them; but young plants, when they have expanded two or three pairs of leaves, and when the stock of carbon contained in their cotyledons or in their seeds is exhausted, require light to enable them to elaborate their sap, without which the process of vegetation could not go on. Abundance of light, also, is favourable to the developement of flowers and the ripening of seeds, as it aids the concentration of carbon, which they require to make them fertile. The curious fact, that seeds, though abundantly supplied with warmth and moisture, will not vegetate without the assistance of the air, was lately verified in Italy; where the Po, having overflowed its banks near Mantua, deposited a great quantity of mud on some meadows; and from this mud sprang up a plentiful crop of black poplars, no doubt from seeds that had fallen into the river from a row of trees of that kind which had formerly grown on its banks, but which had been cut down upwards of seventy years before. Another instance occurred in the case of some raspberry seeds found in the body of an ancient Briton discovered in a tumulus in Dorsetshire. Some of these seeds were sown in the London Horticultural Society's Garden at Turnham Green, where they vegetated, and the plants produced from them are still (1850) growing. Steeping

seeds in oxalic acid before sowing them, is efficacious in making them vegetate sooner, as there is a speedier combination between the carbon in the seeds, and the oxygen in the acid, than can be effected by the ordinary agency of the air in parting with its oxygen to them; but it should only be done when absolutely necessary, as what is gained by the more rapid developement of the seed, is generally lost by the weakness of the seedling.

Planting bulbs and tubers bears considerable analogy to sowing seeds. The bulb or tuber may, indeed, be considered as only a seed of larger growth, since it requires the combined influence of air, warmth, and moisture to make it vegetate; and then it throws out a stem, leaves, and roots like a seed. There is, however, one important difference between them: the seed expends its accumulated stock of carbon in giving birth to the root, stem, and leaves, after which it withers away and disappears; while the bulb or tuber continues to exist during the whole summer life of the plant, and appears to contain a reservoir of carbon, which it only parts with slowly, and as circumstances may require; depositing matter to form a fresh accumulation when it has wasted away. Though bulbs and tubers have here been mentioned as almost synonymous, modern botanists make several distinctions between them. The tunicated bulbs, such as those of the hyacinth and the onion, and the squamose bulbs, such as those of the lily, they consider to be underground buds; while tubers, such as those of

the dahlia and the potato, and solid bulbs or corms, such as those of the crocus, they regard as underground stems.

These distinctions, however, though they may be interesting to the botanist and vegetable physiologist, are of little or no use in practice; the practical gardener treating bulbs and tubers exactly alike, and planting them as he would sow a seed: that is to say, he fixes them firmly in the ground, and covers them, but not so deeply as to exclude the air. In preparing a bed for hyacinths or other tunicated bulbs, it is necessary to pulverise the soil to a much greater depth than for ordinary seeds; as the true roots of the hyacinth descend perpendicularly to a considerable depth, as may be seen when these plants are grown in glasses. The very circumstance of growing hyacinths in glasses, where they vegetate and send down their roots exposed to the full influence of the light, appears contrary to the usual effects of light on vegetation; and, indeed, the plants are said generally to thrive best when the glasses are kept in the dark till the roots are half grown. This practice, however, retards the growth of the leaves and stem, and often injures the developement of the flowers; and, at any rate, it is quite certain that hyacinths in glasses should never be kept in darkness after their leaves have begun to expand; as, if there be not abundance of light to occasion rapid evaporation from the leaves, the plants will soon become surcharged with moisture from the quantity constantly supplied to their roots,

and the leaves will turn yellow, and look flaccid and unhealthy, while the flowers will be stunted, or will fall off without expanding.

Transplanting.—The points to be attended to in transplanting are, care in taking up, to avoid injuring the spongioles of the roots; planting firmly, to enable the plant to take a secure hold of the soil; shading, to prevent the evaporation from the leaves from being greater than the plant in its enfeebled state can support; and watering, that it may be abundantly supplied with food in its new abode. The first point is to avoid injuring the roots; and it is only necessary to consider the construction and uses of these most important organs, to perceive how impossible it is for the plant to thrive, unless they are in a perfectly healthy state. Roots generally consist of two parts: the main roots, which are intended to act as grappling-irons to enable the plants to take a firm hold of the ground; and the fibrous roots, which are intended to supply the plant with nourishment. These fibrous roots are most liable to receive injury from transplanting, as they are covered with a very fine cellular integument, so delicate in its texture as to be very easily bruised; and they each terminate in a number of small pores of extraordinary delicacy and susceptibility, which act as little sponges to imbibe moisture for the use of the plant. It is well known that these spongioles are the principal means which the plant possesses of imbibing food, and that if they should be all cut off, the plant must provide itself with others, or it will probably perish for want of sufficient nourishment.

These spongioles are exactly of the nature of a sponge; they expand at the approach of moisture, and when surcharged with it they contract, and thus force it into the fibrous roots, the cellular integument of which dilates to receive it; hence the moisture is forced (by capillary attraction, as it is supposed) into the main roots, and thence into the stem and branches of the plant; circulating like the blood, and, after it has been elaborated and turned into sap in the leaves, as the blood is changed in its nature in the lungs, dispensing nourishment to every part as it goes along.

The roots have no pores but those forming the spongioles; and only the fibrous roots appear to possess the power of alternate dilatation and contraction, which power evidently depends on their cellular tissue being in an entire and healthy state. Thus, it is quite evident that if the spongiole of any fibril be crushed, or even the cellular tissue injured, it can no longer act as a mouth and throat to convey food to the plant. When this is the case, the injured part should be instantly removed; as its elasticity can never be restored, and it is much better for the plant to be forced to throw out a new fibril than to be obliged to carry on its circulation weakly and imperfectly with a diseased one. Whenever a plant is taken up for transplanting, its roots should, therefore, be carefully examined, and all their injured parts cut off, before it is replaced in the ground. Deciduous plants, and particularly trees and shrubs, are generally transplanted when they are without their leaves, because at that season they are in no danger of

suffering from the effects of evaporation ; and when circumstances oblige them to be transplanted with their leaves on, they should be shaded and watered over the leaves frequently, as the leaves are furnished with pores by which they can absorb both gaseous and liquid food, and the quantity of nourishment taken in by them should be increased as much as possible, to make amends for the smaller quantity taken up by the roots while they are in an enfeebled state.

Shading is necessary after transplanting any plant that retains its leaves ; as the evaporation from the leaves, if exposed to the full action of the light, would be greater than the plant could support with a diminished number of spongioles. If it were possible to transplant without injuring the fibrils, and if the plant were immediately supplied with plenty of water, both for the roots and leaves, shading would not be required ; and, indeed, when plants are turned out of a pot into the open garden without breaking the ball of earth round their roots, they are never shaded. The reason for this is, that as long as a plant remains where it was first sown, and under favourable circumstances, the evaporation from its leaves is exactly adapted to its powers of absorbing moisture ; it is therefore evident, that, if by any chance the number of its mouths be diminished, the evaporation from its leaves should be checked also, till the means of supplying a more abundant evaporation are restored.

The use of watering a transplanted plant is

as obvious as that of shading. It is simply to supply the spongioles and leaves with an abundance of food, that the increased quantity imbibed by each may, in some degree, compensate for the diminished number of spongioles.

All plants will not bear transplanting, and those that have taproots, such as the carrot, are peculiarly unfitted for it. When plants having taproots are transplanted, it should be into very light soil, and what is called a puddle should be made to receive them. To do this, a hole or pit should be formed, deeper than the root of the plant, and into this pit water should be poured, and earth thrown in and stirred, so as to half-fill it with mud. The taprooted plant should then be plunged into the mud, shaking it a little so as to let the mud penetrate among its fibrous roots, and the pit should be then filled in with light soil. The plant must afterwards be shaded longer than is usual with other plants; and, when water is given, it should be poured down nearer to the main root than in other cases, as the lateral fibrous roots never spread far from it. Plants with spreading roots, when transplanted, should have the pit intended to receive them made shallow, but very wide in its diameter; so that the roots may be spread out in it to their fullest extent, except those that appear at all bruised or injured, which, as before directed, should be cut off with a sharp knife.

It is a general rule, in transplanting, never to bury the collar of a plant; though this rule has some exceptions in the case of annuals.

Some of these, such as balsams, send out roots from the stem above the collar; and these plants are always very much improved by transplanting. Others, the fibrous roots of which are long and descending, such as hyacinths, bear transplanting very ill, and when it is absolutely necessary to remove them, it should be done with an instrument called a transplanter (*fig. 4.*); which may be purchased in any ironmonger's shop, and the use of which is to take up a sufficient quantity of earth with the plant to remove it without disturbing the roots.

FIG. 4.
TRANSPANTER.

The uses of transplanting are various. When seeds are sown, and the young plants from them begin to make their appearance, they will generally be found to be much too thick; and they will require thinning, either by drawing some of them out and throwing them away, or by removing them to another bed by transplanting. This, in the case of annuals, is called by the gardeners pricking out. The young plants are taken up with a small trowel, and replaced in a hole made for them, and the earth pressed round them with the same trowel; the only care necessary being to make them firm at the root, and yet to avoid injuring the tender spongioles. Gardeners do this with a dibber, which they hold in the right hand, and after putting in the young plant with the left hand, they press the earth round it with the dibber in a manner that I never could manage to imitate.

I have found the trowel, however, do almost equally well, though it takes up rather more time.

Another use of transplanting is to remove trees and shrubs from the nursery to where they are permanently to remain. To enable this to be done with safety, the trees and shrubs in commercial nurseries are prepared by being always removed every year or every other year, whether they are sold or not. The effect of these frequent removals is to keep the roots short, and yet provided with numerous spongioles; for as the roots are always pruned, or, as the gardeners call it, "cut in," on every removal, and as the effect of pruning is to induce the roots pruned to send out two short fibrous roots furnished with spongioles, in the place of every one cut off, the roots, though confined to a small space, become abundant. The reverse of this is the case when plants are left in a natural state. It has been already mentioned that plants require various kinds of soil; and, as the ground in which ligneous plants are grown is not so often manured as that used for herbaceous vegetables, some particular kinds of earth are soon exhausted, and the plants to obtain what they want are continually in search of fresh soil. To provide for this, the fibrous roots are possessed of an extraordinary power of elongating themselves at their extremities; and thus the roots of even a small plant, left to nature, will be found to extend to a great distance on every side. It is obvious that this elongation of the roots must greatly increase the difficulties attending transplanting.

Where the roots extend to a distance from the tree, a greater extent of ground has to be disturbed, both to take up the plant and to make a pit for replanting it; the risk of injuring the fibrous roots is increased; and as nearly all the spongioles will require to be cut off, from the great length of the roots, and consequent greater difficulty which will attend taking them up entire, the plant will be nearly famished before new spongioles can be formed to supply it with food. All these dangers are avoided by the nursery system of transplanting; while the inconvenience of confining the roots to so small a space is obviated by placing the plant, every time it is transplanted, in fresh soil.

It is customary, when trees or shrubs are transplanted to the places where they are permanently to remain, either to make a puddle for them or to fix them, as it is called, with water; the object, in both cases, being to supply the plant with abundance of food in its new situation. Care is taken, also, to make the roots firm in the soil, and to let the earth penetrate through all their interstices. To attain these ends, one gardener generally holds the tree and gently shakes it, while another is shovelling in the earth among its roots; but this mode has the disadvantage of sometimes occasioning the roots to become matted. When the tree is to be fixed with water, after a little earth has been shovelled in over the roots, water is applied by pouring it from a watering-pot, held as high as a man can raise it; the watering-pot used being large, and with a wide spout, the rose of which must be taken off.

More earth is then shovelled in, and water applied again. This mode of planting has the great advantage of rendering the tree firm, without staking or treading the earth down round it, as is usually done; and the water, from being poured rapidly through the air, carries with it into the soil a quantity of carbonic acid gas from the stratum of that gas existing in the atmosphere near the earth. By another mode of planting, the gardener spreads the roots of the tree out carefully at the bottom of the hole or pit made to receive them, and then fills in the earth. In all cases, the ground is either made firm with water, or trodden down, or beaten flat with the spade, after planting, so as to fix the roots firmly in the soil, for the same reasons as nearly a similar plan is adopted in sowing seeds; care being taken, however, not to make the earth so firm as to exclude the air. Newly-transplanted trees are frequently staked; but this is not essential if the roots are made firm, and, indeed, the tree is generally found to do best when the head is left at liberty to be gently agitated by the wind.

It is a great point, in all cases of transplanting, to preserve the epidermis or cellular integument of the fibrous roots and spongioles in a flexible state; and, for this reason, the greatest care is taken to keep them moist. This is one of the ends in view in puddling or fixing by water in transplanting; and many planters always dip the roots of trees and shrubs in water before replanting them. When a tree or shrub is taken up that is to be conveyed any distance, the roots should be wrapped up as

soon as it is taken out of the ground in wet moss, and covered with bast matting; and, where moss cannot be procured, they should be dipped in very wet mud, and then matted up. Cabbage plants are frequently preserved in this manner; and are conveyed, without any other covering to their roots than a cake of mud, to a considerable distance. In all cases where plants are taken up long before they are replanted, their roots should be kept moist by opening a trench, and laying the plants along it, and then covering their roots with earth. This gardeners call laying plants in by the heels. Where this cannot be done, and the plants are kept long out of the ground, their roots should be examined and moistened from time to time; and, before replanting, they should be laid in water for some hours, and afterwards carefully examined, and the withered and decayed parts cut off.

In removing large trees, care is taken to prepare the roots by cutting a trench round the tree for a year or two before removal, and pruning off all the roots that project into it. This is to answer the same purpose as transplanting young trees in a nursery; while the bad effects of contracting the range of the roots is counteracted by filling the trench with rich fresh earth. The removal is also conducted with much care; and either a large ball of earth is removed with the tree, or the roots are kept moist, and spread out carefully at full length when the tree is replanted. Some planters, before removing trees, mark which side stood to the south, in order to replant them with

the same side turned towards the sun; and this is sometimes done with young trees from a nursery. The reason is, that the tree having generally the largest branches, and being always most flourishing, on the side exposed to the sun, it is thought that its vegetation might be checked, were a different side presented to that luminary, by the efforts it must make to accommodate itself to its new situation. On the other hand, however, it may be urged that changing the position of the plant, particularly while it is young, will be beneficial in preventing it from taking any particular bent, and in promoting the equal distribution of sap through all the branches.

Watering is a most essential part of culture. It has been already fully explained that the seed cannot vegetate, and the plant cannot grow, without water. In fact, water itself forms an important article in the food of plants, as it affords them a great part of the oxygen and hydrogen which they contain. Most of the solid substances that form the food of plants must also be dissolved in water to enable the spongioles to take them up; and the spongioles themselves, unless they are kept moist, will soon lose their power of absorption. Nothing, indeed, can be more evident, even to a common observer, than the necessity that plants feel for water; if a mimulus or a pelargonium in a pot, for example, hangs its head and droops its leaves, what an extraordinary and rapid effect is produced by giving it water! In an almost incredibly short time its leaves become firm, and its stem erect; and the plant is not only

preserved from death, but restored to full health and beauty.

Watering appears an extremely simple operation, yet nevertheless there are several points relating to it that it is necessary to attend to. The water should never be suffered to be stagnant; as, when the soil is so completely saturated with water as to exclude the air, the decomposition of the vegetable matters it contains is stopped, and instead of becoming wholesome food for the plants they are changed into a kind of peat. Water, to be in the best state for being taken up by the plants, should be kept in detached globules by the admixture of air; and it should be only slightly impregnated with carbonic acid gas and other nourishing matter from decaying animal or vegetable substances, as it is found that plants can only take a small portion of food at a time. Nothing can be more admirably and wonderfully adapted for supplying plants properly with water than rain. In falling through the atmosphere, it is thoroughly mixed with the air, and conveys the nitrogen and carbonic acid gas contained in it into the soil; thus supplying plants in a state of nature with those necessary elements, which in a state of culture they obtain chiefly from animal manure.

It is a very common mistake, in watering, to pour the water down close to the stem of the plant. This is injurious in every respect. Water, when poured profusely on the collar of the plant, which is the point of junction between the root and the stem, is likely to rot or otherwise seriously injure that vital part; while the spongioles, which alone can absorb the water, so

as to benefit the plant, being at the extremity of the roots, are always as far removed from the stem as the nature of the plant will allow. Thus, the distance from the stem at which water should be given varies in different plants. In those that have taproots, such as the carrot and many other culinary vegetables, the lateral fibrous roots are short, and the spongioles are comparatively near the stem; but in trees, and most plants having spreading roots, the spongioles are generally as far distant from the stem as the extremity of the branches; and the water, to be efficacious, should be given there.

Another very important point to be attended to in watering is, to water the leaves as well as the roots. I have already mentioned that the leaves have pores through which they can take in nourishment; and the truth of this may be easily ascertained by keeping plants in pots, and watering some of them over the leaves, and the others merely at the roots, when the difference in the growth will be so striking as to carry conviction to every unprejudiced observer. It has been asserted that plants can be kept alive by watering their leaves only, and this may very possibly be the case; but then it must be remembered that though they may be kept alive, they cannot by any means be in a state of vigorous health. Plants in pots, in suburban and town gardens, are very much improved by watering them both at the root and over their leaves with slightly soapy water (not strong soap-suds), as this plan supplies the plants with those saline particles which they would find it otherwise difficult to obtain, from the confined

space in which the roots are grown. Slightly soapy water given always to the leaves as well as to the roots is also advantageous to plants grown in the open air, but it should only be given to them when they are in a state of vigorous growth. Watering over the leaves is also efficacious in suburban gardens in removing the soot and other impurities which frequently rest on the leaves and close up their pores.

The quantity of water to be given varies, not only according to the nature of the plant, but to the state of its growth. In spring, when the sap first begins to be in motion, and the young plant is every day unfolding fresh leaves or blossoms, it requires abundance of water ; as it does when in flower, or when the fruit is swelling. In autumn, on the contrary, when the fruit is ripening, and in winter, when the plant is in a state of perfect rest, very little water is necessary, and much is positively injurious, as being likely either to excite a morbid and unnatural action in the vessels, or even to bring on rottenness and decay. Water is necessary for seeds to induce them to germinate ; but much of it is very injurious to young plants when they first come up, as it unsettles their roots, and almost washes them away. The roots, also, are at first too weak to imbibe water ; and the plants feed on the nourishment contained in the cotyledons, or in the albumen of the seeds. It is when the second pair of leaves has opened that water is required, though it should at first be given sparingly. When the plant begins to grow vigorously, it requires more food ; and, if it be then kept too short of

nourishment, it becomes stunted in its growth. Water is essential to the formation of woody fibre, which is found to consist of carbon, with oxygen and hydrogen combined in the same proportions as they are in water. Thus watering forms an important part of culture, the health of the plant depending in a great measure upon the manner in which it is supplied with water or rain. It must be observed, however, that the quantity of water requisite depends partly on the kind of leaves that the plant unfolds. A plant with large broad leaves, like the tobacco, requires twice as much water as a plant with small pinnate leaves, like an acacia. Plants exposed to a strong light, also, require more than plants grown in the shade; because the evaporation from the leaves is much greater; and plants in pots require more water than plants in the open ground. In watering plants in pots, a great deal of water should be given at once, as if only a little is given it generally runs down between the outside of the ball of earth and the inside of the pot, and never touches the middle of the ball of earth at all. The pot should never be suffered to stand in water, but enough should be given to saturate the earth in it.

The time for watering plants varies according to the season. In spring and autumn it is best to water plants in the morning, but in summer the usual time is the evening; while, in winter, the very little that is required should be given in the middle of the day. Many persons object to watering their plants when the sun is upon them; but this is not at all in-

jurious, so long as the water is not too cold, and is only given to the roots. Watering the leaves when the sun is upon them will make them blister, and become covered with pale brown spots, wherever the water has fallen. It is much better to water plants during sunshine than to suffer them to become too dry; as, when the spongioles are once withered, no art can restore them. When plants have been suffered to become too dry, the ground should be loosened before watering it; and water should be given a little at a time, and frequently, till the plant appears to have recovered its vigour. A great deal of the good produced by watering depends on the state of the ground; as, when the ground is hard and compact, it is very possible to throw a great quantity of water upon it without doing any service to the plants.

The kind of water used should also be considered. The best is pond water, as it is always mixed with air, and is, moreover, generally impregnated with decayed animal and vegetable matter; and the worst is clear spring water, as it is always cold, and is seldom impregnated with air, or with anything but some mineral substance, which, so far from doing good, is positively injurious to the plants. Rain water collected in open cisterns, and river water, are both very suitable; and, when only spring water can be obtained, it should be exposed for some time to the air before using. It is always advisable to have the water at least as warm as the plants to be watered; and,

for this reason, the water in hothouses and greenhouses is generally kept in an open vessel in the house some hours before it is given to the plants. In some cases, the water may be much hotter than the temperature in which the plants are grown; and the effect of hot water, not heated to above 200° , in forwarding bulbs is astonishing; but it must be observed that it should never be poured on the bulbs, or on the leaves, but on the earth near the rim of the pot. Hot water is also very efficacious in softening seeds with hard coverings when soaked in it; and some of the seeds of the New Holland acacias will not vegetate in this country till they have been actually boiled for about a minute; the germinating power of other thinner-skinned seeds is, however, destroyed in a few seconds by immersion in boiling water.

Water is also very useful when poured on manure, as many manures are much best in a liquid state. For example, if a gallon of water be poured on an ounce of guano manure, and allowed to stand twenty-four hours, the liquid may be safely given to plants in pots, which would have been killed by the guano in a dry state.

The following is a summary of the rules to be observed in watering.—Never to suffer plants to become so dry as to wither their roots, and yet never to saturate the soil so completely as to exclude the air; but to remember that water is never so advantageously given to plants as when it is kept in detached globules by the admixture of air, which it is when

given through the rose of a watering pot or a garden engine. In watering plants in pots, care should be taken that every part of the earth is moistened; and it should never be forgotten that plants in pots have been known to die of drought, though water has been given to them every day.

CHAPTER IV.

MODES OF PROPAGATION BY DIVISION, VIZ.
 TAKING OFF SUCKERS, MAKING LAYERS AND
 CUTTINGS, BUDDING, GRAFTING, AND IN-
 ARCHING.

PROPERLY speaking, there are only two modes of propagating plants, viz. by seed and by division. The first raises a new individual, resembling the plant that produced the seed, as a child does its parent, but not perpetuating any accidental peculiarity; and the second method multiplies specimens of the individual 'itself. Species are propagated, and new varieties are raised, by seed; but varieties are generally propagated by division, as they do not always come true from seed. The modes of propagation by division are of two kinds: those in which the young plants root in the ground, such as suckers, layers, and cuttings; and those in which they are made to root in another plant, as in budding, grafting, and inarching.

Suckers.—Sending up suckers, forming offsets, and throwing out runners, are all natural ways of propagation that require very little aid from the hand of man; and, if all plants produced these, nothing more would be required than to divide the offspring from the parent, and replant it in any suitable soil. But only certain plants throw up suckers, such as the

rose, the raspberry, the lilac, the English elm, &c.; offsets are only formed on bulbs; and runners are only thrown out by strawberries, brambles, and a few other plants; and thus these modes of propagation are extremely limited in practice. No plants produce suckers but those that send out strong horizontal under-ground stems; as the sucker is in fact a bud from one of these stems which has pushed its way up through the soil, and become a distinct plant. As this plant generally forms fibrous roots of its own, above its point of junction with the parent tree, it may in most cases, when it is thought necessary to remove it, be slipped off the parent, and planted like a rooted cutting. As, however, the nourishment it can expect to derive from its own resources will be at first much less than what it obtained from its parent, it is customary, when a sucker is removed, to cut in its head, to prevent the evaporation from its leaves being greater than its roots can sustain. Sometimes, when the parent is strong, part of the horizontal under-ground stem to which the sucker was attached is cut off and planted with the young plant.

Suckers of another kind spring up from the collar of the old plant, and when removed are always slipped or cut off with the fibrous roots that they may have made attached. Offsets are young bulbs which form on the edge of the root-plate of the old bulb, and merely require breaking off, and planting in rich light soil. Runners are shoots springing from the crown or collar of the plant, which throw out roots at their joints, and which only require dividing

from the parent, and replanting in good soil, to make new plants.

Layers.—Many plants, when kept in a moist atmosphere, having a tendency to throw out roots from their joints, the idea of making layers must have very early occurred to gardeners. When the roots are thrown out naturally wherever a joint of the shoot touches the moist earth (as is the case with most of the kinds of verbenas, which only require pegging down to make them form new plants), layers differ very little from runners; but layers, properly so called, are when the art of the gardener has been employed to make plants throw out roots when they would not have done so naturally. The most common method of doing this is to cut half through, and slit upwards, a shoot from a growing plant, putting a bit of twig or potsherd between the separated parts, and then to peg down the shoot, so as to bury the divided joint in the earth (see *fig. 5.*); when the returning sap, being arrested in its progress to the main root, will accumulate at the joint, to which it will afford such abundance of nourishment as to induce it to throw out a mass of fibrous roots, and thus to convert the shoot beyond it into a new plant, which may be separated from the parent, and transplanted. A verbenas, or any other slightly-ligneous plant, may be treated in this manner, but at the same time it may be observed that it is scarcely worth while to take the trouble of slitting the verbenas, as it will be sufficient to peg down a joint in moist soil to induce it to send out roots.

FIG. 5. A VERBENA LAYERED.

The only art required in layering is to contrive the most effectual means of interrupting the returning sap, so as to produce as great an accumulation of it as possible at the joint from which the roots are to be produced. For this purpose, sometimes, instead of cutting the branch half through, a ring of bark is removed below the joint, care being taken that the knife does not penetrate into the wood ; and at others a wire is twisted firmly round the shoot, so as to pinch in the bark ; or a knife or other sharp instrument is passed through the branch several times in different directions : in short anything

that wounds or injures the shoot, so as to throw an impediment in the way of the returning sap, and yet not to prevent the passage of the sap that is ascending, will suffice.

Layering is a very common mode of propagating plants; and in nurseries often every shoot of a tree or shrub is thus wounded and pegged down. In this case, the central root is called a stool, from the verb *to stole*, which signifies the power most deciduous trees possess, of sending up new stems from the collar of their roots when cut down. The seasons for performing the operation of layering are during the months of February and March, before the new sap begins to rise, or in June or July, after all the summer supply of ascending sap has risen; as at these seasons there is no danger of injuring the tree by occasioning an overflow of the ascending sap, which sometimes takes place when the tree is wounded while the sap is in active motion. In most cases the layers are left on twelve months, and in many two years, before they are divided from the parent plant, in order that they may be sufficiently supplied with roots. In nurseries, the ground is generally prepared round each stool by digging, and sometimes by manuring; and the gardener piques himself on laying down the branches neatly, so as to form a radiated circle round the stool, with the ends rising all round about the same height.

Chinese mode of layering.—The Chinese method of layering, which consists in wounding a branch, and then surrounding the place with moist earth contained either in a flower-pot or

a basket, is frequently adopted in the Continental gardens; and it has the very great advantage of producing a young tree which will flower and fruit while yet of very small size. It is generally applied to camellias, orange-trees, and magnolias; but it will do equally well for almost any other tree or shrub. When a plant is to be layered in this manner, a ring of bark is first taken off, and then the flower-pot is procured, open on one side so as to admit the branch; and some moss being put at the bottom of the flower-pot, it is filled up with earth, and a piece of wood is placed inside the pot before the open part to prevent the earth from falling out. It may be fastened in its place by wires hung over a branch, or supported by four little sticks tied to the pot with string. The earth should be very moist before it is put into the pot, and if the season be dry, it may be remoistened from time to time. When the layer is supposed to have rooted, a tolerably deep notch should be made in the branch below the pot; and afterwards it may be cut off, and the young plant transferred with its ball of earth entire, to another pot or to the open ground. A simpler way of performing the operation is, using a piece of lead instead of a flower-pot. A modification of this plan was adopted by Baron Humboldt in South America. When he met with any tree that he thought worthy of being introduced into Europe, he took a ring of bark off one of the branches, and then surrounding the branch above the ring with moist earth, he bound round it several strips of pitched cloth or oil

cloth, which he carried with him on purpose, so as to exclude the air, and consequently keep the earth moist. After an absence of two or three months, he returned to the tree, and cut off the branch below the bandage, when he generally found that it had struck root into the moist earth. In this way he obtained nearly all the rare and curious trees that he brought to Europe.

Cuttings differ from layers in being entirely separated from the parent plant before they are put into the ground; but in both cases the principle is the same, namely, that each bud is essentially a plant, and possesses the power of developing roots, as well as a stem and leaves, if placed in favourable circumstances. In some cases a single bud or eye may be struck; but as when this is tried there is a difficulty in keeping the vital power of the bud in activity till there are organised roots to supply it with food, it is generally safer to try to strike a cutting having two or more buds; as the pith contained in the space between the buds is soluble, and is the nutriment prepared by nature for the support of the incipient stem and leaves.

When the branch is left on the parent tree, only the ascending shoot of each bud is developed, and, under favourable circumstances, this ascending shoot becomes a new branch; but when the branch is made a cutting, the lowest bud must become granulated to force it to develop roots. When a cutting is cut through, not at a bud or joint, it is necessary that the joint should be buried to insure the

developement of roots, and the part below the joint generally rots. In this case there is, of course, a great probability that the whole cutting will become rotten also. Indeed, as all the vessels of a cutting are divided and left open, when it is separated from the parent plant, there is always danger of its rotting if exposed to much damp; and yet it must have warmth and moisture to excite its vital action. Hence, cuttings are generally potted in sand, and covered with a bell-glass, that the sand may keep the wounded end of the cutting dry, and yet that the bell-glass may preserve a proper degree of humidity in the atmosphere to keep up a vital action in the vessels, and to prevent too much evaporation taking place.

Great care should be taken that no space is left between the earth and the end of the cutting, which should be quite firm and level; as unless the earth is pressed closely round it, it is apt to wither or to rot; and hence it is found that cuttings of orange and lemon trees, which are always considered difficult to strike, will seldom grow unless the end of the cutting rests upon the earthenware of the bottom of the pot. "The object of this," says Dr. Lindley in his *Theory of Horticulture*, "seems to be to place the absorbent or root-end of the cutting in a situation where, while it is completely drained of water, it may, nevertheless, be in the vicinity of a never-failing supply of aqueous vapour." If, on the contrary, any open space be left, or if the end of the cutting be left ragged or uneven, water is sure to lodge round it, and to rise irregularly through its

vessels, and make them decay. It is also necessary to take the greatest care that the end of the cutting is not bruised, and that the bark is not injured in any way; and that, though the cutting is shaded from the sun to prevent too rapid evaporation, it should not be quite excluded from the light. Cuttings are generally made from the tips of the shoots, and are thought best when cut off just below the point where the shoot of the current year springs from the old wood. Generally speaking, soft-wooded or suffruticose plants grow most readily; and dry hard-wooded plants, such as heaths, are most difficult to strike. Cuttings of the soft-wooded plants may be made at any time in the spring, summer, or autumn; but the hard-wooded plants do best in autumn, winter, or very early spring.

The curious little plants in flower in fairy pots, which were so common in the summer of 1850, were produced by cuttings taken off the tips of the shoots of plants after the flower-buds had formed, and which were then struck rapidly in very small pots, plunged in a slight hotbed, or in a bed of sand in a portable greenhouse, the sand being heated by hot water, as will be described hereafter.

The cutting being taken off, and the division at the joint being made perfectly smooth (see *fig. 6.*), several of the leaves should be cut off close to the stem, with a sharp knife; and, a hole being made in the soil, the cutting should be put in, and the earth pressed close to its extremity, or it will never send out roots. Various means have been devised to induce cut-

tings to strike readily, and amongst others may be mentioned the following mode of striking cuttings of orange and lemon trees, which is practised by the gardener at Luscombe Royal, near Dawlish, in Devonshire. His plan is to fill a pot half full of drainage, and then to chip a piece of smooth stone or tile round, so as to fit the pot as nearly as possible. This is laid upon the drainage, and the pot filled with pure

FIG. 6. A CUTTING OF THE LEMON-SCENTED VERBENA (*Aloysia citriodora*), prepared for putting into the ground.

sand, or sand with a very little loam. When the cutting is inserted, care is taken to let the flat part at the base rest upon the stone or tile, without any sand intervening; in order, as he says, to exclude the air from the pith of the branch. The cuttings treated in this manner scarcely ever fail, and generally have good roots at the end of about six weeks; while orange

cuttings made in the ordinary way are found very hard to strike, and, even when most successful, seldom have roots in less than two or three months.

A new mode of striking cuttings has been invented by Professor Delacroix of Besançon. This gentleman, some years ago, conceived the idea of insuring the success of cuttings by putting the lower end in water and the middle in earth, a circular incision being made between the earth and the water. This plan, however, was not found to succeed; but it led him to another, which he designates as simple, economical, and certain. According to this plan, the cutting is placed entirely under ground, so as to form a curve, with a bud in its highest part, the bud being on a level with the surface of the soil. In this way the whole length of the cutting is protected by the earth, and the bud is the only part exposed to the air. This mode of making cuttings is said to answer admirably with apples, pears, plums, apricots, and tulip trees, all of which are difficult to strike from cuttings; and it is also found to succeed admirably with rose trees and other plants which though not difficult to strike generally, are so occasionally.

Cuttings may be struck in the open ground, and in common soil, without any covering: but cuttings thus treated must be those of plants which strike readily. When struck in pots, it is customary to fill the pots half or entirely full of silver sand, to prevent the stalk of the cutting from having too much moisture round it. Those cuttings which are most liable to be

FIG. 7. CUTTINGS OF THE COMMON HORSESHOE and LARGE WHITE-
FLOWERED GERANIUMS (*Pelargonium zonale* and *P. macranthum*), pre-
pared for putting into the ground; the leaves being left on those
stalks which are represented long, and taken off those which appear
cut close, or nearly so, to the stem.

injured by moisture, such as heaths, &c., are struck in pots filled entirely with sand; or, at any rate, with sand about an inch or two inches deep, at the top of the pot, to keep the stem dry, and to prevent it from rotting. Charcoal powdered may be used with great advantage instead of sand. The cutting, when prepared, should be buried to about the second joint, and two or three joints with leaves should be left above the soil. A few leaves to elaborate the sap, in the case of herbaceous plants or evergreen trees and shrubs, are essential; for I have known very promising cuttings of petunias,

FIG. 8. LADY'S GAUNTLET OF STRONG LEATHER.

which had been some weeks in the ground, and which had thrown out abundance of roots, entirely destroyed by some snails having eaten all the leaves; and I am told that the case is

FIG. 9. A CUTTING OF THE CHINA ROSE (*Rôsa indica*), prepared for putting into the ground; it being observed that the leaves represented as shortened are only drawn so for want of room in the page.

by no means an uncommon one. In preparing cuttings of roses, it is always advisable to wear a gauntlet, as shown in *fig.* 8., to prevent the thorns from injuring the fingers. Cuttings of delicate plants are generally covered with a bell-glass pressed closely on the earth, to keep a regular degree of moisture round the plants, and to prevent too rapid an evaporation; but some cuttings when thus treated are very apt to damp off, and require to have the glass taken up occasionally and wiped. Cuttings of greenhouse plants, I have been told by practical gardeners, strike best when put into the pots as thickly as possible : and, as they are generally well watered when first put into the ground, they will, if covered closely with a glass, very seldom require any watering afterwards. As long as they continue looking fresh they are doing well ; and as soon as they begin to grow they should be transplanted into small thumb pots, and supplied moderately, but regularly, with water ; changing the pots for larger ones as the plants increase in size, and according to their nature. Sometimes the pots are sunk in a hotbed, or a bed of sand heated by a tank of hot water below it, to induce the cuttings to take root, and this is called applying bottom heat ; and sometimes one flower-pot is placed within another a size or two larger, and the inner one filled with water (the hole at the bottom being first stopped with clay or putty), and the cuttings placed in the outer one. All these expedients are more or less efficacious ; and the great object with all of them is, to excite and stimulate the plant. Cuttings of

succulent plants, such as those of the different kinds of cacti, require to be dried for some time after they are made, by placing them on a shelf in the sun. This is done to prevent the wounded part from becoming rotten in the ground, as the sap is very abundant, and in a very liquid state.

FIG. 10. PIPING OF A CARNATION.

Slips.—When cuttings are made of the shoots from the root or collar of the plant, or of little branches stripped off with a small portion of the root or stem attached, they are called slips: and they require no other preparation than cutting off the portion of bark smooth and close to the shoot. Slips are generally taken off in March, but they

will also succeed if made in autumn.

Pipings are cuttings of pinks and carnations (see *fig. 10.*), and, indeed, the term is applicable to all plants having jointed tubular stems. Pipings were formerly prepared by taking a shoot that has nearly done growing, holding the root end of it in one hand below a pair of leaves, and with the other pulling the top part above the pair of leaves, so as to separate it from the root part of the stem at the socket formed by the axils of the leaves, so that the part of the stem pulled off has a tubular or pipe-like termination. Hence the name of

pipings ; but now they are merely cut off at a joint like any other cuttings, after which they are inserted in finely-sifted earth or sand, and a hand-glass is fixed firmly over them. Most florists cut off the tips of the leaves of pipings, as shown in *fig. 10.*, but others plant them entire ; and the pipings grow apparently equally well under both modes of treatment.

The principal points to be attended to in making cuttings are, to cut off the shoot at a joint without bruising the stem ; to make the cutting at a time when the sap is in motion ; to fix the end which is to send out roots firmly in the soil ; to keep it in an equal temperature, both as regards heat and moisture ; to cut off some of the leaves, and to shade the whole, so as to prevent too much evaporation, without excluding the light, which is wanted to stimulate the plant ; to keep the soil moist, but not too damp ; and to pot off the young plants as soon as they begin to grow. Remember, also, that all cuttings strike sooner, and with more certainty, when they have the advantage of bottom heat.

Budding has been compared to sowing a seed ; but it may rather be considered as making a cutting with a single eye, and inserting it in another tree, called the stock, instead of in the ground. A young shoot of the current year's wood is cut off in the latter end of July or August, or, perhaps, if the season should be very moist, in the first week in September ; and incisions are made longitudinally and across, on each side, above and below a bud, so that the bud may be cut out, attached to an oblong

piece of wood and bark, pointed at the lower end. The leaf is then taken off, but the foot-stalk is left on.

The next thing is to separate the bark with the bud attached, from the wood; and on the nicety of this operation much depends, as if any wood be left in the bark the bud will not take; generally, however, if the sap be in a proper state of movement, the wood comes out easily, without leaving the smallest particle behind. The bud must be then examined below, that is, on the side which was next the wood; and if it appears fresh and firm it is likely to take, but if it looks shrunk and withered it had better be thrown away, as it will never grow. Slits, longitudinal and across, are then made in a shoot of the stock, generally near the fork of a branch; and the bark is gently raised with the handle of the budding-knife (which is purposely made thin and flat), while the piece of bark to which the bud is attached is slipped into the opening, and the bark of the stock is closed over it. This is an operation that requires the greatest nicety and exactness; as, unless the inner bark of the bud fits quite closely to the soft wood of the stock, it is in vain to hope that it will take. The operation is then completed by binding the two parts together with a strand or strip of bast mat, which in the case of rose trees is quite sufficient; but buds on apple and pear trees are sometimes wrapped round with wet moss, which is tied on by shreds of bast matting. In all cases, the strips of bast should

be left long enough to be tied with bows and ends, that the ligature may be loosened and tied again without deranging the position of the bud, as soon as it begins to grow. The first sign of the bud having taken, as it is called, is

FIG. 11. MODE OF BUDDING A ROSE TREE.

when the petiole of the leaf (*a* in *fig. 11.*) drops on being very slightly touched with the finger; but the ligature should not be loosened till the bud begins to throw out leaves; and then it should be retied only a little slacker than before, until the bud is firmly united with the stock.

In France, buds are only applied to a part of the stock from which a bud has been taken, so that the bud of the scion may exactly sup-

ply the place of the original bud of the plant. But this precaution, though certainly founded on reason, is seldom attended to in England.

Budding, though sometimes used for apples and pears, when the spring grafts have failed, is most commonly applied to roses: it is, however, occasionally used for inserting eyes in the tubers of the dahlia. The root of the dahlia consists of a number of tubers collected together, each of which should be furnished with an eye or bud at its summit, so as to form a ring round what is called the crown of the root, from which the stems of the plant are to spring. When the plant is to be propagated, the tubers are divided, and planted separately, and each that has a bud at its summit will send up a stem, and will become a new plant. Sometimes, however, it happens that several of the tubers are devoid of buds, and that others have more than one; and, when this is the case, one of the buds is scooped out, and, a notch being made in the top of the barren tuber to receive it, the bud is fitted in, and the point of junction covered with grafting-wax. The tuber must then be planted in a pot, with the budded part above the soil; and the pot plunged into a hotbed till the bud begins to push, when the tuber may be planted out into the open ground.

What is called flute-grafting is, in fact, a kind of budding; as it consists in taking a ring of bark, on which there is a bud, off a shoot; and then supplying its place with a ring of bark, with a bud attached, from another tree: placing the supposititious bud as nearly as possible in the position of the true bud. Sometimes, how-

ever, this is not thought necessary; and the ring of bark is taken from any part of the stock; though it is always replaced by a ring of bark containing a bud from the scion. There are many other kinds of budding, but, as the principles are the same in all, it is not necessary to detail them here. The blade of the budding-knife (*fig. 12.*) should be short, and it should curve outwards, to lessen the danger of wounding the wood when making the incisions.

The principal points to be attended to in budding are: to choose a fresh healthy bud; to separate the bark to which it is attached, without wounding it, quite cleanly from the wood; to make a clear incision through the bark of the stock, and to raise it from the wood without wounding it; to press the bark containing the bud so closely to the wood of the stock that no air can remain between them; and to perform the operation in moist weather, not earlier than the last week in July, nor later than the first week in September. Of these points the most important are, the joining closely of the bark of the bud to the wood of the stock, and the performing of the operation in moist, or at least in cloudy weather; and, if these are attended to, there is little doubt of success. When the young shoot begins to grow,

FIG. 12.—BUDDING KNIFE.

it is usual to shorten the branches of the stock, so as to throw the whole vigour of the tree into the bud. It is singular to observe that, even when the operation is most successful, no intimate union takes place between the bud and the stock: they grow firmly together, but they do not incorporate, and the point of union may always be distinctly traced.

It must always be remembered that a plant can only be budded on another plant of the same nature as itself: thus a peach may be budded on a plum, or on an apricot, as they are all three stone fruits, and all belong to the same section of the natural order Rosaceæ; but a peach can neither be budded on a walnut, which belongs to another natural order, nor even on an apple or a pear, both of which, though belonging to the order Rosaceæ, are kerneled fruits, and are included in another section.

Grafting differs from budding in its being the transfer of a shoot with several buds on it from one tree to another, instead of only a single bud; and as budding has been compared to sowing seeds, so has grafting to making cuttings. The art of grafting consists in bringing two portions of growing shoots together, so that the liber, or soft wood, of the two may unite and grow together; and the same general principles apply to it as to budding. There are above fifty modes of grafting described in books, but only three or four are in common use.

In all kinds of grafting the shoot to be transferred is called the scion, and the tree that is to receive it is called the stock; and it is always

desirable, not only that the kinds to be united should be of the same genus, or at least of the same natural family, but that they should agree as closely as possible in their time of leafing, in the duration of their leaves, and in their habits of growth. This is conformable to common sense; as it is quite obvious that unless the root send up a supply of sap at the time the leaves want it, and only then, the graft must suffer either from famine or repletion. For this reason, a deciduous plant cannot be grafted on an evergreen, and the reverse. The necessity of a conformity in the habit of growth is strikingly displayed in Mr. Loudon's *Arboretum Britannicum*, in a wood engraving of a flowering ash grafted on a common ash, and growing at Leyden; by which it is shown, that an architectural column, with its plinth and capital, may be formed in a living tree, where there is a decided difference in the growth of the stock and the scion.

These examples show that no intimate union takes place between the scion and the stock; and the fact is, that, though they grow together and draw their nourishment from the same root, they are in every other respect perfectly distinct. The stock will bear its own leaves, flowers, and fruit, on the part below the graft; while the scion is bearing its leaves, flowers, and fruit, which are widely different, on the part above the graft. Nay, five or six grafts of different species on the same tree will each bear a different kind of fruit at the same time. This want of amalgamation between the scion and the stock is particularly visible in cases of

severe frost, when the former is more tender than the latter; as the graft is frequently killed without the stock being injured. It is also necessary, when grafted trees are for any reason cut down, to leave a bud or two above the graft for the new shoots to spring from; as otherwise the proprietor will find his trees changed as if by magic, and instead of choice kinds only the common sorts left. A rather droll instance of this happened some years ago, in the neighbourhood of London. An ignorant gardener having a conservatory full of very choice camellias, and wishing to reduce the plants to a more compact shape, cut them down for that purpose; when in due time he found, to his great confusion and dismay, that the choice camellias had all vanished, and that he had nothing left but a number of plants of the common single red on which they had been grafted.

The proper season for grafting is in spring, generally in March and April; in order that the union between the scion and the stock may be effected when the sap is in full vigour. At this season a stock is chosen of nearly the same diameter as the scion, whether that stock be a young tree, or merely a branch; and they are both cut so as to fit each other. One piece is then fitted on the other as exactly as possible; and, if practicable, it is contrived that the different parts, such as the bark, soft wood, and hard wood, of the one may rest on the corresponding parts of the other; and on the exactness with which this is done, the neatness of appearance of

the graft depends. It is not, however, essential to the success of the operation, that all the parts of the scion should fit exactly on the corresponding parts of the stock, or even that the two trees should be of the same diameter, for if the bark and the soft wood correspond in any one point so as to unite, it is sufficient to make the graft take. As soon as the scion and the stock are properly fitted to each other, the parts are neatly bound together with a strand of bast mat, steeped in water to make it flexible; and the bast is covered with a composition called grafting-clay, which is put on to keep the absorbent vessels of the wounded parts moist, and capable of the alternate contractions and dilatations which will be necessary during the passage of the ascending and returning sap between the stock and the graft. These directions apply alike to all kinds of grafting; and the difference between the sorts refers principally to the manner in which the corresponding parts are cut to fit each other.

Whip, or Tongue, Grafting (*fig. 13.*) is where both the stock and the scion are cut in a slanting direction, so as to fit each other, and a little slit is made in the stock, into which a tongue or projecting part cut in the scion fits. The head of the stock is then cut off in an oblique direction, slanting upwards from the part cut to receive the scion, and the two are bound closely together with a strand of bast mat, or wrapped in moss, and then covered with grafting-clay. The part left on the stock in a slanting direction above the graft withers, and is cut off when the graft has taken. This

is the kind of grafting generally practised in nurseries, and it is the most useful, as it does not require the scion and the stock to be of the same size.

FIG. 13. COMMON MODE OF WHIP, OR TONGUE, GRAFTING.

Cleft-Grafting is where the scion is shaped at the extremity like a wedge, and a cleft is made in the stock to receive it. When this

kind of grafting is practised with trees and shrubs, the head of the stock is cut off; but a modification of it is practised with succulent plants, in which the end of the graft, having been cut into the shape of a wedge, is inserted in a cleft or notch made in the side of the stock to receive it, and the line of junction is covered with grafting-wax. The tubers of strong common dahlias may be grafted in the cleft manner with choice sorts, as may the tubers of the herbaceous pæonies with scions of the tree pæony. This last is very useful, as cuttings of the *Pæônia Mou̇tan* remain weak for several years, while roots grafted in July or August will flower the following spring.

Crown-Grafting resembles the last kind in requiring the head of the stock to be cut off; but the scion is shaped at the extremity like a wedge flattened on one side, and it is pushed in between the bark and wood of the stock, with its flat side next the wood, till it is stopped by a shoulder with which it is provided, to prevent it going in too far.

In *Saddle-Grafting* the head of the stock is cut off, and the extremity of the trunk is shaped like a long wedge; a long slit is then made in the scion, and the divided parts are made to stand astride on the stock. The bark is then pared off at the extremity, so that the two parts may fit quite close; and a firm ligature is applied.

Herbaceous Grafting is very badly named, as it gives the idea of its being a kind of grafting applied to herbaceous plants; whereas, in fact, it only means grafting with the succulent

wood of the current year, in opposition to common grafting, which is always performed with firm wood, frequently of several years' growth. Herbaceous grafting is now generally used for trees of the pine and fir tribe, which, only a few years ago, it was thought impossible to graft at all. The proper time for this kind of grafting is when the young pine shoots have made about three parts of their growth, and are still so herbaceous as to break readily between the fingers, like a shoot of asparagus. The shoot of the stock used formerly to be broken off about two inches below the point, and all the leaves stripped off for nearly two inches more, except two sheaths of leaves, which were left, one on each side, close to the top. The shoot of the stock was then split with a very thin knife between the sheaths of leaves left; the scion, having had its lower extremity prepared by stripping off the leaves and cutting it into the shape of a wedge, was inserted as in cleft-grafting; and the parts were bound together with list, or with a strip of thin woollen cloth. A cone of paper was then put over the whole, to protect it from the sun and rain, and the graft was very seldom found to fail.

Now, instead of breaking off the end of the shoot, it is found to be more efficacious to make the incision on the side of the stem of the stock, as shown in *fig. 14*. The scion is still prepared and inserted in the same manner as before; and when the plant is in a pot, it is preserved as much as possible from the air, in the manner which will be afterwards described when speaking of *La Greffe étouffée*.

FIG. 14 .HERBACEOUS GRAFTING.

Sometimes this kind of grafting is applied to annual plants. The period chosen should be when the plant is in its greatest vigour, and is just coming into flower. The flower stem is cut off close to a leaf, and a slit is made in the stem downwards. The scion is then taken off near the root of the plant, and the end, being cut into a wedge-shape, is inserted in the slit. The wound is afterwards bound up with strips of cloth spread with grafting-wax, and the leaf taken great care of. When the graft begins to grow, this leaf and all the shoots above it are removed. In this manner artichokes have been grafted on cardoons, and cauliflowers on cabbages, with great success. Tomatoes have also

been grafted on potatoes, the potatoes perfecting their tubers, and the tomatoes their fruit, at the same time; and it is said that the ripening of the latter was much accelerated. This mode of grafting was invented by the Baron Tschoudy, a gentleman residing at Metz; and the principal point in it which requires attention is, the preserving of a leaf, or two leaves, at the extremity of the stock, to serve as nurses to the graft.

Inarching, or Grafting by Approach (*fig. 15.*).—Though I have left this till last, it is, in fact, the most simple of all the ways of graft-

FIG. 15. STOCK AND SCION PREPARED FOR INARCHING.

ing, and it is certainly the only one practised by nature. In a natural forest, two branches rub against each other in windy weather, till the bark of both becomes wounded; a calm ensues, and, while it lasts, the wounded branches lying across each other adhere and grow to-

gether. Of this, which is called inosculation, examples in the beech, the hornbeam, and the oak, are given in Mr. Loudon's *Arboretum Britannicum*; and it is probable that mankind derived the first idea of grafting from observing instances of this kind. Inarching, as practised in nurseries, closely resembles layering. A branch is bent and partly cut through, and the heel thus formed is slipped into a slit made downwards in the stock to receive it. The parts are then made to meet as exactly as possible, and are bound together with bast mat, and covered with grafting-clay, as in common grafting. In five or six months the union will be complete; and the inarched plant will be ready to be separated from the parent, which is done with a very sharp knife, so as to leave a clean cut, and not a bruised one. The head of the stock, if it was left on when the plant was inarched, is then cut away, and the plant is ready for removal. It is, however, customary to keep on the grafting-clay and ligature for a few weeks, till the plant is firmly established. This mode of propagation is very commonly practised in spring (generally in March) with camellias (see *fig.* 16.), and magnolias; and it is usual in nurseries to see a fine new kind of camellia surrounded by a sort of frame, on which are several pots of stocks of the single red, placed at different heights for the convenience of attaching to them different branches of the choice kind to undergo the process of inarching. In most of these cases the head of the stock is retained, and the scion is introduced at the side; but as soon as the graft has

FIG. 16. MODE OF INARCHING THE CAMELLIA.

taken, and has thrown out a sufficient number of leaves to carry on the elaboration of the sap, all the branches of the original plant above the graft are cut away, to strengthen the inarched one.

Camellias are also now frequently grafted in a manner first practised in Belgium, but which has now become general, which has the advantage of producing flowering plants much sooner than by any other plan. This mode of grafting may be practised at any season, and on a stock of any age, from the cutting of a year old to the long-established plant, provided it be healthy and of sufficiently small size to be grown in a pot. The head of the stock is cut off close to a leaf which has a strong healthy bud in its axil. The cut is made sloping upwards to the leaf, and on the preservation of this leaf and bud a great part of the success of the operation depends. The stock is then split in face of the leaf and bud to a depth equal to two-thirds of its thickness; and the scion, which has been previously cut with a sharp knife into the shape of a wedge terminating in a narrow point, is inserted. The bark of the stock and that of the scion are united as closely as possible, and the two are tied firmly together; the wound in the scion, where the head was cut off, being covered with pitch, to prevent the possibility of any moisture entering the wood, though no pitch is permitted to touch the point of junction between the scion and the stock, lest it should prevent the uniting of the bark. Sometimes, as soon as the operation is finished, the pot containing

the stock is plunged into a bed of tan, lukewarm if it be in spring, and hot if it be in winter, and covered closely with a bell or hand glass. The glasses ought to be taken off every second day, and wiped, as too much humidity will make the young plants damp off; and the glasses may even be left off for an hour or more occasionally, if the plants appear too moist. It is not, however, absolutely essential to plunge the pot in tan, if care be taken to preserve the graft from the air. This last mode of grafting is called *la greffe étouffée*; and *la greffe des Belges* is another mode of performing the operation by a kind of side grafting, or rather of inarching. It consists in cutting off the head of the stock, or the end of one of the branches, in a slanting direction, leaving a leaf and a bud above the cut on the higher side; and then cutting the scion into a slanting shape, so as to fit the wound in the stock exactly, and binding the two closely together with a strip of bast matting, but without using any other covering. As soon as the operation is finished, the pot containing the stock is laid horizontally on a bed of dry tan, or on a bed of dry moss, the branches lying on the surface, and the pot being half-buried in the tan or moss; the grafted part being covered with a bell-glass stuffed round the bottom with the moss or tan, so as to prevent a particle of air from entering. This close covering is kept on for a fortnight, three weeks, or a month, according to the season; at the end of which time, the graft will be found perfectly united to the stock. Air is then admitted to the graft by degrees, by first loosening and then remov-

ing the moss from the glass; the glass itself is afterwards taken off, and the pots set erect.

This mode of grafting is practised very extensively at Messrs. Knight and Perry's Exotic Nursery, Chelsea, and in many other first-rate establishments of the same kind.

The great points to be attended to in this mode of grafting are, giving the plants bottom heat, and covering them closely, whence the name of *greffe étouffée*, as the plants appear almost stifled for want of air. According to both modes, as soon as the graft has taken, the leaf and bud of the stock above the insertion of the scion, which were left on to draw up the sap, are cut off, and the plant is then in a fit state to be removed to the greenhouse, or any other place where it is to flower.

Grafting-clay and *grafting-wax* have been so frequently mentioned in the various operations of grafting and budding, that it seems necessary to say a few words on their composition. Common grafting-clay is made with any kind of stiff clay mixed with a fourth part of fresh horse-dung free from litter, and a portion of cut hay; a little water is sprinkled on the mass, and the whole is beaten together several times a day for about a week, till the ingredients are thoroughly amalgamated. The French grafting-clay, or *Onguent de Saint Fiacre*, is composed of equal parts of stiff clay and cow-dung; but a superior kind, which was recommended by the late M. De Candolle, is composed of one pound of cow-dung, half a pound of pitch, and half a pound of yellow wax. Grafting-wax is generally made of equal parts of turpentine, bees'-wax, and rosin, with

a little tallow, melted together, and thoroughly incorporated. This is thinly spread on pieces of coarse cotton, and used in strips like cerecloth. In grafting trees that have a soft and delicate bark, fine moss and cotton wool tied on with ligatures of bast mat are better than anything else, and they are generally quite sufficient for every purpose in which grafting is employed by ladies. A composition partly made with caoutchouc, is now often used instead of the common grafting-clay.

The essential points to be attended to in grafting are: choosing a stock and a scion that correspond in nature and in habits of growth; cutting the parts to be united so as to fit exactly, and leave no vacuity between; taking care that the soft wood of the scion shall always rest on the soft wood of the stock, as it is between these parts that the union is to be effected; binding the parts closely together, and covering them so as to prevent them from becoming so dry as to shrink apart, in which case the vessels would wither and become incapable of uniting.

Uses of Grafting and Budding.—The obvious use of grafting is to propagate varieties that cannot so easily be continued by seed, and that will not strike by cuttings. There is, however, another use nearly as important; and this is, to make plants flower and fruit sooner than they would otherwise do. There are many plants that only flower at the extremity of their shoots; and these plants, when tender, would require enormous plant-houses before they would be thrown into flower or fruit. To

remedy this inconvenience, a method has been devised of cutting off the tips of the shoots of old plants and grafting them on young plants of small size; and then, after they have grown for some time, cutting off the tips again and regrafting them in a similar manner, by means of which flowers are at length produced on plants of quite a small size. The same method is applied in Paris to exotic fruit-trees, to throw them into fruit; and it has been tried with success with the rose apple (*Eugenia Jambos*), the mango, &c. In common nurseries, the fruit of new seedling apples is obtained much sooner by grafting their shoots on common apple stocks, than by leaving the young plants to nature; and this plan was also practised at Brussels by the late Professor Van Mons, to test his seedling pears. Tender plants may also be made to flower in the open air by grafting them on hardy species of the same genus; and thus many kinds of half-hardy flowering shrubs are now grown in the open ground, that were formerly kept in green-houses.

CHAPTER V.

PRUNING, TRAINING, PROTECTING FROM
FROST, AND DESTROYING INSECTS.

PRUNING appears at first sight a most laborious and unfeminine occupation; and yet perhaps there is no operation of gardening which a lady may more easily accomplish. With the aid of

FIG. 17.
PRUNING-
SHEARS.

a small and almost elegant pair of pruning-shears (*fig. 17.*), which are sold in all the shops, I have myself (though few women have less strength of wrist) divided branches that a strong man could scarcely cut through with a knife. The only thing to be attended to is to choose a pair of pruning-shears with a sliding joint, so as to make what is called a draw-cut; in order that the branch may be divided by a clean cut, and not bruised

on the side next the plant; and also to leave a somewhat sloping section. When a branch is pruned, it should also be cut as near to a bud as can be done without injuring the bud itself; or, to speak more definitely, not more in length than the branch is thick should be left beyond the bud. The cut should slope downwards from the bud, to prevent the water lodging in the angle; and also that the sun and air may

have their full influence in exciting the bark to cover the wound. When a long piece of a branch, or what gardeners call a snag, is left beyond the bud, it withers, from there being no leaves beyond it to carry on the circulation of the sap; and it thus not only becomes a deformity, but very often seriously injures the tree, by rotting, and infecting the fruit-bearing branch to which it is attached.

The *sécateur* of the French (*fig. 18.*) is a still more useful instrument than the English pruning-shears, as it is much more powerful; and it is, indeed, so efficacious that it is generally used in France for pruning fruit trees.

FIG. 18.

THE SÉCATEUR.

According to the usual method of pruning with a knife, the gardener holds the branch in his left hand, below the part that is to be removed; and then, holding the knife firmly with the thumb at the back of the blade, he makes a strong cut upwards, and from him, so as to remove the branch with a single stroke, and to leave a slanting section. This operation, however, requiring strength as well as skill, it will generally be safer for a lady to use only her pruning-shears, or a *sécateur*, which will be sufficient to cut through the largest branch that a lady would be able to remove. For removing dead roses, &c., it may be sufficient to use a pair of garden scissors fixed to a

pole (*fig. 19.*), which may be lengthened or taken to pieces like a fishing-rod, as is practised by Captain Mangles. The scissors are strong and sharp, and are made to act by means of a long cord which passes through rings down the side of the pole; but they are not strong enough to remove anything but dead flowers or seed vessels.

When a very large branch is to be removed, it is generally necessary to cut a notch out of it on each side, and then to divide the remainder with a saw; but this is an operation that most ladies will prefer leaving to a gardener. In all cases the great art of pruning consists in making a clean sharp cut, so as to leave the bark in a healthy state to make an effort to cover over the wound, and in pruning sufficiently near a bud not to leave any dead wood.

The time for pruning is, either early in spring, after all danger is over from frost, but before the sap has begun to move; or in winter, after the movement of the sap for the summer has ceased. Summer pruning is also necessary with some trees; but, generally speaking, it should be confined to rubbing off only the buds which would produce unnecessary shoots, and which should be removed as soon as they appear.

FIG. 19.

This operation is called disbudding, and it is highly efficacious in sparing the strength of the tree. Many persons pinch off the points of those shoots which appear to be running too much to wood; but, as this only excites the branch to throw out fresh shoots, it is much better to strip the superfluous branches of their leaves as they appear; and, as when thus treated they can produce no buds for want of leaves, their growth will be checked without injuring the tree, and they may be safely removed in the winter pruning. The vine is very apt to bleed when pruning has been delayed too late; and, in very strong vigorous plants, the ascending sap sometimes drops from the branches like rain. The French, very poetically, call these drops the tears of the vine.

The uses to which pruning is applied are various; but most commonly it is intended either to improve the form of the tree, or to make it bear more flowers and fruit than it otherwise would do; it is also used for removing diseased or broken branches; and, in cases of transplanting, for proportioning the head to the roots.

Pruning to improve the form of a tree, in pleasure-grounds, is only required in those cases where trees have grown under unfavourable circumstances, and where they have been too much drawn up, or distorted in any manner; but, in useful plantations, it is necessary to prepare trees for the purposes for which they are intended. Thus, for example, a tree intended for timber should have its side

branches taken off while they are quite young, in order that the wounds may soon heal over, and not leave loose knots to weaken or disfigure the wood; while a tree intended for a screen should be allowed ample space for its branches to spread from the ground upwards, and then they should only be shortened at their extremities, to make them throw out short branches near the tree. In pleasure-grounds the principal object is, generally, either to preserve the shape of the tree or shrub, so that it may form an agreeable object on a lawn; or to let it combine in a group with others, either for ornament, or to serve as a screen or shelter. In the first case, it is obvious that no pruning is requisite, but to remove dead, diseased, or unsightly branches; and, in the second, the pruning must depend upon the shape the tree is required to take to group well with the others planted near it.

Pruning to produce flowers and fruit has in view two objects: first, to cut off all superfluous wood, so as to throw the strength of the tree into the fruit-bearing branches; and, secondly, to admit the sun and air into the interior of the tree. In both cases, the attention of the pruner must be directed to thinning out weak and crowded shoots; and to keeping both sides of the tree well balanced, in order that the circulation of the sap may be equal throughout. This will preserve the general health of the tree, at the same time that it throws the sap into the proper channels; and the fruit will be produced in as much abundance as can be done without injuring the tree.

It should never be forgotten, that, to effect permanent improvements, nature should be aided, not overstrained; and that all extraordinary exertions are succeeded by a period of feebleness and languor, or, if the exertion be continued too long, by death. Thus, in all cases, pruning and training to produce fruit should never be pushed too far; as, though by occasioning an extraordinary deposit of the returning sap in some particular part that part may be forced into fruit, the unnatural deposit cannot fail in the end to engender disease.

Sometimes a tree, from being supplied with more food than it can digest, or from some other cause, has a tendency to produce what the English gardeners call water-shoots, and which the French call gourmands. These are strong vigorous-growing branches, which are sent up from the main trunk of the tree, but which do not produce either flowers or fruit; and which, consequently, if the tree be full of wood, should be removed as soon as their true character is discovered. If, however, the tree have too little wood in the centre, or if it appear exhausted by too much bearing, these branches should be spared, as they will serve admirably both to fill up any blanks that may have been left in the training, and to strengthen the trunk and roots by the quantity of rich returning sap which they will send down from their numerous leaves. A certain quantity of leaves and barren branches are essential to the health of every tree; and the fruit-grower who consults his own interest should cherish them, instead of grudging the sap required for their

support. Whenever there is not a sufficient quantity of leaves to elaborate the sap, the fruit that ought to have been nourished by its rich juices becomes flaccid and insipid; its skin grows tough instead of crisp; and, if the deprivation of leaves has been carried to excess, the fruit never ripens, but withers prematurely, and falls off. Pruning, at the best, is a violent remedy; and, like all other violent remedies, if carried further than is absolutely necessary, it generally ends by destroying.

Training is intimately connected with pruning, and like it should always be used with caution. A trained tree is a most unnatural object; and, whatever care may be taken of it, there can be no doubt that training shortens its life by many years. The principal object of training is to produce, from a certain number of branches, a greater quantity of fruit or flowers than would grow on them if the plant were left in its natural state; and this is effected by spreading and bending the branches, so as to form numerous depositions of the returning sap, aided, where the plant is trained against a wall, by the shelter and reflected heat which the wall affords. Thus the points to be attended to by the gardener in training are, the covering of the wall, so that no part of it may be lost; the bending of the branches backwards and forwards, so that they may form numerous deposits of the returning sap; and the full exposure of the fruit-bearing branches to the sun and air. For these purposes the gardener shortens the long shoots, to make them throw out side branches, with which he covers his walls, never suffering

them to cross each other, but letting each be as much exposed to the influence of the air and light as is consistent with a necessary quantity of leaves; and he bends them in different directions to throw them into fruit. These general principles are common to all fruit-trees, but of course they must be modified to suit the habits of the different kinds. Thus, for example, some trees, such as the fig and the pomegranate, only bear on the extremities of their shoots; and, consequently, if their shoots were continually shortened, these trees would never bear at all; other trees, such as the apple and the pear, bear their fruit on short projecting branches, called spurs; and others at intervals on nearly all the branches, and close to the wall. All these habits should be known to the gardener, and the modes of training adopted which will be suitable to each. Training flowers should also be regulated by a knowledge of the habits of the plants; but it consists principally in checking their over-luxuriance of growth, and tying them to stakes or wooden frames. In all kinds of training, neatness is essentially requisite, and any departure from it is exceedingly offensive. Where the hand of art is so evident as it is in training, we require excessive neatness to make us amends for the loss of the graceful luxuriance of nature.

The operation of training against a wall is performed by the aid of nails and shreds; the shreds being narrow oblong pieces of list or cloth, put round the branches, and attached to the wall by nails driven in with a hammer. Care should be taken that the pieces of list are

long enough to allow of the free passage of the sap, and yet not so long as to permit the branch to be so agitated by the wind as to bruise itself against the wall. The nails should also never be driven in so as to wound or corrode the bark ; and, when driving in the nails, the gardener should be very careful not to bruise the branch with his hammer. The shreds should be broad enough not to cut the bark, and yet not so broad as to cover the buds ; and they should, as much as possible, be of some uniform and dark colour. As few shreds should be used as are sufficient to attain the end in view ; but these should be very firmly attached, as nothing gives a more gloomy picture of misery and desolation in a garden, than trees that once were trained having become detached, and hanging drooping from the wall. Sometimes wires are fastened to walls, to which the plants are tied with strands of bast mat ; the strand, after it is put round the branch and the wire, being gently twisted between the finger and thumb, in order that it may make a firm knot without tearing or weakening the ligament. Climbing shrubs are tied to the pillars of a veranda, or to trelliswork, in the same manner ; as are also flowers to sticks, or slight wooden or wire frames, with the exception that, in their case, the bast does not require twisting.

Protecting from frost is an essential part of culture to a lady gardener, particularly in so uncertain a climate as that of England. Not only the blossoms of peaches and nectarines, and those of other early flowering fruit trees, are liable to be injured by the spring frosts ; but

those of the tree pæony (*Pæonia Moútan*), and other beautiful shrubs, are frequently destroyed by them; and, unfortunately, many of the modes of protection, by knocking off and bruising the blossoms, are almost as injurious as the frosts that they are intended to guard against. Twisting a straw rope round the trunk of a tree, and putting its ends into a bucket of water, is certainly a simple method, and it has been recommended as a very efficacious one. When a mat is used to protect wall trees, it does perhaps least injury to the blossoms when curtain rings are sewed to its upper end, and it is hung by these on holdfasts, or large hooks, driven into the upper part of the wall. To make it more secure, particularly in windy weather, it may be tied on the sides with strands of bast matting to nails driven into the wall; and a broad moveable wooden coping should rest on the holdfasts, and cover the space between the mat and the wall, to prevent injury from what are called perpendicular frosts. Camellias, and many half-hardy shrubs, may be protected by laying straw or litter round the roots; as the severest frosts seldom penetrate more than a few inches into the ground. Even in the severe winter of 1837-8, the ground was not frozen at the depth of ten inches. Tree pæonies, and other tender shrubs that are in a growing state very early in the spring, may be protected by coverings of basketwork, which are sufficiently large and light to be lifted off during fine days. Hand and bell glasses, sea-kale pots, and wooden frames covered with oiled paper, are all useful for protecting small plants. It is astonishing

how very slight a covering will often suffice to protect a plant from frost, if the covering be over the top of the plant, even though the sides be exposed; while, on the contrary, a warm covering in front of the plant will fail to save it, if the top be exposed to the perpendicular frosts.

Plants in pots may be protected by plunging them in the ground, and then covering them with a bast mat, supported by four or eight stakes, driven into the ground to a sufficient depth to make them quite firm, and being of a sufficient height above the ground to keep the mat from breaking the branches of the plants, as shown in *fig. 20*. The mat is kept

FIG. 20. MODE OF PROTECTING PLANTS.

in its place by bricks being laid on the part which rests on the ground. Protecting the roots and collar is a most important point, and few half-hardy trees and shrubs will be seriously injured, if the ground over their roots is covered a few inches deep with straw or dead leaves. Every lady should have two or three hand-glasses, of different sizes, always at her disposal, even during summer, for the convenience

of sheltering newly-transplanted plants, &c.; and for winter use she should have several beehive-like covers, each with a handle for lifting it, formed of plaited rushes or some similar material, which may be easily made by poor women and children in country places, under the direction of a lady; and which will be a charitable mode of employing them.

Insects and Snails and Slugs are the terror of all gardeners; and the destruction they effect in some seasons, in small gardens, is almost beyond the bounds of credibility. Birds do comparatively little injury, and, indeed, all the soft-billed kinds (which fortunately include most of the sweetest songsters) do good. The willow wren and the common wren, the blackcap, the nightingale, the redstart, all the warblers and fly-catchers, the swallows and martins, the wag-tails, the wryneck, the tomtit, the fern owl or night jar, and many others, live almost entirely on insects, and destroy great numbers every year; while the blackbird and the thrush, the robin and the sparrows, though they devour a portion of the fruit, destroy insects also. All birds may, indeed, be safely encouraged in small gardens near towns, as they will do much more good than injury; and a few cherries and currants are a cheap price to pay for their delightful songs.

As it is the larvæ only of insects, with very few exceptions, that do injury to vegetation, many persons never think of destroying them in any other state; forgetting that every butterfly that we see fluttering about may lay thousands of eggs, and that if we wait till these

eggs have become caterpillars, irreparable mischief will be done to our plants before they can possibly be destroyed. Whenever a butterfly is seen quietly sitting on the branch of a tree, in the day-time, it will generally be found to be a female, that either just has laid, or, what is more probable, is just about to lay, her eggs. As soon as the eggs are laid, the butterfly generally dies; and, where dead butterflies are found, search should always be made for their eggs.

In summer, a little oblong chrysalis, the colour of which is yellow with black bands, will frequently be found hanging from the gooseberry bushes; and whenever it is seen it should be destroyed. This chrysalis is the pupa of the magpie moth, the caterpillar of which frequently strips the gooseberry bushes of all their leaves in spring, and thus renders their fruit worthless in summer.

The caterpillar of the lackey moth is another very destructive insect. These creatures, which are curiously striped, like the tags on a footman's shoulder (whence their name), assemble together in great numbers, and, covering themselves with a web, completely devour the fleshy part of the leaf on which they have fixed themselves, leaving only the veins; they then draw another leaf to them, which they also devour, and then another, till the greater part of the leaves of the tree they have attacked present a fine lace-like appearance, as though they had been macerated. Did all these insects live to become moths, they would completely destroy, not only our gardens, but our forests,

as they feed on almost every different kind of tree; but with that beautiful arrangement by which all the works of our Great Creator are balanced equally with each other, and none allowed to predominate, these insects are such favourite food for birds, that not a hundredth part of them are suffered to reach maturity. The eggs of the lackey moth are often found fixed on a naked twig in winter, looking like a bracelet of hard beads, and adhering so firmly together, that the whole bracelet may be slipped off entire.

The cabbage butterflies are also very destructive in the larva state. The caterpillars are soft, of a pale whitish green, and very active, leaping about in the hand when taken; and the chrysalis, which is also green, looks as if it were swathed up like a mummy.

The caterpillar of the beautiful little ermine moth, which is a gregarious feeder, like the caterpillar of the lackey moth, is nearly as destructive; and it is the more necessary to mention this, because the moth itself is so small, so delicate, and so quiet, that no one unacquainted with its habits would think of killing it as an injurious insect.

The leaf-rollers, the saw-flies, and the gnats which occasion the oak-galls, are all very destructive. The leaves of the rose tree are often found marked, in summer, with pale brown zigzag lines, with a narrow black line running down the middle of each. These lines are the work of a very small orange-coloured caterpillar, not more than two lines long, that lives on the parenchyma of the leaf; and the pale

brown mark is occasioned by the epidermis drying where the pulp beneath it has been removed. The moth is called the red-headed pygmy, and it is so small as not to measure more than two lines and a half broad, when its wings are fully expanded.

The "worm i' th' bud" of the rose is the maggot, or grub, of one of the kinds of saw-fly; a beautiful transparent-winged little creature, that no one would suspect of springing from such a frightful-looking maggot. But of all the insects that infest the rose, the most destructive are the aphides. These little green flies cover the tender leaves and buds of the young shoots in myriads, and are extremely difficult to destroy without spoiling the appearance of the shoots that have been attacked by them. Tobacco-water is an excellent remedy, if not too strong. It should be made by steeping half a pound of the best tobacco in a gallon of hot water; and, as soon as the infusion has become cold, the young shoots should be dipped in it, and suffered to remain a few seconds, after which they should be immediately washed in clean water before they are suffered to dry. If this be done carefully, the insects will be destroyed, and yet the shoots will remain uninjured; but if the tobacco-water be too strong, or if it be suffered to dry on the plant, the shoot will be blackened, and the young leaves destroyed. Lime-water may also be tried, if no more lime be used than the water will hold in solution; as unless the water be quite clear in appearance when applied, the plant will be very much disfigured with the white stains of the

lime. Instead of using lime or tobacco-water, I greatly prefer dipping the branch into a basin of clean water, and gently shaking it while in the water, the surface of which will become covered with green flies, which should be skimmed off, and put into some vessel where they can be destroyed, while another branch is dipped in the water. In this way I always clear the roses in my own garden, and I am generally rewarded by a brilliant display of flowers. Another means of getting rid of all noxious insects is, to fumigate the plants infested with tobacco; and the best way of doing this is by Brown's patent fumigator (*fig. 21.*). The cup

FIG. 21. BROWN'S PATENT FUMIGATOR.

of the fumigator is filled with loose tobacco, which is lighted, and the handle being turned round, the fumes are gently spread through the greenhouse, or among the plants. By putting a little of the moxa, or Spanish tinder, among

the tobacco, or using it alone, caterpillars, butterflies, snails, &c., may be stupified, so that they will fall from the branches, and may be gathered up and destroyed. There are also several kinds of fumigating bellows.

An excellent preventive remedy is to wash the stems and branches of deciduous rose trees, in winter, with water heated to 200°, or with a mixture of strong tobacco-water and soft soap; cleaning the branches well, at the same time, with a soft brush.

The American blight shows itself in little tufts, of a white woolly or cottony substance, which appear on the stems and branches of apple trees, generally where they are cankered, or have been injured. This woolly substance is the covering of a kind of aphid, and it is not known why it is called the American blight, as it appears to have been first brought into England from France, about the year 1787. When the insect was first discovered, it was thought to be a kind of coccus, like that on the vine, and, in fact, it has very much the appearance of insects of that kind. The coccus, however, only envelopes its eggs in a white woolly substance; but in the American blight, both the male and female insects are covered with this white substance, and in very hot weather, the male, which has wings, may be seen occasionally floating in the air, and looking like a piece of cotton wool. Wherever these insects establish themselves, the part they attack soon becomes ulcerated or cankered; and if their ravages be not stopped, the tree will die in the course of a few years. Various means have

been devised for their destruction, but the plan proposed by Mr. Waterton appears to be the best. This is, to clean the tree from the insects as thoroughly as possible with a brush and water, and then to fill up all the cankered parts with moistened clay.

Besides the insects already enumerated, there are several kinds of beetles which devour plants both in the larva and perfect state. Of these, the cockchafer remains in the larva state four years, and is one of the most destructive insects known; its grub is the celebrated *ver blanc* of the French. The rose beetle, or rose chafer (*Cetonia aurata*), is extremely beautiful, from its splendid wing cases of burnished green and gold; and these beetles, notwithstanding their shape, which looks too heavy and clumsy for flying, may frequently, in hot summer weather, be seen upon the wing, making a loud buzzing noise. When taken up in the hand, they draw up their feet, and appear to be dead; but, after having been handled and even tossed about for some time, they will, if a favourable opportunity appears to offer, suddenly spread out their wings and buzz away, leaving their captor too much astonished to be able to make any effort to retain them. Several of these insects may often be found on one rose; but they appear to be only engaged in sucking the honey from the flower, as they do not injure it. They undergo their transformations in the ground, and the grubs are supposed to live entirely on little bits of rotten wood.

Besides the insects already mentioned, the various kinds of weevils, the wire-worm, the

thrips, the red spider or rather mite (*Ácarus telàrius*), various kinds of *Típula* or gaffer long-legs, wood-lice, and earth-worms, are all found on plants, and are all more or less injurious to them. In the general destruction of insects the lady-bird should always be spared, as, both in its larva and its perfect state, it lives on the larvæ of the green fly or aphis.

Snails and Slugs are more destructive to vegetation than any kind of insect; and they are still more difficult to get rid of. There is a very small grey slug, that is peculiarly injurious to plants in pots; the large grey slug is also very destructive, and the common garden snail. The beautifully banded snail (*Hèlix nemoralis*) is, however, supposed to live partly on earth-worms, and the shell slug (*Testacèlla scutèlla*) lives entirely on them. The usual modes of entrapping snails, slugs, and wood-lice, are, laying down slices of raw potatoes or cabbage leaves at night, and examining them before the dew is off the plants in the morning. As, however, this requires very early rising, a more convenient method is to lay a few flower-pots upon their sides, near the places where the snails have committed their ravages; and the snails, which can neither move nor feed unless the ground be wet with dew or rain, will generally be found to take refuge in the flower-pots from the heat of the sun. They are likewise often found, in the middle of the day, sticking against walls under ivy, or in box edgings. In gardens very much infested with snails, search should be made in winter among all the ivy and box in the garden; and all the snails found in a

torpid state should be destroyed. This, though some may escape, will effectually prevent them from becoming numerous; and, as the eggs are not laid till April or May, care should be taken, before that season, to destroy all the snails that can be found. The eggs are round, almost transparent, and of a bluish white, like opal; and they are always found in small clusters, buried in the ground.

CHAPTER VI.

THE KITCHEN-GARDEN.—THE MANAGEMENT OF
CULINARY VEGETABLES.

IN almost all gardens, it is customary to set apart a portion of the ground for the culture of culinary vegetables ; and, in villas and country seats, this portion is quite detached from the pleasure-ground, and is called the kitchen-garden. When this is the case, it usually consists of a square or oblong piece of ground, varying from one to five acres in extent, according to the size of the establishment, and inclosed by a wall ten or twelve feet high. If a greater extent of ground than two or three acres be required, it is generally laid out in two or more gardens, communicating with each other, so as to afford an extent of wall proportionate to that of the ground. In front of the wall is a border for the roots of the fruit trees, ten or twelve feet wide, and beyond that a walk usually four feet wide, leaving a plot of ground in the centre for the culture of culinary vegetables and espalier fruit trees. The central plot is usually divided by a main walk up the centre five or six feet wide, and two or four side walks three or four feet wide ; the smaller plots, inclosed between these walks, being again divided into oblong compartments, or beds.

The situation of the kitchen-garden must of course be partly determined by that of the house and offices; as it should be near the stables for the sake of manure, and near the kitchen offices for the convenience of not having far to carry the fruit and other crops. There should also be a convenient road to it concealed from the pleasure-ground. In small suburban gardens there should always be a convenient, and, if possible, a partially concealed, road for servants to bring in vegetables; and there should be a little plot of ground for thyme, mint, sage, parsley, &c., very near the kitchen door.

The surface of a large detached kitchen-garden should be level, or gently sloping to the south or south-east; and there should be no plantations or high trees within a hundred or a hundred and fifty feet, to insure a free current of air, which is essential to the welfare of the crops. The whole of the garden should be well drained; and a basin for water should be in the centre, open to the air, for the convenience of watering. A kitchen-garden should never be placed in a valley, as in such a situation it would be damp, and very liable to injury from frost; and it should not be on the summit of a hill, because it would be exposed to high winds.

The general form and arrangement of all large kitchen-gardens being alike, it is obvious that they must have been determined by some general principle; and this principle appears to be utility. The walks are made straight, that the heavy loads wheeled along them may not

be in danger of overturning, which they would be if the walks took a serpentine direction; while the compartments are divided into oblong beds, for the convenience of digging and cropping; it being found most convenient to sow vegetables in straight lines, to allow of weeding and hoeing between them, earthing up, &c. For these reasons, all pieces of ground in small gardens appropriated to the culture of kitchen vegetables should be made to approximate, as closely as possible, in form and general arrangement, to regular kitchen-gardens; and, where there is any portion of the ground that cannot be brought into a rectangular shape, it should be set aside for tart-rhubarb, artichokes, or some other permanent crop; and a square or oblong plot in the centre should be reserved for peas and beans, and other annual vegetables.

The best soil for a kitchen-garden is a sandy loam, and the surface soil should be from two feet to three feet deep. If it is on a clayey subsoil, every part of the garden should be well drained: as, from the quantity of refuse constantly dug into the ground from the culinary vegetables, if any water should be suffered to remain in a stagnant state in the soil, it would be particularly injurious.

When there is only one detached kitchen-garden, it is usual to surround it entirely, or on three sides, with a piece of ground called a slip, consisting of a fruit-tree border on the other side of the wall, with a walk bounded by a low hedge. This is done in order that fruit trees may be grown on both sides of the wall. The vinery and forcing-houses are generally

placed facing the main walk of the garden; and what is called the melon ground, which forms a small walled garden, is often placed behind them. This, however, is not essential; but the melon ground should always be on the side next to the stable offices, for the convenience of carting manure.

Walks.—The obvious use of walks, in a garden constructed on a general principle of utility, is, to enable the gardener and others to reach every part of the garden as speedily as possible, without treading on the beds; and for this reason, though the walks are made to intersect each other at right angles, it is customary in many gardens to round the central beds adjoining them at the corners. Paths two feet wide are also made between the beds into which the compartments are divided; and the beds themselves are never wider than a man can conveniently reach across to the middle, to rake or hoe. These paths, however, as they vary according to the nature of the crop, are never made of any permanent materials; and the whole compartment is generally dug over when necessary, without paying any regard to them, and redivided into fresh beds every season.

The walks, on the contrary, being intended to be permanent, are of a very different nature; and, in addition to their obvious uses, it is essentially requisite that they should be hard and firm. This is necessary, as the manure, &c., wanted in a kitchen-garden is generally distributed through the garden in a wheelbarrow; and the weight, in the act of wheeling,

is principally thrown upon a very narrow wheel, which, on soft walks, literally ploughs its way through the gravel, leaving an uneven furrow, extremely offensive to the eye. To avoid this inconvenience, the walks in kitchen-gardens, where expense is not an object, are frequently made of cement or asphalte, or laid with bricks or flag-stones; but, as all these materials give the idea of a court-yard, rather than a garden, most persons prefer gravel walks. Where gravel is to be employed, the intended walks are marked out with two garden lines; the space between is then dug out, generally in the form of an inverted arch, from one foot to two feet deep in the centre (according to the nature of the soil, and the expense it may be thought advisable to incur), and the excavation is filled to within six inches of the top with brick-bats, stones, or any other hard rubbish that can be procured. If the excavation be made in the shape of an inverted arch, in filling it up the extreme point of the arch should be left hollow to serve as a drain; and if it be made rectangular, a drain is generally left on each side. In filling in the rubbish the largest pieces are thrown in first, then smaller ones, and lastly pieces broken very small, which are rammed down or rolled, so as to form a smooth surface immediately under the gravel. This is done both to give solidity to the walk, and to prevent the gravel from being wasted by trickling down between the interstices of the stones. As walks can never be firm unless they are kept quite dry, in all cases there should be at least one drain to each walk. The gravel before

laying it down should be sifted, and all stones larger than a moderate-sized gooseberry should be thrown out or broken; and, as soon as it is laid down and evenly spread, it should be well rolled, previously to which, if it should be very dry, it ought to be sprinkled with water. If the gravel be at all loose, it should be mixed with equal parts of brick-dust and Roman cement before laying it down, or the gravel may be mixed with burnt clay powdered, in the proportion of one wheelbarrow full of clay, to a two-horse cart-load of gravel; or if the gravel be already laid, and it is wished to render the walk more firm, powdered burnt clay may be strewn over it, and raked in. In all these cases, the walks must be watered to consolidate the mixture, and the following day heavily rolled. Sometimes the clay is mixed with water before applying it to the gravel. Where good gravel cannot be procured, tolerably firm walks may be made of sea gravel, or powdered sandstone, or even of sand, by this treatment. The clay may be burnt by making it into a heap, intermixed and surrounded with faggot-wood; or, as a substitute for burning, it may be dried by spreading it on the top of the furnace or boiler employed to heat the hot-houses.

When the walks in a kitchen-garden are formed of flag-stones, artificial stone, or brick, the material used is laid on brick arches or piers; and when grass walks are employed, they require no other preparation than marking them out on the ground, consolidating it by pressure, and then laying them with turf.

Grass walks were formerly common in kitchen-gardens, but they are manifestly unsuitable, being more injured than any others by the wheelbarrow, and being quite unfit to walk on in wet weather.

When gravel walks want renovating, the gravel should be loosened with a pick, turned over, raked, and firmly rolled, adding a coating of fresh gravel wherever it may be found necessary. Weeds may be prevented from growing on gravel walks by watering the walks with salt and water. The salt will also kill the weeds already there, and, if these are large, they should, of course, be hoed up and raked off. Great care is, however, necessary to prevent the salt and water from touching the box-edgings, which it is very apt to do, particularly if the walk be raised in the centre, as is sometimes the case, though it is not generally advisable to make it so, as the water which drains off the centre forms a soft part on each side. When salt and water is suffered to drain to the box-edging, it kills the leaves on the lower part of the plant, and gives the edging a very bare and miserable appearance.

Box-edgings are better than any others for gravel walks. They are generally planted in March or April. A garden line being first drawn tightly along the earth bordering the walk, a shallow trench is then opened close to the gravel, and the earth from it thrown on the bed. The box is pulled into separate plants, and the branches and roots of each trimmed, till all the plants are very nearly of the same size. The plants are then put into the trench, with

no earth between them and the gravel; and the trench is filled up by drawing the earth into it, and pressing it close to the roots, so as to make the plants quite firm. Nothing else is requisite but a few waterings, till the box begins to grow; and the only difficulty is to keep the plants in a straight line, with the points of their shoots at an equal distance above the soil. When box-edgings are pruned, they should always be cut in with a knife, and never clipped with shears. They should also never be suffered to grow too high without pruning; and they should be occasionally taken up and replanted wider apart, when their stems appear to be becoming naked below.

Cropping.—The crops grown in the open air in a kitchen-garden are of two kinds, those produced by the fruit trees, and those of the herbaceous vegetables; and the latter are again divided into the permanent crops and the temporary ones. The permanent crops are those which remain for a number of years in one place, producing a crop, year after year, from the same roots; such as asparagus, artichokes, rhubarb, &c.: while the temporary crops are those that require sowing or fresh planting every year, and these should never be sown for two years in succession on the same ground.

PERMANENT CROPS.—In regular kitchen-gardens, it is of very little consequence where the permanent crops are placed, as every part of the ground is generally alike accessible from the walks, and alike suitable for cultivation: but in small gardens the case is different; and there are generally some awkward corners,

which are best set apart for the lasting crops. The part to be sown annually should be always divided into regular square or long narrow compartments, in order to manage properly the rotation of crops.

Asparagus Beds.—Of all the permanent crops grown in a garden, the one which requires most preparation is asparagus. It is not, perhaps, generally known that this plant is a native of Britain; but the fact is, that it grows wild in several places both in England and Scotland. The cultivated plant is, however, of course, very different from the wild one; for, while the latter is meagre, insipid, and very tough, the former is not only succulent and finely flavoured, but grows to an enormous size. There are two sorts of asparagus grown for the London market: the one having a thick whitish stalk, only just tipped with a pinkish head; and the other having both the stalk and the head green and slender. Asparagus is always raised from seed; but, as the stalks are not fit to cut till the roots are two or three years old, persons wishing to plant an asparagus bed generally purchase plants one year or two years old from a nurseryman.

Asparagus plants require a light, rich, sandy loam, and the ground in which they are to be planted is always first trenched from three to four feet deep, or even more, and plenty of stable dung is buried at the bottom of the trench; the beds are then marked out four feet wide, with paths two feet wide left between them, and the plants are planted in rows, about six inches deep (the crown of the root being

left about two inches below the surface) and nine inches apart. The beds are generally covered during winter with rotten manure, which is forked in and the beds raked in spring; and this treatment should be repeated every year, or every two or three years at farthest, the beds being slightly covered, in the intermediate years, with litter, leaves, &c., which may be forked in the following spring. The stalks should not be cut till the third year after planting; but, after that, the roots will continue to produce freely for twelve or fourteen years. Asparagus is generally cut a little below the surface, with a sharp knife, slanting upwards; and the market-gardeners cut all the shoots produced for two months, say from April to Midsummer, but suffer all the shoots that push up after that period to expand their leaves, in order that they may elaborate their sap, and thus strengthen the roots. Whole fields of this plant are cultivated by the market-gardeners near London, to the extent, as it is said, of from eighty to a hundred acres, chiefly near Mortlake, Battersea, and Deptford. During some seasons, these fields, and many private gardens near London, are infested with a most beautiful little beetle, striped with red, black, and blue, which eats through the shoots close to the ground almost as soon as they appear, and which can only be destroyed by hand-picking. Where it is known to have been prevalent, or where one is seen for the first time, women and children should be employed to examine the beds, and to destroy all they can find, to prevent the insects from laying

eggs, and thus producing a brood to destroy the crop the following year. Asparagus is generally forced by covering the beds with manure, and by deepening the alleys between the beds, and filling them with manure also.

Sea-Kale.—About eighty years ago, Dr. Lettsom, a celebrated physician and botanist of that day, happened to be travelling near Southampton, when he observed some plants pushing their way up through the sea sand. Finding the shoots of these plants quite succulent, he inquired of some person in the neighbourhood if they were ever eaten, and was answered, that the country people had been in the habit of boiling these shoots and eating them as a vegetable from time immemorial. The doctor tasted them, and found them so good, that he took some seed to his friend Mr. Curtis, the originator of the *Botanical Magazine*, who had then a nursery in Lambeth Marsh. Mr. Curtis wrote a book about the plant, which brought it into notice, and he sold the seed in small packets at a high price: and thus this long-neglected British plant, which for so many years was only eaten by the poorest fishermen, became our highly-prized and much-esteemed sea-kale, which is now so great a favourite at the tables of the rich.

Sea-kale is raised either from seeds or cuttings of the roots. In either case, when the plants are a year old, they are put into a bed thoroughly prepared as if for asparagus, and planted in the same manner. The first year the plants will require little care, except cutting down the flower-stems wherever they appear;

but the second year they will be ready for forcing. This is performed by covering the plants first with river sand, then turning what are called sea-kale pots over them, and, lastly, covering the pots to the depth of fifteen or twenty inches with fresh stable dung, the heat from which will draw the shoots up, and make them succulent and fit to eat.

Artichokes are another kind of permanent crop, but they are not suitable for growing in a small garden. The artichoke is a native of Italy, said to have been introduced in the reign of Henry VIII. It is propagated by division, and requires a light, rich, and rather moist soil. Manure should be laid between the rows every autumn, and the plants should be covered with straw in severe weather in winter. Artichoke plants do not continue to produce good heads longer than six or seven years; but young plants come into bearing the second year after transplanting.

Strawberries.—Though strawberries should be properly included in the list of fruits, they are generally classed by gardeners among the permanent herbaceous crops in a kitchen-garden. There are a great many named sorts grown in gardens, but they are mostly varieties or subvarieties of three species, viz. the Pine (*Fragària grandiflòra*), which is supposed to be originally from Surinam; the Chili (*F. chilénsis*), and the Scarlet (*F. virginiana*). Of these, the pine-strawberries are large, with scarlet flesh, and of a very fine and delicate flavour; and the best kinds are Keens' seedling and the old pine: the Chili strawberries (one of

which is Wilmot's superb) have very large fruit, with white flesh, but possess very little flavour; and the scarlet strawberries have small, bright red, slightly acid fruit, which is principally used for ice-creams and preserving. To these may be added the Hautbois (*F. elàtior*), which, though so often mentioned by the street venders, is in reality very seldom grown, because the fruit, which is small and blackish, is rarely produced in any quantity.

Strawberries should be grown in rich loamy soil, and they are generally planted in beds three feet wide, three rows in a bed. Every year, the strongest of the runners should be taken off, and planted to form a succession crop, as the beds seldom remain good many years. When strawberries are wanted for forcing, pots are placed near the beds, and the runners are put over them, and kept down with a stone, or hooked down with pegs, to induce them to root.

Tart Rhubarb.—The part of the rhubarb used for making pies and puddings is the foot-stalk of the leaf; and the kinds usually grown in gardens for this purpose are, *Rhèum Rha-pónticum*, a native of Asia, introduced in 1573, and *Rhèum undulàtum*, a native of China, introduced in 1734; or varieties of these species. Among these, the Elford, or Scarlet Rhubarb, has slender stalks, but is valuable for its beautiful colour; and the Giant Rhubarb is remarkable for its enormous size.

Rhubarb is either raised from seed, or propagated by offsets. The seed is sown in April in light rich soil, and the plants are pricked out

in autumn into a bed of rich sandy loam, which has been dug over, or trenched to the depth of eighteen inches or two feet. Rhubarb may be forced by covering it with pots and manure, like sea-kale; or the roots may be planted in a box, and kept in the house on a stove, or near the fire in the kitchen, covering the box with a bast mat, to keep the plant in darkness and free from the dust, and watering frequently.

Horseradish grows best in rich alluvial soil; and it is propagated by dividing the crown of the root into cuttings, each about two inches long. The ground is then prepared by trenching at least two feet deep, and the cuttings or sets are planted in a kind of furrow about fifteen inches deep, with their crowns upwards. The second year the roots may be taken up, and the crowns cut off and replanted. As the sets are planted in March, and the leaves seldom begin to appear till the following June or July, it is customary to sow a light crop, of lettuce for example, or spinach, on the surface of the ground over the horseradish sets; which crop is cleared off in time to make way for the leaves of the true crop. When the sticks of horseradish are taken up, they may be kept in sand in a cellar or out-house till wanted for use.

TEMPORARY CROPS, AND THEIR ROTATION.
—It has been already explained, under the head of manures, that crops exhaust the soil of certain minerals that are necessary for their support; but as different plants require different earths, the same ground which has become unfitted for one crop, will still continue to produce other

crops for several years in succession, without manuring, or at least without renewing the soil. This is called the rotation of crops; and in fixing the order of this rotation, plants differing as much as possible in their habits should be chosen to succeed each other; as, for example, onions may be succeeded by lettuces, carrots by peas, potatoes by cabbages, turnips by spinach, &c.

The Cabbage Tribe.—Few persons unacquainted with botany will be able to believe that broccoli, cauliflowers, cabbages, Scotch or German greens, Brussels sprouts, and Savoys, not only all belong to one genus, but are actually varieties of one species of a genus, viz. *Brássica oleràcea*; and that the turnip, the Swedish turnip, and the rape (the seed of which is used for oil), belong to other species of the same genus. The cabbage, in its wild state, is a biennial which grows naturally on the sea-coast in different parts of England, and is a tall straggling plant with loose leaves, and rather pretty yellow cruciferous flowers. The borecole, or kale, is the first improvement effected by cultivation; and the cauliflower the last. Indeed, it is impossible to imagine a greater difference between any species and variety, than exists between the cauliflower and the original wild cabbage plant. All the varieties of the cabbage tribe require a soil which has been enriched with abundance of animal manure; and, when decaying, they have all a peculiarly offensive smell, like that of putrid meat, from the large quantity of nitrogen that they contain.

The Cabbage.—The word “cabbage,” in its original signification, means a firm head or ball of leaves folded closely over each other; and thus it is equally correct to say a cabbage lettuce and a cabbage rose. The cabbages grown in gardens are usually sown at three different times: for the spring, summer, and autumn crops. The spring cabbages are sown in an open, airy situation, and light soil, generally in the last week in July; some market-gardeners near London fancying their crops will not prove good unless the seed be sown on the 25th of July, or the nearest week day. When the plants come up, they are thinned; and in October or November they are ready for planting out in beds, the plants being nine inches and the rows a foot apart. The summer crop is sown in February, and planted out in April, the plants twelve inches from each other, in rows eighteen inches apart; and the autumn crop is sown in May, and planted out in July, generally eighteen inches apart every way. In small gardens, cabbages are seldom raised from seed; but the plants are purchased when ready for planting out. All cabbages require a soil enriched with animal manure, and frequent hoeing up to admit air to their roots; and on this account they should always be planted in rows. In dry weather they should be watered, to make them succulent. The stalks of the spring cabbages are generally pulled up and carried to the refuse heap as soon as the cabbages are cut; but the stalks of the summer and autumn kinds are left standing, that they may throw out what are called sprouts. In

some gardens the February sowing is made to serve for the whole year, by using the Vanack cabbage, the sprouts of which form heads; and this plan is advantageous in small gardens, as it saves space and labour. The Pomeranian Cabbage, which is remarkable for its conical form and compact habit of growth, is made, in France, to last during the winter by taking the plants up when full grown, and laying them in a sloping direction up to the neck in the soil.

When the cabbage stalk is left for sprouts, it is customary, in some places, after cutting the cabbage, to give the stalk two cuts across, so as to divide the top into four; as, when this is done, it is thought to produce sprouts with more certainty. The culture of the red cabbage is exactly the same as that of the green kinds, except that there is no spring crop, and the stalks are never left standing for sprouts.

Coleworts are young cabbages gathered before they form a head; and they are generally sown in June or July for an autumn, winter, or early spring crop. As they are always eaten young, they need not be planted more than ten or twelve inches apart every way; and, when they are gathered, the stalks are pulled up and thrown away.

Savoys and Brussels Sprouts.—Savoys are large cabbages with wrinkled leaves, the seed of which is sown about the end of March, in order that the crop may be ready for the table in November. The culture is the same as that of cabbages, except that, as the Savoys are large, they should be planted out, in the bed

where they are to cabbage, two feet apart every way. Brussels sprouts are a variety of the Savoy cabbage; the plants first produce a small Savoy on an elongated stalk, and, when this is cut off, the long stalk throws out a number of little wrinkled-leaved cabbages from its sides, which are the Brussels sprouts. The culture is the same as for the Savoy, except that the plants, as they do not spread, need not be more than one foot apart every way; and that the seed is generally procured from Brussels, as that ripened in England is said to produce inferior plants. Both Savoy and Brussels sprouts are considered much better if not cut till there has been some frost upon them; and they are consequently of great value as winter vegetables.

Broccoli and Cauliflower.—The cauliflower (the name of which is supposed to be derived from *caulis*, a stalk, and *florens*, flowering) is a native of Cyprus, introduced in 1694; and no one unacquainted with the details of its culture, and who has seen the immense quantities brought to the London market, could credit the extraordinary care bestowed on each plant to bring it to perfection. Cauliflowers take nearly a year from their first sowing to bring them into a state fit for the table; and, as the plants are too tender to bear an English winter without protection, they require to be grown in frames, or sheltered by hand-glasses during frosty weather. The seed is sown in August, in a bed of rich light earth, and the ground is occasionally watered till the plants appear. They are then shaded with mats during

the heat of the day, and thinned out, so as to leave the plants a little distance apart. In September they are pricked out into beds of rich earth, and watered and shaded; and about the end of October, or the beginning of November, they are transplanted into frames, or into beds richly manured with rotten dung, spread over the ground three or four inches thick, and trenched in a spade deep; after which, they are watered and covered with hand-glasses. During the whole winter they require constant attention; slightly watering them, and raising the glasses to give them air in fine weather; and covering up the glasses closely with mats or straw in severe frosts, and during the continuance of sharp winds. They must also be frequently looked at, to pick off decayed leaves, &c., which might rot the stem; and the ground in which they grow must be strewed with a mixture of lime and soot, to protect them from the attacks of caterpillars and slugs. Care must also be taken, by giving air, &c., to prevent them from being drawn up, or running to flower too soon. At length spring arrives, and the plants which have safely survived the winter must be looked over, and thinned out so that only one or two may be left to each glass; the earth is then loosened, the plants are regularly watered, and the glasses taken off in the middle of the day, but carefully replaced at night. At last, towards the end of April, the glasses are removed altogether, and in May some of the plants will begin to make heads; but even then the care bestowed on them must not cease. The plants must be examined daily, and some

of the leaves turned down over the flowers, to preserve them from the rays of the sun, which would turn them brown, and from the rain, which would rot them. At length, about the end of May, or in June and July, the cauliflowers are ready for the market; and little do the purchasers of them think of the labour and unremitting attention which, for so many months, have been required to rear them. A second crop, sown in February and planted out in April, will be ready in August; and a third crop, sown in May and planted out in July, will be in perfection about Michaelmas or October, and may be preserved in mild weather till near Christmas.

Broccoli is generally supposed to be a variety of the cauliflower; but it differs essentially, both in being much hardier, and in being very apt to vary. Thus, while only two kinds of cauliflower are known, the early and the late, and even these can hardly be distinguished from each other, there are ten or twelve distinct sorts of broccoli, and more are being raised every season. All these kinds, however, appear to have sprung from two, the purple and the green, which are said to have been brought from Italy. Broccoli is grown for the table in autumn, winter, and early spring; but there is no summer crop. The principal seasons for sowing are, February and April for the autumn and winter crops, and June for the spring crop; and the plants succeed best in fresh loamy soil, or, if this cannot be procured, in ground that has been deeply trenched and well manured. The culture is like that of cabbages, except that, in

very severe winters, the plants require a little protection.

The Borecole is generally known in England by the name of Scotch kale, and in Scotland by that of German greens. There are many different subvarieties, fourteen of which are enumerated in the *Encyclopædia of Gardening*; but all the kinds agree in being generally sown in April, and transplanted in June. They require no other culture except hoeing and earthing up; and, as they are exceedingly hardy, they are very valuable vegetables for winter use.

The Leguminous Tribe.—Vegetables belonging to this tribe generally occupy the ground but a few months in the summer, and are thus very suitable, in the rotation of crops, to precede or follow those of the cabbage tribe, which occupy the ground the greater part of a year.

Peas.—The list of peas is almost interminable, and it is continually changing; so that what may be considered the fashionable peas of one season are generally superseded the next by some others, to which every possible merit is attributed. There are, however, some very distinct kinds, the principal of which are: the Dwarf early kinds, which are dry and mealy when full-grown, and become whitish when they are old; the Prussian and Marrow-fat Peas, which are soft and juicy, with a rich marrowy flavour, and which remain green even when quite ripe; the Early Surprise, which unites the advantages of both kinds, being ready for the table the first week in July, and

yet having the appearance and flavour of the Marrow-fat Peas ; the Sugar Peas, or *Pois sans Parchemin*, which are boiled and eaten, like kidneybeans, in their pods ; and the Transparent Pea, the foliage and pods of which are both destitute of the usual glaucous hue. The soil for peas should be a light, dry, sandy loam, tolerably rich, but not freshly manured ; and this is another reason why they are particularly well adapted to succeed any of the cabbage tribe, for which a great deal of manure is required. They should generally have an open sunny situation ; and the early crops should be sheltered from the prevailing winds of the district. If peas are sown in freshly manured, very moist, or clayey soil, they will run to haulm, that is, they will produce more leaves and stalks than peas ; and, if grown in calcareous soil, they will boil hard and tough, even when young, and when old will never become floury.

The early peas are small, and few in each pod, with very little flavour. They are, indeed, of little use, except for forcing, or for sowing in November and December, to stand the winter in the open border, in order that they may produce a crop the following May or June. When forced, they are sown in pots plunged in a hotbed, and transplanted into the open border in March ; turning them out of the pots into holes made to receive them, without breaking the balls of earth round the roots. In some cases, they are fruited in pots placed in a greenhouse, or even in a stove ; by which means,

when it is thought worth while to incur the expense, fresh green peas may be had at Christmas.

The main crop of early peas is sown in February. A pint of small early peas will sow twenty yards of drills; each drill being one inch and a half deep, and the drills two or three feet asunder. The drills are marked out by stretching a garden-line lengthwise along the bed, and then making a drill or furrow along it with a dibber; the earth is pressed firm at the bottom of the drill by the very act of making it, and the peas are then distributed along it, two or three to every inch, or wider apart, according to their size, and covered with soil, which is afterwards trodden down or rolled. When attacks are apprehended from mice, dried furze is generally strewed over the peas as soon as they are put into the ground, and before they are covered with earth; and this is efficacious, not only in protecting the peas from their enemies, but in keeping enough air about them to allow them to vegetate. They should then be well watered, and will require no further care till they come up. When they are two or three inches high, they should be hoed; that is, the weeds which may have grown between the rows should be eradicated with the hoe, and the earth drawn up to the roots of the peas. When about six inches high, they should be staked, with two rows of sticks to each row of peas; the sticks being about a foot higher than the average height of the peas, and care being taken never to let them cross each other at top.

Late peas only differ in their culture from the early crops in having their drills farther from each other, and in the peas being placed farther apart in the drills. A pint of these peas is calculated to sow thirty-three yards of rows; as peas of the larger kinds should be from one inch to two inches, or even more, apart in the drills, though dwarf marrowfats and blue Prussians are frequently sown about three in two inches. The time of sowing usually varies from April to July; but, where no early peas are grown, even the late kinds may be sown as early as February or March. The tall-growing kinds should, however, never be suffered to stand the winter; and they should not be sown before March, unless the weather appear likely to be open, on account of the greater difficulties attending tall-growing plants. It may, indeed, be here observed, though the fact is obvious, that all dwarf-growing plants are much better adapted for forcing than the tall-growing kinds, from their being much more easily sheltered and protected. Peas are generally eaten when not more than a quarter ripe for using as seed, and they should always be cooked as soon as possible after they are gathered, as they are, perhaps, more injured by keeping than any other vegetable. The pea is a native of the South of Europe, and it is supposed to have been introduced in the reign of Henry VIII.

Beans, though belonging to the same natural order as peas, and generally classed with them by persons speaking of garden products, yet differ in several very important particulars in

their culture: for instance, they should be grown in much stronger soil; they do not require sticks; and they are generally topped, that is, the leading shoot of each plant is cut off, an operation that would be fatal to peas. There are many different kinds of beans, though not so many as of peas; and the different varieties may be divided into the early and the late. The early beans may be sown in drills in November or December, to stand the winter; but the main crop is generally sown in January or February. The broad beans are sown in March and April, and some even so late as June; and, instead of drills, a hole is made for each bean separately with a dibber. Both sorts are covered with earth, which is pressed down and then watered; and they require no further care till the beans are three or four inches high, when they should be hoed and earthed up. As soon as the plants come into blossom, the tops are cut off; and this is said not only to increase the crop, but to prevent the plants from being attacked with the insect called the black blight. The crop should be gathered when the seeds, that is, the beans, are about half-ripe. The bean is said to be a native of Egypt, and it is supposed to have been brought to England by the Romans.

Kidneybeans differ from the other leguminous vegetables, in the pods of all the kinds being eaten. There are two distinct sorts, which are different species, viz., the Dwarf Kidneybeans, and the Scarlet Runners; and these are again separated into numerous subdivisions. A new variety of the Runners was introduced in 1850,

the pods of which are of a pale colour, and without any tough lining. This variety is cultivated in France under the names of *Haricot beurre*, and *Haricot d'Alger*. The soil for the dwarf kinds should be similar to that for peas; viz. rich, light, and dry, but not newly manured; and it should have been well pulverised to the depth of a foot or eighteen inches. The drills are generally made about two inches deep, and two feet or two feet and a half apart. The seeds are sown the first or second week in May. As the plants grow, they may be earthed up; and, if the plants are very vigorous and appear disposed to run to haulm, a few of the leading shoots may have their tops pinched off; but this should be done carefully, and the operation confined to a few of the strongest-growing plants. The scarlet runners require nearly the same culture, except that the seeds should be sown two or three inches asunder, and only lightly covered; and that the rows should be at least three feet apart. The seeds are covered lightly, as abundance of both air and moisture is required to make seeds enveloped in so thick a skin germinate; and the rows must be wide apart, as otherwise, from the height of the plants, the crop would not get enough sun and air. The scarlet runner is properly a perennial; and, if the plants are cut down to the ground after producing their crop, and their roots are covered with dry litter, they will produce an early and abundant crop the following summer. Kidney-beans are very frequently forced nearly in the same manner as peas; viz. by sowing them in pots plunged in a hotbed, and then removing

them to a hothouse or greenhouse (according to the season) to fruit. Sometimes they are sown in the earth of the hotbed, and fruited there like cucumbers. The dwarf kidneybean is a native of India, and was introduced before the time of Gerard; but the scarlet runner is a native of South America, and was not introduced till 1633, when it was at first only cultivated in the flower-garden as an ornamental plant, and it is treated as such by all the early writers on flowers.

The Potato is a native of South America; but it was first brought to England, by Sir Walter Raleigh, from Virginia. It was hence called the Potato of Virginia: and it was, at its first introduction, thought very inferior to the *Convólulus Batàtas*, which was called the Spanish Potato; and to the Jerusalem Artichoke, which was called the Potato of Canada, from its having been first taken from South America to Canada, before it was brought to England. About twenty or thirty sorts of the common potato are now cultivated for the table; but so large a quantity is wanted in almost every family, that few persons attempt to grow their main crop in a garden. A few early potatoes are, however, frequently grown, even in small gardens, and the best of these is decidedly the ash-leaved kidney. The soil for potatoes should be a deep sandy loam, on a dry subsoil; the ground should be trenched, and rotten dung dug into the trenches, as few crops are more exhausting to the soil. The potatoes to be planted should be then cut into what are called sets, each set containing a bud or eye.

Unripe potatoes are considered the best; as sets from perfectly ripe potatoes are apt to produce diseased plants. Sometimes the tubers are planted whole; and, when this is the case, it is customary to rub off all the buds but one. Seed is never used, except when it is wished to raise new sorts. Potatoes are seldom good forced; but an early crop may be raised by planting the sets the first week in October in a light sandy soil, and covering the beds with straw or litter to preserve the sets (which should be planted eight or nine inches deep) from frost. The young plants will appear in March; and, if they are slightly protected by laying a mat over the bed, the tubers will be fit for the table in May or early in June. The principal early crop is, however, planted early in March, and the principal late crop in May or June. When the potatoes are to be planted, the ground should be first well pulverised, and then, the garden-line being stretched across the beds, holes should be made along it with the dibber, about six inches deep, and about nine inches or a foot apart. The sets should then be put one in each hole, with the eye upwards, and the earth pressed firmly down on each. When the potatoes come up they should be hoed, and again in about a fortnight or three weeks; and, when the plants are eight or ten inches high, they should be carefully earthed up: hoeing and earthing up, it must be observed, being of the greatest service in admitting air to the roots. As soon as the plants come into blossom, some cultivators cut off the tops, to prevent the roots from being exhausted by the formation of the

potato apples, or fruit. When the stalks begin to wither, the tubers are ripe, and may be taken up; but most persons have not patience to wait so long, and they begin to take up their early potatoes before the tubers are half-grown.

In 1845, and the three following years, a dreadful disease attacked the potatoes in Great Britain and Ireland, and almost entirely destroyed the main crop. There had previously, as early as 1830, been a disease among the potatoes in Germany, which was called the dry rot, and which made the tubers so hard that they were quite unfit to use as food; but this was quite different from the murrain which made its first appearance at Liège in 1842, by which the tubers became soft and rotten. It was first noticed in Great Britain near Ryde, in the Isle of Wight, in August, 1845, and its first symptom was a dark spot on the leaf, which spread so rapidly to the stem, that in a few days the whole plant became black and rotten. It has been found that if the tubers are taken up as soon as the stem and leaves become blackened, they are fit for use; but in a very few days spots appear in them, and they rot rapidly, becoming in a very short time a mass of putrescent matter. The potatoes, as soon as they are affected, acquire a pungent and nauseous taste, and become totally unfit for food. Various experiments were tried to stop this fatal malady, and the result of those conducted by Mr. Thompson, in the garden of the Horticultural Society of London, at Chiswick, was, that the plants grown in soil manured with lime and powdered charcoal, were generally very slightly

affected by the disease; while those grown in soil enriched with stable manure, were decidedly the worst. From some experiments tried in the country, it appeared that phosphate of lime was very efficacious in stopping the progress of the disease.

The Jerusalem Artichoke is a tuberous-rooted sun-flower, a native of Brazil; the epithet Jerusalem being a corruption of the Italian word *girasole*, signifying to turn to the sun, from the supposed habit of the flower. The Jerusalem artichoke is planted in February or March, by sets, like the potato; and the tubers will be ready for use in September or October. It was introduced in 1716.

The Turnip succeeds best in a dry sandy or gravelly soil, which has been well manured, and dug to a considerable depth. The beds should be four or five feet wide; and, the seeds having been strewed very thinly along raised drills about a foot apart, the earth should then be raked smoothly over the seeds, and the summit of the drills slightly beaten with the back of the spade. The first sowing is generally made in March, or the first week in April; and, as soon as the young plants show their rough leaves, they should be hoed up separately. When they are a little more advanced, they should be thinned to six inches apart. The hoeing should be repeated occasionally all the summer, as turnips, like potatoes, require the air to be admitted freely to their roots; but they should not be earthed up, as it will prevent the tuberous part from swelling. They should also be watered frequently in dry weather, to prevent

the tubers from becoming tough and stringy. They will seldom want any other culture; and about the end of May, if the weather has been favourable, they will be ready for use. A second sowing is generally made about the middle of May; and a third, for the main crop, towards the end of June. A still later sowing is often made in August, for plants to stand through the winter, and supply the greens called turnip tops in February, March, and April.

Besides the turnips usually sold in seed-shops, the Teltow, or small yellow German turnip, the French long white, and the Scotch yellow, are well deserving of cultivation for their excellence. The common turnip, the carrot, and the parsnep, are natives of England.

Carrots are of two kinds: the Long Carrots, the taproot of which tapers gradually from the crown to the point; and the Horn Carrots, the taproot of which continues of nearly the same thickness for three-fourths of its length, and then abruptly diminishes to a very long and slender fibrous root. There are numerous sub-varieties of both kinds. The goodness of the carrot depending entirely on the ease with which the root can penetrate the soil, it is obvious that the soil in which these plants are grown must not be of a very adhesive nature; and thus the best soil for carrots is red sand, or sandy peat. When soils of this nature cannot be procured, the ground should be trenched two spades deep, and a very little thoroughly rotten dung, or vegetable mould, should be well mixed with the earth in digging the lower spadeful. If manure in a fresh state be laid on a carrot

bed, or if the soil be not thoroughly pulverised, the roots will become forked, fibrous, and worm-eaten. The seeds of the carrot, being each furnished with a pappus, or feathery wing, are apt to become entangled with each other, and can only be separated by rubbing them between the hands, and mixing them with sand. They are then to be sown very thinly, and the ground, after being slightly raked over, to cover them, is beaten flat with the back of the spade. When the young plants come up, the ground should be occasionally loosened, from time to time, with a small hoe, round each. When the leaves begin to change colour, the roots should be taken up, dry weather being chosen for that purpose; and, the tops being cut off, the carrots should be carried into a cellar, or out-house, and there buried in sand. Early carrots are generally sown in February, and the principal crop about the middle of March.

The Parsnep requires the same culture as the carrot, except that there is no early crop. The seed is sown in February or March, and the roots are ready for use about the latter end of September or the beginning of October; being easily kept through the winter, like the carrôt, in sand.

The Red Beet is a native of the sea-coast on the South of Europe, and was introduced in 1656. The seed should not be sown till the last week in March, or the beginning of April. The ground should previously be dug to the depth of a foot or eighteen inches, and mixed with a little sea or river sand, and vegetable mould, or rotten dung. The roots will be ready

for the table in September or October. In taking them up, and boiling them, great care must be used not to wound the outer skin; as, if they are scraped or broken, all the colouring liquid will escape, and the root will become of a dull, dingy, whitish pink, instead of its usual brilliant dark red.

The Skirret, the Scorzonera, and the Salsify are all taprooted plants, which require the same culture as the carrot.

The Radish is a native of China, and was introduced into England before 1584. There are numerous varieties; but they may be all divided into three or four kinds: the Spring Radishes, which are subdivided into the spindle-rooted and the turnip-rooted; the Autumn kinds, which are generally oval, or turnip-rooted; and the Winter kinds, which are oblong and dark-coloured.

The soil for radishes should be light, rich, and well pulverised to the depth of at least eighteen inches; as, if the taproot of the radish meets with any obstructions in the soil, it becomes distorted or forked.

The seed may be sown at any season when the ground is open; but the very early spring kinds are generally sown in January or February, to be ready to draw in March and April. The beds are sown broadcast, the seeds being scattered as thinly as possible; and they are covered with mats, straw, or fern at night, and during part of the day in very severe weather. After-sowings of the spring radishes may be made every fortnight till the end of May; and the radishes sown about this time are generally

suffered to run to seed, that their green pods may be used for pickling in July and August. The autumnal radishes are sown in June and July, and the winter radishes in July and August.

Spinach.—The round-leaved variety is generally sown for a summer crop, on rich moist soil, in January or February, if the ground be open; and the triangular-leaved kinds, of which the Flanders is the best, are sown for the winter-crops in August. The only culture required is, occasionally hoeing the ground, and watering if the weather should be dry. The summer crop, when gathered, may be pulled up by the root; but the winter crop should only have the outer leaves pinched or cut off, and it will thus continue producing fresh leaves for many months. The Flanders Spinach is quite hardy; and, if protected by matting from being covered with snow, it may be used for the table all the winter. The seeds will keep good four years. New Zealand Spinach is quite different from common spinach, and very inferior; and what is called French Spinach is the orache of the gardens. Neither of these plants is worth growing.

Sorrel is a perennial, and it is generally propagated by offsets in spring or autumn; or, if by seed, it is sown in March. It should never be suffered to remain longer than two years without taking up and replanting, as, if this be neglected, the plants are apt to rot in the centre and die off.

The Onion Tribe.—Very few onions, except for salads, are grown in small gardens. Where

they are cultivated, the soil should be a rich loam, well pulverised, and richly manured with thoroughly rotten dung, bone dust, or some other very powerful manure. The seed is sown broadcast in March, on beds about four feet wide; and, after it is raked in, the surface of the bed is rolled or beaten flat with the spade. In about three weeks the beds should be hoed and thinned, as the young onions will be then ready for salads; and the beds should be again hoed and thinned out, from time to time, as the onions may be wanted. Care should be taken, in hoeing the bed, not to earth up the bulbs, as it is said to prevent them from swelling. When the onions are from three to six inches apart, they are generally left to swell for the main crop, and they will be ready to draw in August or September. Many persons, about a month or six weeks before the onions are ready to take up, bend the stalk down flat on the bed, to throw all the strength of the plant into the bulb, and to prevent its thickening at the neck. Onions for pickling are generally sown in April; and onions for salads may be sown at intervals all the year. When onions are wanted of a very large size, they are sown in drills, and regularly earthed up; and the Spanish onions are generally transplanted. In Portugal it is said that the alleys between the beds are filled with manure, which is kept constantly watered, and the water directed over the beds. Charcoal roughly powdered, and mixed with the soil in which onions are grown, has a most extraordinary effect in improving both their size and

quality ; and it is also said to prevent them from being attacked by the onion fly, a most destructive insect, the grub of which eats into the bulb of the onion. Onions of enormous size have been grown in England, by raising them on a slight hotbed in February, and transplanting them in April or May. When they are transplanted it is into very rich soil, three-fourths of which is rotten manure ; and only the fibrous roots are buried in the soil, the bulb being left above ground. The plants are placed from nine inches to a foot apart every way, and regularly watered. Onions thus grown are not only of enormous size, but of very delicate flavour. The potato and bulb-bearing onions are generally planted in February and taken up in June or July ; and they are thus useful for cottagers and in small gardens, as occupying the ground much less time than the common kinds ; but they are very far inferior both in quality and keeping.

Neither the native country of the common onion, nor the date of its introduction into England, is known ; but it has been in cultivation from the earliest times of which we have any record.

Leeks may be treated like onions, and may be grown to an enormous size by transplanting each plant into a hole about twice its own diameter, at the bottom of which its fibrous roots are spread out and covered with earth, while the bulb is left untouched by the soil, standing in a kind of hollow cup. The plant is then supplied with water, and will soon swell so as almost to

fill up the cavity. The leek is a native of Switzerland, and it was introduced before the time of Elizabeth.

The Chive is a perennial plant, a native of Britain, and it is propagated by dividing the roots in spring or autumn.

Garlic is propagated by dividing the bulb into what are called cloves, and planting them in February or March. They are generally put in drills, and hoed frequently as they continue to grow. When the leaves turn yellow, which they will do about August, the bulbs should be taken up, and what may not be wanted for use should be reserved for planting the following spring. Garlic is a native of the South of Europe, and was introduced before the time of Henry VIII.

The Shallot is a native of Palestine, and it has been in cultivation in British gardens at least as long as the garlic. It is very difficult to grow, as it is apt to be attacked by a kind of maggot; but it has been found to succeed, planted in cup-shaped hollows, like the leek.

All the onion tribe require a very rich, well-drained, loamy soil; and they always succeed best where they have abundance of manure, as when the soil is poor they are liable to be attacked by insects. In some places it is customary to sow the onion tribe in drills, and to strew soot along the drills to keep off the fly, which is so destructive to them all; but mixing charcoal with the soil has all the beneficial effects of soot, and it has the advantage of being more nutritious to the plant.

Salad Plants.—These are very numerous,

and include lettuces, endive, small salads, celery, &c. It is somewhat remarkable that nearly all these were known to our ancestors, and were in common use at British tables dressed much as we dress them now, while the potato was yet unknown, or only eaten as a sweetmeat stewed with sack and sugar.

The Lettuce is said to have been introduced in 1562, but from what country is unknown. There are numerous varieties, but they may be all referred to two kinds: the Cabbage Lettuces, which grow flat and spreading; and the Cos Lettuces, which grow compact and upright. The Cabbage Lettuces are most generally used in winter, and the Cos Lettuces grown at that season have generally brown leaves; but a new green winter Lettuce (the Green Winter Roman Lettuce) was exhibited at a meeting of the Horticultural Society of London in November, 1850, which had the colour and appearance of the Cos Lettuces usually grown in the spring. A very remarkable lettuce was also introduced in 1850, called the Artichoke-leaved Lettuce, from the resemblance which the leaves bear to those of the artichoke. Lettuces are generally sown broadcast, in deep, light, rich soil, with a dry subsoil, at any season from February to August; and the cabbage kinds require no after-care, but weeding, thinning out, and watering in dry weather. Cos lettuces are, however, generally blanched, by bending down the tips of the leaves over the heart, and tying them together with bast mat. Lettuces are also sown by the French to cut for salads when quite young, as we cut mustard and cress.

Endive is a native of China and Japan, introduced before 1548. In most cases it is sown in large gardens at three times, viz. in June, July, and August; but, in small gardens, one sowing is generally thought sufficient, and that is made in June. The seeds are sown very thinly in beds of rich mellow earth; and, when the plants are from four to six inches high, they are transplanted into beds of rich light earth, where they are planted in drills about a foot apart in the line; and as they grow they are occasionally earthed up. When the plants are about three parts grown, the outer leaves are tied over the hearts to blanch them, with strands of bast mat or osier twigs; a dry day being chosen for the operation. Only a few plants should be tied up at a time; and they should be seldom allowed to stand more than a fortnight or three weeks after the operation; as, if they remain longer, particularly if the weather be wet, they begin to rot. In wet or cold seasons endive is best blanched by turning a sea-kale pot over each root, instead of tying down the outer leaves; as, if the plant should not be dry when it is tied down, it is apt to rot. There are two distinct kinds of endive: the Broad-leaved, or Batavian, and the Curled-leaved, which last is the most common, and to which the French give the name of *chicorée*.

The true Chicory or Succory is sometimes called wild endive; but the French name for it is *barbe de capucin*. It is common in calcareous and sandy soils in different parts of England, where it is conspicuous from its bright blue flowers. Its culture is the same as that

of endive; but it may also be treated as a winter salad, by being taken up in October or November, and stacked in cellars with alternate layers of sand, so that the crowns of the plants may just appear along the ridge. Here, if the frost be excluded, the roots will soon send out a profusion of tender succulent leaves; which, if kept from the light, will also be quite blanched.

Mustard and Cress.—Mustard is the native white mustard eaten in its seed leaves; and cress is an annual cruciferous plant, introduced before 1548, but from what country is unknown. They are both of the easiest culture, and will not only grow in any soil or situation, but may even be raised for the table by spreading the seed in a saucer on wet flannel. The flour of mustard is made from the ground seeds of the black mustard, which is cultivated extensively in some parts of England for that purpose.

Corn Salad or Lamb's Lettuce, Winter Cress, Burnet, Tansy, and many other plants, are occasionally used in salads, particularly on the Continent, but they are seldom grown for that purpose in England.

Celery is frequently used in salads; and it is interesting, as being so greatly improved by cultivation as scarcely to be recognised; for in its wild state it is a British plant called smallage, which grows in ditches, and is scarcely eatable. In gardens, celery requires more manure than any other vegetable, except the cabbage tribe. The seed for the principal crop of celery is generally sown in March or April, and the

seed-bed should be formed of equal parts of fresh dark loamy soil and old rotten dung. When the plants are about two or three inches high, they are pricked out into another bed made of very rich soil, six or seven inches deep, on a hard bottom; and, when they are about a foot high, they are transplanted into trenches for blanching. The trenches are made four feet apart, eighteen inches wide, and twelve inches deep; and they are filled nine inches high with a rich compost of strong fresh soil and rotten dung. The plants are taken up with as much earth as will adhere to the roots, and the side-shoots or offsets are removed from the central stems; they are then set by the hand, nine or ten inches apart, in the centre of each trench, and well watered. As the plants in the trenches grow, the earth is gradually drawn up to them, a little at a time, taking care never to let the earth rise above the heart of the plant; and this earthing up is repeated five or six times, at intervals of about ten days or a fortnight, till the plants are ready for use. Thus treated, a single plant of celery of the solid kind has been known to weigh nine pounds, and to measure four feet in length.

Water-cress is generally gathered wild, but it may be cultivated in gardens where there is a clear running stream, on a sandy or gravelly bottom. The plants are disposed in rows parallel with the stream, about eighteen inches apart, in shallow water; but four or five feet apart if the water be very deep, as if nearer together they will check the stream. Thus treated, the plants may be cut at least once a week during the

whole summer. The beds must, however, be cleared out and replanted twice a year; and, when this is done, all the plants are taken up, divided, and planted again in the gravelly bed of the stream, a stone being laid on each to keep it in its place.

Potherbs.—Of these *Parsley* is a hardy biennial, a native of Sardinia, introduced before 1548. It is generally sown in a drill in February or March, and this will supply leaves all the summer. The plants do not seed till they are two years old. The curled variety is preferred for garnishing. *Tarragon* is a strong-smelling perennial from Siberia, introduced before 1548. It is principally used for making tarragon vinegar. *Fennel* is a perennial, which, when once introduced, spreads everywhere, and can scarcely be eradicated. The common fennel is only used for garnishing, and for making sauce for mackerel; but there is another kind, called *Finochio*, which is a dwarf variety, the stalk of which swells to a considerable thickness. This thickened part is blanched by earthing up, and it is then eaten in Italy and some other parts of the Continent, either as salad with oil and vinegar, or stewed. *Chervil* is an annual used for garnishing, and sometimes in salads; and the common *Marigold* is an annual, a native of the South of Europe, introduced before 1573, but now seldom grown except in cottage gardens.

Sweet Herbs.—These plants, though called in gardening books sweet herbs, are mostly aromatic shrubs: such as thyme, sage, &c.

Thyme.—There are two kinds of this deli-

cate little shrub cultivated in gardens; the common and the lemon thyme: both are natives of the South of Europe, and were introduced before 1548. Young plants are generally raised by division of the root, or from offsets slipped off the branching roots in spring or autumn: they grow best in poor dry soil, or in lime rubbish.

Sage is a much taller-growing shrub than thyme. It is a native of the South of Europe, and was introduced before 1597. It is propagated by slips, or by cuttings of the young shoots taken off in May or June; but as the plant is very long-lived, it seldom wants renewing. It requires the same kind of soil as thyme.

Mint.—There are three kinds grown in gardens: the common, or spear mint, which is the kind boiled with peas, and used for mint-sauce, &c.; the peppermint, comparatively little cultivated, and only used for distilling; and the penny-royal. They are all British perennials, and are propagated by dividing the root, making cuttings, or taking off offsets. All require rather a moist and strong soil.

Marjoram.—There are four kinds in cultivation: the pot marjoram, which is a low shrub, a native of Sicily, introduced in 1759, and propagated by slips; the sweet, or knotted marjoram, a hardy biennial, a native of Portugal, introduced in 1573, and sown every year from seed generally ripened in France; the winter marjoram, a hardy perennial, a native of Greece, introduced before 1640, and propagated by cuttings or slips; and the common marjoram,

a perennial, and a native of Britain. The first three kinds require a light dry soil, and the last a calcareous soil, and a sheltered situation.

Savory and Basil.—Winter savory is a hardy under-shrub, and summer savory an annual; both are natives of the South of Europe, and both have been cultivated in England since about 1650. Basil is an annual, a native of the East Indies, introduced about 1548. All these aromatic herbs may be purchased, admirably dried, in small cakes, at Mrs. Johnson's in Covent Garden Market, and at other places; and, as they are wanted all the year, they are most convenient in this form. The usual mode of drying the aromatic herbs is by cutting off the long stalks when fully grown, and tying them up in bundles, which are hung up to dry; but the disadvantage of this plan is, that a great quantity of dust becomes attached to the plants while they remain hung up, whereas when they are pressed into the form of cakes, and dried, they may be kept perfectly clean. When it is wished to dry herbs in cakes, the plants should be gathered just as they are coming into flower; and the leaves, being stripped off the stalks, which are thrown away, should be put into square or oblong moulds, and pressed with a common napkin press.

Cucumbers require a hotbed to grow them to perfection; but the smaller kinds for pickling are sometimes planted in the open ground. The seed should be from two to four years old, and it should be sown in pots plunged in a hotbed, not below 58° at night, nor above 65° in the day. When the plants come up, they

should be pricked out into other pots, three in each pot, and watered; the earth in the fresh pots, and the water, being previously kept under the glass for some time, that they may be both of the same heat as the plants. When the plants are about five weeks old, they are generally removed to a larger hotbed, with a two or three-light frame. In this bed, a little ridge of earth is made under each light; and, in each of these, the contents of a pot is planted, without breaking the ball of earth round the roots of the plants. The heat of this bed is generally a little higher than that of the seed-bed. Water should be given every day, warmed to the temperature of the plants. If the plants are wanted to fruit early, the ends of the shoots may be pinched off as soon as they have produced two rough leaves, and this is called stopping the runners at the first joint; the stopping being repeated wherever the runners show a disposition to extend themselves without producing fruit.

As plants raised under glass have not the benefit either of currents of air or of insects, to convey the pollen of the barren plants to the stigma of the fertile ones, the latter must either be dusted with pollen by the gardener, or the plants must be exposed as much to the air as possible in the middle of the day, when it is warm enough, during the time that they are in flower. Seeds for the first crop of cucumbers are generally sown in December or January; but, as extra heat and care are required at this early season, the crop for a small garden may be sown about March. The great art is to

grow the cucumbers long and straight, and to keep them green with a beautiful bloom. For the first purpose, many cultivators place a brick under the young fruit; and for the latter they leave on the plant abundance of leaves, and keep the ground moist, as the plant appears to thrive best when it has abundance of heat and moisture, and is kept in the shade. A dry heat, and especially exposure to the burning rays of the sun, will make cucumbers flaccid and yellow.

Pickling Cucumbers are generally sown in patches of ten or twelve seeds in each, in the open air; and, when they come up, they are thinned out to four or five in each patch. They are sown in rich ground, and well watered; and, as they grow, they are occasionally earthed up.

Melons.—The culture of the melon is the same as that of the cucumber, except that the lowest heat of the seed-bed should not be less than 65°, and that of the fruiting bed 75°. To grow the finer kinds of melons well, however, requires the attention of a regular gardener; and, as this is the case also with pine-apples (the plants of which are too expensive to be trifled with), no directions are here given respecting them.

Gourds.—The vegetable marrows, the American butter-squash and the mammoth gourd, are excellent for the table, either in soup, or half-boiled and then fried in batter. The plants of all these kinds should be raised in a hotbed, the seeds being sown in March or April, three in a pot, and covered nearly an inch deep. In

May, the young plants should be removed to the open ground, where they should be planted in rich soil, and sheltered for a night or two, till they have become inured to the change. They should be frequently watered in dry weather, as the fruit will not swell without abundance of moisture.

Tomatoes.—The tomato, or love-apple, is a tender annual, a native of South America, introduced before 1596. The seeds should be sown in a hotbed in March, and as soon as the young plants come up, they should be pricked out into pots. They may be transplanted into a warm border in front of a south wall in May, where they should be trained against the wall, or pegged down over a warm bank of earth sloping to the sun. They require abundance of water while the fruit is swelling; and as much heat as possible while it is ripening.

Mushrooms.—It was formerly supposed that mushrooms could not be cultivated, but that they were only to be found in a wild state, as truffles are still. Now, however, mushrooms are grown both in houses and in beds in the open air as constantly, and with as much certainty of success, as any other vegetable product. Cultivated mushrooms are not grown by either seeds or cuttings, but from what is called spawn, which is found amongst old stable manure when it is in a very dry state, and which consists of small white fibres, looking like broken threads. The spawn is procured in cakes, or bricks, as they are called, from the nurseryman, and it is placed in beds of stable manure, either under cover, or in the open

air. When it is wished to form mushroom beds in the open air, some stable manure, in which there is a large proportion of straw, should be procured in May, or in June, and it should be thrown into a large ridge, in which it should be suffered to remain till the following August, after which it should be treated in the following manner, according to the advice of my neighbour Mr. Hopgood, of the Craven Hill Nursery, who has been long celebrated as a mushroom grower.

“If a bed be required to bear in October and November, the manure must be spread out to the air in the last week of August, and well beaten to pieces, that is to say, out of the flakes it will be in when taken from the ridge; the whole mass being afterwards watered till it is well moistened. This will make it ferment, and when it has become of a nice heat, it should be carefully turned over, mixing the whole well together: if it be not quite wet enough, pour more water over it. Afterwards, it should be turned over every two or three days according to circumstances: if the manure be very hot, every second day; but if only moderately hot, every third day. When the violent heat is abating, which will be in about ten days or a fortnight, the bed should be made up immediately in the following manner: let it be three feet wide at the bottom, about three feet high, and of a conical form; let it be beaten very solid all the time it is being built; and when completed, let it be covered over with mats to get up the heat. As soon as there is sufficient heat in the bed the mats should be taken off

every fine day, except when it is very windy; and when the bed cools down to a milk-warm heat, it should be immediately spawned by putting in, in four rows, pieces of spawn as large as a moderate-sized orange, each piece being ten inches apart. The bed should then be beaten with a heavy spade, and afterwards three inches at least of good meadow mould should be put over the bed, when it should be again beaten very hard. Having proceeded thus far, the whole bed should be covered with some fresh litter from the stable, about four inches thick, and the mats should be again put on. The work is now completed for a time. In about a fortnight, the mats being removed, the covering should be shaken up, and as much more litter as is already on the bed having been added, the mats should be replaced as before. In another fortnight this operation should be repeated, and very soon after the mushrooms will begin to appear. When this is the case, the litter must be again shaken up, and the beds, while they continue in bearing, must be carefully looked over two or three times a week. Great care must be taken after the beds are once made to keep them as much as possible from the rain.

“If beds are wanted to bear from November to February, the manure need not be spread out till the middle of September; and if the beds are wanted to bear from March to June, October is the proper month to begin spreading out the manure. In every other respect, however, the beds should be managed as above

directed, only they will be longer before they begin to bear.

“It is of the utmost importance that every particular in the directions given should be attended to, or the result will most certainly be a failure. The mushroom spawn must also be in good condition; as, if it be in a bad state, no mushrooms will be produced.”

When mushrooms are grown in a mushroom house, a quantity of fresh stable manure must be thrown together in a heap under cover, and turned over many times in the course of a fortnight or three weeks, till every part has thoroughly fermented. When the dung is thought to be in a fit state, if there are not proper places or boxes, a bed is marked out on the earth forming the floor of the house, twelve or fourteen feet long, and five feet broad. In the bottom of the bed there should be a layer of long fresh stable manure, about four inches thick; and, on this, successive layers of the prepared dung, each beaten flat with the fork, till the bed is about eighteen inches high. In this state it may remain about a fortnight; and then if the bed be found, on trying it by plunging in a stick, to be not too hot, the bricks of spawn should be broken into pieces about an inch and a half or two inches square, and strewed over the bed at about nine inches apart, each piece of spawn being buried by raising up a little of the dung and inserting it. After this the surface of the bed is beaten flat with a spade, and the whole is covered with mould, that of a loamy nature being preferred.

The whole is then beaten quite smooth and very hard, and slightly covered with oat straw, which should never be more than six inches thick. In about a month or six weeks the mushrooms will be ready for the table; and when gathered they should be pulled up by the roots, and not cut off, as the root, if left in the ground, will decay, and be injurious to the young plants.

Mushrooms may also be made to grow on lawns and in pleasure-grounds, by procuring some bricks (as they are called) of mushroom spawn in April or May; and, after breaking them into pieces about an inch or two inches square, burying the pieces at intervals all over the lawn. In each place a little of the turf should be raised, under which the spawn should be inserted, and the turf then pressed down over it. The lawn should be afterwards rolled, and no other care will be requisite till the plants are ready for gathering, which they will be in September, if the summer has been tolerably warm and dry. This plan seldom succeeds in small gardens, as in those situations the mushrooms, as soon as they appear, are generally eaten by the snails.

CHAPTER VII.

THE MANAGEMENT OF FRUIT TREES.

THE fruit trees cultivated in gardens are of three kinds : the wall trees, the espaliers, and the standards. To these may be added the fruit shrubs and the vines ; which last are generally grown under glass.

The Wall Fruit Trees. — There are two things on which the welfare of wall fruit trees materially depends, viz. the construction of the wall, and that of the border. The walls of kitchen-gardens are very generally made too high : a serious fault in many respects, but particularly in impeding the free passage of the sun and air to the fruit. It has, indeed, been found, by experience, that walls about eight feet high will produce better fruit than walls of ten feet or twelve feet, which is the general height ; and, besides, they have the advantage of not throwing so deep a shadow over the garden. Of whatever height the walls may be, they should always be in straight lines ; as the various expedients which have been from time to time adopted, of curved or zigzag lines, have been found not to answer in practice, but to produce eddies and currents of wind exceedingly injurious to the fruit. The garden wall

should have a slight stone coping; and, where the trees are likely to want protection, strong hooks, or holdfasts, projecting from the wall, should be built in at regular distances, for the convenience of suspending the mats or bunting that may be employed, or of supporting a deep wooden coping. Hot or flued walls are not desirable, as they are very expensive and troublesome, and of very little use.

The walls should be built on good, sound, and deep foundations, but on no account on arches; as it is of importance to the gardener to confine the roots of the fruit trees to the border in front of the wall, which is under his control, instead of suffering them to spread through the arches to the other side of the wall, where they are entirely removed from him.

The essential point to be attended to in the construction of a fruit border is, that the soil shall not be more than eighteen inches deep on a hard bottom. If the subsoil be hard gravel or rock, covered with mould to the depth mentioned, nothing more can be desired; but if the subsoil be wet clay, or sand over gravel, or in short anything that will allow of roots penetrating into it, artificial means should be resorted to, to keep the roots near the surface of the ground. The most common method of forming a border is to excavate the ground to the depth required, and to pave the bottom of the excavation with large stones or pebbles; but bricks, cement, asphalte, or in short any other substance which appears likely to attain the end in view, may be employed; taking

care, however, to provide effectual drainage, as otherwise the chamber, as it is called, would become a reservoir of stagnant water, exceedingly injurious to the plants. The chamber having been formed, it should be covered with good rich garden mould to the requisite depth; varying in some instances according to the kind of tree to be grown in it, but in all cases thoroughly pulverised, so as to offer no obstruction to the passage of the roots.

When the trees are planted, care should be taken to raise each on a little hillock, at the point of junction between the trunk and the root, to allow for the sinking of the ground. The collar of a ligneous plant should never be buried; as any moisture collected round this tender part brings on canker, and innumerable other diseases. Fruit trees thus buried generally produce deformed fruit, and die in a few years of premature old age.

It can never be repeated too often, that the essential point in growing fruit trees is to keep their roots as near to the surface as possible, at least never to suffer them to descend so deep as to be out of the influence of the sun and air. Many persons unacquainted with vegetable physiology have an idea that when a fruit tree which has been productive suddenly ceases to bear, it is because its roots have reached the gravel, or in other words, the subsoil. This is, however, false reasoning on true premises. It is quite true that the tree has ceased to bear in consequence of the descent of its roots; but the reason this descent is injurious is, that the ground far below the surface is cold, and fre

quently impregnated with stagnant water, and either that the roots thus become swollen and unable to perform their proper functions, in which case the leaves turn yellow, and the tree appears to wither, or that, from the want of air, they supply the tree with an abundance of poor thin watery sap, quite unsuitable for the production of fruit. On the contrary, when the roots are kept near the surface, though they have no air-vessels except in the spongioles, these spongioles imbibe carbonic acid gas from the atmosphere with all the moisture they take up; and thus the vessels are not only kept in a healthy state, by not being overcharged with water without air, but the sap is so thickened and enriched with the carbonic acid gas, that it is brought into a proper state for forming those deposits which lead to the production of fruit.

The use of walls is to afford tender plants the heat necessary to mature their fruit, by reflecting the sun's rays back upon it; and by giving out to the fruit during the night the heat they have absorbed during the day. They are also useful in sheltering the plant from cold winds; and in preventing the branches from bruising each other in violent storms. This being the use of walls, it is evident that only those trees should be trained against them that require protection; and the south and south-east walls being warmer than the others, it is equally evident that the trees trained against them should be only those that require a great deal of heat to mature their fruits. There are some fruits, such as the apple, which too much

heat renders mealy and insipid; and these would obviously be injured instead of improved by a south or south-east wall; while other fruits, such as the peach, could not produce good fruit in our climate without one. Before planting trees against the walls of a garden, it will thus be necessary to select the trees proper for each wall; and, as some of the finer kinds will be several years before they attain a sufficient size to fill up the places assigned to them, trees of inferior kinds may be planted between them, so that no part of the wall may be lost; the inferior trees being cut in as the others grow, and being finally removed. This is accomplished by planting alternately dwarf trees of the kind which is to remain, and trees grafted standard high, which are called riders, of the kinds which are to be removed. The distance at which the permanent trees should be planted, depends upon the nature of the tree.

There is, however, one objection to a south or south-east wall for tender plants, which should be carefully guarded against. This is, the danger from spring frosts, to which the blossoms are exposed during the night, from being brought prematurely forward during the day. To guard against this, the south wall should have a deep wooden coping, supported by holdfasts, projecting about a foot from the wall; and under this coping there should be a row of hooks, on which should be hung a kind of curtain of bunting, which should be kept on day and night in frosty weather, while the blossoms are expanded. This serves not only

to protect the blossoms from the frost, but to save them from the withering effect of the sun, which is more injurious to them after a frosty night than the frost itself. In fact, when tender trees are covered with hoar-frost, they may sometimes be saved if shaded till they have thawed; but they are always killed if exposed while the frost is on them to the sun. The reason is, that the sap contained in the side of the branch next the wall remains unfrozen, while that in the side exposed to the air is melted by the heat of the sun; and thus the melted sap, having no proper means of escape, lacerates the vessels which contain it, by its sudden expansion: whereas, when both sides thaw together, the sap flows gradually away by its natural channels. Bunting is preferable to matting or canvas for protecting wall trees: because it is thinner, and does not entirely exclude the light and air; because it is more easily put up and taken down, and takes up less room when stowed away; and because it is cheaper, four square yards costing only two shillings at Edgington's, the marquee-maker. Coarse cotton net, such as is manufactured at Nottingham, is also found efficacious.

Kinds of Wall Fruit Trees, &c.—The principal fruits grown against a wall in England are those containing stones; and of these the most valuable are the peach, the nectarine, and the apricot. The plum and the cherry are also occasionally grown against a wall, but they are most common as standards. The kernel fruits, such as the apple and pear, are generally standards; the apple being very rarely trained

against a wall in England, though it is frequently in Scotland. In the neighbourhood of London, figs and grapes are grown against walls in the open ground ; and throughout the south of Devonshire this is the case with olives and the orange tribe.

Stone Fruits.—All kinds of stone fruits are more or less delicate at the time of forming their stones, or “stoning,” as it is called ; and the fruit requires thinning at that period, to prevent the greater part of it from dropping off. All the stone fruit trees blossom early, and are delicate while their flowers are expanded. For these reasons their crops are more uncertain in a variable climate like that of England, than the crops of the kernel fruits, and require more care and attention to bring them to perfection.

Peaches and Nectarines.—The peach and the nectarine are only varieties of one species ; and instances have been known of peaches and nectarines growing on the same tree without grafting. Both peaches and nectarines are divided into two kinds : the free stones, the flesh of which parts readily from the stone ; and the cling stones, the flesh of which adheres to the stone. Some of the best peaches for a small garden are the Grosse mignonne, Belle-garde, and Barrington. The earliest peach is the Red Nutmeg, which ripens in July ; and one of the latest is the Catherine, which does not ripen till October. The best nectarines are the Elruge and the Violette hâtive, with the New White for a variety in colour. The Stanwick Nectarine and the Sweet-kernelled Peach have

been lately introduced from Syria, and they form an entirely new class of peaches and nectarines, having sweet eatable kernels, as well as delicious pulp. The Stanwick nectarine is about the size of an Elruge, and it is somewhat like it in shape. The skin is pale, with a slight violet tinge on one side; and the flesh is white, exceedingly melting, juicy, rich, and sugary, without the slightest flavour of prussic acid. The stone is very rugged, and of a deep chocolate colour; and the kernel is sweet, like that of a nut. This nectarine is about a fortnight later than most of the other kinds, and in some situations the tree retains its leaves all the winter. Both peaches and nectarines are budded on plum stocks, or on seedling peaches or almonds, the latter being greatly preferred by the French nurserymen. The best soil for peaches is, about three parts of fresh turfy loam taken from some field, and one part of drift sand. This soil should be moderately enriched with vegetable mould composed of decayed leaves, or very rotten dung, and it should be laid on the prepared chamber to the depth of about eighteen inches, rather less than more. Care should be taken not to enrich the soil with too much manure, lest the trees should produce more wood than they can ripen. No tree is more liable to produce what gardeners call water shoots or gourmands, than the peach, if over-manured; and these are shoots which grow with great luxuriance, but which, as they bear only leaves and never fruit, waste the vigour of the tree unprofitably. When the trees are to be planted,

no pit is dug, but the roots are carefully spread out on the surface of the border (all injured parts being cut out), and then covered three inches deep with soil. Peach trees are seldom planted against the wall where they are to remain, till they have been two, three, or four years trained ; and they are generally removed at the latter end of October, or the beginning of November, just as the leaf begins to fall. They are best trained in the fan manner ; and, as they always bear their fruit on shoots of a year old, these shoots must be left on in pruning, and the old wood cut out. The trees should be pruned at two seasons, viz. winter and summer : the winter pruning is performed either at the fall of the leaf, or in the beginning of February, and consists of cutting out or shortening the old wood or barren branches ; and the summer pruning, which consists chiefly of what is called disbudding (that is, rubbing off the buds as soon as they appear), should be applied to the removal of all shoots growing right out from the wall (and which, consequently, could not be well trained), or which appear otherwise to be improperly placed. Experienced gardeners also look over the blossom buds, as soon as they show themselves, and thin them out, without allowing the tree to waste its strength in forming fruit which it can never ripen, and which is of no use in its green state. The disbudding is easily performed ; and watching the trees, to find when it will be necessary, affords a constant source of interest. Thinning the blossoms is rather more difficult ; but, with a little practice, a lady could do it

much better than a gardener, as it is an operation that depends principally on delicacy of touch. When a peach tree is trained in the fan manner, the first year the little side shoots are left for producing the fruit, and none of these should be more than a year old. The next year these shoots must be cut out (as the same shoot never bears two years in succession), and others, which have been produced while they were bearing, must be trained in their stead. The borders should never be cropped, on account of disturbing the roots, and only raked or slightly forked over occasionally, to prevent the surface from caking over, and becoming impervious to air and moisture. No recent stable dung should ever be given to peaches: and, when the trees seem exhausted, they should be taken up and replanted in fresh soil; or they should be removed, and trees of quite a different kind, such as pears for example, planted instead of them in the same soil. When the borders cannot be spared to be left entirely bare, a light crop, such as of spinach, lettuces, mustard and cress, or parsley, may be sown on them, and the remains of this crop, when done with, should be raked off: but fruit borders ought never on any account to be touched with a spade, and even a fork should be used but seldom and sparingly; never, indeed, unless the ground has become too hard and compact to admit the rain, the sun, and the air. It must never be forgotten, that, unless the spongioles of the roots are permitted to imbibe, with the moisture they take up, the carbonic

acid gas always floating in the atmosphere, the sap of the tree will never be rich enough to produce fruit. The fruit and seeds of every plant are, in fact, concentrations of carbon, precipitated by the action of light; and where any plant is deficient in carbon, or deprived of light, it cannot produce much fruit. The culture of the nectarine is exactly the same as that of the peach. In both, when the season is cold and wet, with but little sun, some cultivators remove a few of the leaves to admit more air and light to the fruit; but this should be done very sparingly, as, unless a sufficient quantity of leaves be left to carry on the proper circulation of the sap, the skin of the fruit will become tough and withered, and the flesh insipid. When the fruit is ripe, it is customary, in large gardens, to suspend a net under the branches to catch any fruit that may fall, and thus to save it from being bruised. The peach is supposed to be a native of Persia, and to have been introduced into England about the middle of the sixteenth century. Peaches and nectarines, on a wall ten or twelve feet high, should be planted about twenty feet apart, with riders of some kind of plum or cherry, till the permanent trees spread.

The Apricot is a native of Armenia, and was introduced about 1562. The culture is the same as that of the peach, except that it is not trained quite so much in the fan manner, but somewhat horizontally. It also bears, not only on the side-shoots of the last year, but on close spurs formed on the two-years-old wood. The whole of the fruit is also generally suffered to

form, and is thinned out while it is green, in May or the beginning of June, as green apricots are generally thought delicious in tarts. The best apricots are, the Moorpark for the table, and the Breda for preserving. This last is frequently grown as a standard. Large branches, or rather arms, of apricot trees, particularly of the Moorpark, are very apt to die off without any apparent cause; but, when this is the case, it will be generally found that the plant was injured by frost the preceding winter. Two new kinds of apricot were introduced from Syria in 1847 and 1848. One of these (the *Kaisha*) ripens when the Moorpark and Turkey apricots, on the same wall, are perfectly green and hard. The fruit is roundish, about five inches and a half in circumference, and semi-transparent. The skin is slightly downy, of a pale lemon colour, tinged and marbled with red on the side next the sun. The flesh is tender, juicy, of a clear lemon colour, parting freely from the stone, which is small and round. The kernel is sweet, like that of a nut. The fruit is not only delicious, but extremely beautiful from its semi-transparency and pale lemon-coloured tint. Another Syrian apricot is called *Shuker Para*, or bit of sugar, from its extreme sweetness. A variety of this, originated in the garden of John Barker, Esq., near Aleppo, called the Suedia Green-gage Apricot, has several peculiarities. It reproduces itself from seed with as much certainty as any vegetable in the kitchen garden; and as the extraordinary sweetness of the fruit is developed for several

days before it becomes ripe, it will bear to be transported to a considerable distance. On one occasion, indeed, in India, it was actually sent, packed in cotton, a month's journey by a caravan. The colour is a yellowish white, tinged on one side with a somewhat dingy purplish red. The fruit resembles a nectarine in the consistence of its skin, which cannot be peeled. It has, also, a great affinity to the green-gage plum, and the kernel is perfectly sweet. The apricot flowers sooner than any other wall tree; and the sap, when only partially released by the thawing of that side of the branch which is nearest the sun, is consequently in more rapid motion, and is more likely to lacerate the vessels, than the sap of trees that are later in producing flowers. This theory, which was first broached by Mr. Barron, the very scientific gardener at Elvaston Castle, has since been confirmed by the fact which has been repeatedly observed, that the branches prematurely killed are always on a south wall, and in a situation exposed to the sun. The effect of the frozen and partially-thawed sap is sometimes only shown in the bark, which cracks, and permits the superabundant sap to exude in the form of gum; but, when this relief is not sufficient, the branch becomes sickly, and finally dies soon after midsummer, about the time of the return of the sap. The best mode of preventing this serious evil is to begin protecting the branches long before the flowers appear, and, indeed, Mr. Barron keeps them covered all the winter. Apricot trees should be twenty-five feet apart

on the wall, as the tree spreads rapidly, and does not bear cutting in.

The Plum.—No plum tree, except, perhaps, the green gage, should be planted on a south wall; and, as a north wall is too cold for the finer kinds, they do best planted against a wall facing to the east or west. Any common garden soil will suit plum trees; and, when the soil appears exhausted, it may be renovated by a little rotten dung, laid on the surface, and slightly forked in; as much care as possible being taken to avoid disturbing the roots. Plum trees bear on what are called spurs, which are short rugged-looking little branches, jutting out from the shoots of two or three years' growth. The same spurs bear more than once, and often continue fruitful several years. Plum trees are generally trained horizontally. The kinds are very numerous, but the Green Gage and Orleans are, perhaps, the most popular. The Jefferson Plum is a new variety, introduced from America in 1841, which is said to be superior in flavour even to the Green Gage. The fruit is of a dark yellow, speckled with purple and brownish red; and the flesh is a deep orange, slightly adhering to the stone, and exceedingly rich and sugary. The tree is a great bearer; and the fruit has the property of hanging on the tree for a considerable time after it is ripe. The fruit ripens well on standard trees. A Syrian plum, called *Aloo Bokhara*, introduced by John Barker, Esq., in 1848, is remarkable for its transparency, which is so great, that when the fruit is ripe, the stone may be distinctly seen

through the skin. The kernel is sweet. Plum trees should be twenty feet apart, if all dwarfs; but dwarfs and riders alternately may be only fifteen feet apart.

The Cherry.—Only the finer kinds of cherries are grown against walls; and the tree, in its native localities, delights in a dry sandy soil, and an elevated airy situation. When cultivated, it will thrive in any common garden soil that is tolerably open; and it is not injured by manure applied moderately, and in a perfectly rotten state. The cherry is trained horizontally, and bears on spurs springing from both the old and the new wood. As the branches are continually throwing out fresh spurs from their extremities, it is a maxim with gardeners never to shorten the bearing branches of a cherry tree. The morello is, however, an exception to this rule, as its mode of bearing resembles that of the peach; and it is always pruned and trained like that tree. The cherry trees grown against walls are, the different varieties of May Duke, the Circassian, the Large black Tartarian, the Morello, and Bigarreau. A curious kind of Chinese cherry is grown occasionally, the fruit of which is about as large as a sparrow's egg, of a reddish amber colour, and furnished at the point with a tumour. Its flavour resembles that of the May Duke. The flowers, which are pinkish, are very ornamental. Cherries need not be more than fifteen feet apart for the common kinds, and twenty feet for the morello.

Fig trees grow and bear quite well in the neighbourhood of London, and they even

thrive and bear in many street gardens in the city. The fig requires less care in training and pruning than any other tree; it should, indeed, rarely be touched with the knife, and only the ill-placed shoots removed by disbudding. The fruit is produced on the young wood at the extremity of the branches, but it does not ripen till the wood on which it grows is a year old. The best soil for figs is a fresh light loam, not above a foot or fifteen inches deep, on a hard well-drained bottom. This is essential; as the fig will not grow with any stagnant water about its roots, though it requires to be constantly and abundantly supplied with moisture. Many country persons throw soap-suds on the roots of their fig trees with very great success. The tree may be trained in any shape; and the long branches should be bent backwards and forwards, not only to make them throw out side shoots, but to cover the wall. The best figs for general bearing are the Black and Brown Ischias and the Large Blue or Purple Fig. A tree of the last kind which is trained against our house at Bayswater, under the glass veranda, has never failed, during the last twenty years, to produce a good crop every summer. Fig trees should be thirty feet apart, if the branches are trained horizontally; but they may be placed rather nearer, if the branches are bent backwards and forwards to cover the wall.

ESPALIERS. — Espaliers, though they are nearly as troublesome to train as wall trees, have none of their advantages. They are, indeed, only superior to standards in taking

up less room, in having a neater appearance, in their fruit being more easily gathered, and in their roots being more under the control of the gardener. The latter is an important advantage, and one of which every gardener should avail himself. It has been already observed, when speaking of the laying out of a kitchen-garden, that, beyond the fruit border, there is generally a walk inclosing the compartments devoted to culinary vegetables in the centre. Now, where espaliers are grown, there should be a second chambered border, exactly like the fruit border under the wall, which should be shut out from the culinary compartments by a low wall under ground, or flat stones placed edgewise, or boards, or in fact anything, to prevent the roots of the espaliers from spreading into the ground devoted to the culinary crops. When due precautions have been taken, the espaliers should be planted near the boundary, and their roots carefully spread out over the chambered border, those parts being cut off which cannot be brought to lie flat in the proper direction. The ground is then pressed firmly upon the roots, and espalier rails, either of iron or wood, are fixed near the trees to tie them to. Espalier trees are seldom suffered to grow higher than five or six feet, on account of the trouble of training them when they are of a greater height; but to make amends for this loss of space, their branches are allowed to spread as widely as possible, according to the nature of the trees. Thus apples should be planted thirty feet apart, and cherries about the same distance; pears thirty-five feet, and plums

twenty-five feet. The finer kinds of fruits are seldom planted as espaliers; and apples and pears are more commonly thus treated than cherries and plums. The continual cutting necessary to keep the trees in a proper shape for training, and the unnatural position of the roots, are, indeed, very unsuitable to trees so apt to gum and canker as the cherry and the plum. The width of the border destined for the roots of the espaliers is generally five feet; and it should only be cropped with a few herbaceous or annual flowers, that will not require the ground to be stirred deeper than can be done with a rake. Some persons suffer the roots of their espalier trees to extend under the gravel walks, which are intentionally left hollow; but this defeats the purpose for which they are to be attracted to the surface, for the spongioles will be as effectually excluded from the air under a compact coating of gravel, as if they were buried many feet deep in the soil. If an underground wall is built along the inner side of the espalier border to confine the roots of the trees, stones should be fixed in it at intervals, with holes made in them for the reception of the espalier rails, which should be run in with pitch. These rails should be about nine inches asunder, and they may be kept together at the top with a transverse rail, to which they should be nailed. The inconveniences of espaliers are, the very great trouble of training them and keeping them within bounds; the rough and untidy appearance which their spurs assume when the trees begin to get old; and the numerous diseases to which

the trees are liable, from their unnatural position and constant cutting in, and which always render espalier trees short-lived.

STANDARD FRUIT TREES. — Tall standard trees should never, on any account, be planted in a kitchen-garden; as, from their drip and shade, it is impossible to grow good culinary vegetables under them; while, on the other hand, the constant digging and trenching necessary to cultivate culinary vegetables force the roots of the trees to descend so far, that it is impossible for them to produce good fruit. Dwarf standards are, however, by many preferred to espaliers; as they are susceptible of all the advantages, without any of the disadvantages, attendant on that mode of training. A chambered border may be prepared for the dwarf standards, in the same manner as for the espaliers; and they may be placed in the centre of it, instead of on one side. The dwarf standards are generally grafted very near the collar of the plant, and are trained to form bushes rather than trees, but in various manners. Some are trained round a hoop placed inside, and others have their branches trained upwards for a few feet, and then bent downwards like an umbrella; some are trained *en quenouille*, with a single stem; others *en pyramide*; and others have their branches spread out horizontally, and supported by stakes placed at a regular distance in a circle round the tree. In short, there are no limits to fancy in this respect. The trees generally grown in gardens as dwarf standards, are apples, pears, and morello cherries. The other

kinds of cherries may be treated in the same manner; but they are generally preferred as tall standards, in a detached orchard near the kitchen-garden, or adjoining the pleasure-grounds. The common kinds of plums and damsons are also grown as tall trees in the orchard, as are the kitchen and keeping apples. Mulberry trees are generally planted on the lawn, as well for the picturesque form of the tree, as for the convenience of the fruit, which drops as soon as it is ripe, and is spoiled if it falls on dug earth or gravel. Sweet chestnuts are grown in the park or pleasure-grounds, among other trees; and walnuts in similar situations, or in a back court or stable-yard, for the convenience of their shade. Filberts and hazels are generally planted on each side of a walk in the garden or pleasure-ground, which they are trained over; and berberies and elder-bushes in the shrubberies; the last four being the only kinds of trees which should ever be planted as standards in the slips to the kitchen-garden.

KERNEL FRUITS.—The principal of these are apples and pears, but the division also includes the medlar, the quince, and the true service.

The Apple is universally allowed to be the most useful of all fruits; and it is certain that there is no fruit more extensively cultivated. The list of apples is as numerous as that of peas; and it is almost as difficult to make a selection from. Apples are, however, generally divided into three kinds: the dessert or eating apples, the kitchen or baking apples, and the

cider apples. The last are good for nothing but to make cider, and can never be mistaken; the line of demarcation between the first two is, however, not so strongly marked, as many of the kinds will serve both purposes. Many dessert apples, for example, possess the chief merit of a good kitchen apple, viz. that of falling well, or, in plainer terms, of becoming quite soft when baked or boiled; and many of the baking apples are very good to eat raw. The Ribston pippin, one of the best of all apples, but rather a shy bearer, and the Hawthornden, a most abundant bearer, but an apple that does not keep well, are both alike excellent for the kitchen and the dessert. The best keeping apple is the French crab, of which some specimens have been preserved quite fresh and plump for more than three years. Dwarf apple trees are sometimes grown in pots; and a kind was introduced in 1848, from Armenia, which never grows above two feet high, even though the tree may be forty or fifty years old.

The most common way of propagating apple trees is by grafting the best kinds on crab-stocks, either standard high, that is, on stocks suffered to grow to the height of about six feet; or as dwarfs, that is, about six or eight inches from the collar of the stock. Sometimes trees intended to be grown as dwarf standards in a kitchen-garden are grafted what is called half standard high; that is, about two or three feet from the collar. When apple trees are planted in the kitchen-garden where they are to remain, each tree should always be

placed on a little hillock; as no tree is more liable to become cankered from having its collar buried. The tree succeeds best in a deep strong loam, provided it be well drained, and rich rather than poor; and when the soil appears exhausted, it may be renovated by laying on it what the farmers call a top-dressing of manure, taking care not to bury or even to touch the collar of the tree. Apple trees will, however, flourish in any soil except sand or gravel. They are very apt to become cankered, and to be attacked by the woolly aphis, sometimes called the American blight (already described in p. 111). Canker is generally caused by some defect in the drainage or the soil, or by planting too deep, and, of course, no remedy can be efficacious till the cause of the disease is removed: when, however, the soil has been renovated or drained, the effects of the disease may be obviated by heading down the tree, when it will produce new and healthy branches; or by cutting out the cankered part, if it should be so low as to make it inconvenient to cut off the trunk of the tree below it. The American blight is best cured by brushing the parts infested all over with soft soap and water; and repeating the operation whenever any fresh insects appear.

The Pear.—The culture of the pear, as a standard, differs very little from that of the apple; and, though it is naturally rather a deeper-rooted plant, it requires its fibrous roots to be kept near the surface. There is a general complaint in gardens against pear trees as bad bearers, and very healthy-looking trees have

been known to exist twenty years in a garden without ever even showing any blossoms. Various causes have a tendency to produce this effect. The pear being naturally inclined to send down its roots, will do so, unless effectually prevented by a chambered border, or a hard rocky subsoil; and if the spongioles of the roots are allowed to descend out of the reach of the air, the tree never can produce good fruit. Planting pear trees in a very rich stiff soil will produce the same effect on them as on wall fruit trees, as before stated. Injudicious pruning, particularly in summer, is another cause; as cutting in young shoots, while the sap is in motion, has a tendency to make the tree throw out two new shoots in the room of every one removed, and thus to exhaust itself in producing branches. Summer shoots should either be checked by disbudding as soon as they appear, or suffered to remain till winter, when they may be cut in, without exciting the tree to fresh efforts to replace them; stripping them of their leaves, however, during summer, as directed under Pruning, if they appear likely to exhaust the tree. Much of the fertility of pear trees also depends on the habit of the stock being similar to that of the graft; and much also on a judicious manner of training. As a wall tree, the pear is always trained horizontally, and spurs are left on all the branches for producing fruit. These spurs used formerly to be left large, and standing out a foot or eighteen inches from the wall; but they are now found to bear best when kept short. According to this plan, every spur is

allowed to bear only once, viz. in its third year ; and, after this, it is cut out to give place to another spur, which has been trained to succeed it. By this mode of treatment, a constant succession of young spurs is kept up, and fruit is produced all over the tree ; whereas, by the old method of pruning and training, in the course of a few years, the projecting spurs became barren, and fruit was produced only at the extremity of the branches. Pears are frequently grafted standard high, when intended for training against a wall, in order that they may be used as riders between dwarf plums or peaches. Pear trees generally bear better as espaliers, or dwarf standards, than against a wall, and this has been attributed to rather a curious reason. The stamens of the pear have naturally very little farina ; and where the blossoms are exposed to great heat, and have little air circulating round them, as is the case with wall trees, the pollen is very apt to dry up without fertilising the stigma. The blossoms of espaliers and dwarf standards are exposed to less heat and more air than those of wall trees ; and thus their pollen is more likely to perform its natural functions. The truth of this observation has been proved by shading the blossoms of a wall pear tree during the whole period of their expansion, and fanning them with an artificial current of air by means of bellows, when it was found that more than twice the usual quantity of fruit was produced. Espalier pear trees have generally a very rough appearance, from their rugged projecting spurs ; but dwarf standards both look and bear well.

It has, however, been asserted by some gardeners, that riders on the walls, and tall standards in the orchard, come into bearing earlier than dwarf standards, unless the branches of the dwarfs are suffered to grow very long, and are curiously bent and twisted to produce depositions of sap. Probably, however, the true cause of the dwarf standards not bearing is, that, in some cases, they have been planted in the deep rich soil of the kitchen-garden, intended for culinary vegetables; while the trees in the orchard, compared with them, were in poor light soil, and those against the wall in a prepared border.

There is perhaps no fruit that has been so much improved by cultivation as the pear; and this extraordinary improvement has been principally effected by the exertions of the late Professor Van Mons of Louvain, near Brussels. This gentleman, towards the latter end of the last century, having turned his attention to the culture of fruit trees, conceived the idea that new varieties of pears might be raised scientifically; and the result of some experiments tried by him, in conjunction with his friend Counsellor Hardenpont, was, that several pears were obtained very superior to the kinds previously known: and among these were the *Passe-Colmar*, and the *Beurré de Ranz* (commonly called the *Beurré Rance*). Encouraged by this success, the Baron Van Mons and Counsellor Hardenpont repeated their experiments every year, and thus raised above a hundred thousand new kinds of pears; and, though by far the greater part of these proved

in the end not worth growing, many very valuable pears have been obtained. Some of the best of these are, the Marie Louise; the Glout Morceau, an excellent bearer; and the Beurré Diel, a large and finely-flavoured pear. Among the higher-flavoured pears may be mentioned, the Winter Nélis (Nélis d'Hiver), the Bezi d'Héri, and Van Mons' Léon le Clerc, the last being said, when grown in favourable situations, to be the finest pear ever known.

The goodness of all these pears, however, depends a great deal on the stocks upon which they are grafted; and thus the fruit produced does not always answer the expectations of its growers. Another point to be attended to is the thinning out of the fruit, that more may not set than the tree seems able to ripen; as, if the tree is suffered to bear too large a crop, the fruit will be small, comparatively, and without flavour.

The Quince is a low tree, which thrives best near water. It is always grown as a standard; and the fruit, which is very ornamental when ripe, is never eaten raw. It requires no particular care, except that of planting it in a moist soft soil; and, if possible, where its roots can have access to water. There are four or five sorts grown in nurseries, but they differ very little from each other. A quince introduced from Persia in 1848, differs, however, from all the other kinds in losing all its austerity when it becomes ripe, and being eatable like a soft ripe pear. This quince is highly perfumed, and its odour is so strong, that it is said to be impos-

sible for a single specimen of the fruit to be in a caravan without every one accompanying the caravan being aware of its presence.

MISCELLANEOUS FRUIT TREES. — Under this head I shall include all those trees usually grown as standards in pleasure-grounds or on lawns ; but which, as their fruit is eaten, appear properly to belong to the department of the kitchen-garden.

The Medlar.—There are three or four kinds of medlars, one of which is much larger than the others. The medlar will thrive in any soil or situation not too dry ; but, like the quince, it does best within the reach of water. The fruit, which is never eaten till it is in a state of decay, is not of much value, but the flowers are very large and rather handsome.

The Mulberry.—There are three distinct species of mulberry, besides innumerable varieties. The distinct species are, the White, only used for feeding silk-worms with its leaves ; the Black, which is generally grown in gardens for its fruit ; and the Red, or American, Mulberry. In addition to these may be mentioned the Large White Mulberry of Iran, introduced by Mr. Barker in 1848. Many persons are not aware of the difference between the black and the white mulberries, and they think that if they have a mulberry tree in their garden, they cannot do better than feed their silk-worms with its leaves ; though the fact is, that the white mulberry is scarcely ever grown in England, and the leaves of the black mulberry are positively injurious to the worms. Lettuce leaves are, indeed, better than any other food for

silk-worms reared in England. The fruit of the red mulberry is eatable, but not very good; and its leaves are also injurious to silk-worms. From the fruit of the large white Persian Mulberry a syrup is extracted scarcely to be distinguished from that made from sugar.

The black mulberry is said to be a native of Persia; but if so it must have been brought to Europe at a very early period, as it was common in Italy when ancient Rome was at her zenith. It appears to have been introduced into England long before 1573, as some old trees, still in existence, are said to have been of considerable size in that year. The mulberry has several peculiarities in its habits, which distinguish it from most other trees. The most striking of these is, that it may be propagated by truncheons: that is, if a large limb of a tree, as thick as a man's arm, or thicker, be cut off, and stuck into the ground, it will grow without any further trouble being taken with it; and probably the next year, or the year after, it will bear abundance of fruit. This, I believe, is the case with no other tree except the olive. The mulberry also is later than any other tree in coming into leaf; but, when it does begin to open its buds, its leaves are expanded, and its young fruit formed, without any apparent flowers, in an incredibly short time. Another peculiarity is, that old trees frequently split into five or six different parts, each of which in time becomes surrounded with bark, so that a very old and thick trunk appears changed into five or six slender new ones: the branches also, if they lie along the ground, take root and

become trees ; and if an old mulberry tree be blown down, every branch sends down roots into the ground, and in a very short time becomes a tree. When apparently dead, a mulberry may in most cases be resuscitated by cutting it down to just above the collar, when it will send up a number of young stems, which will very soon be covered with fruit. The mulberry, in other respects, needs very little care from the gardener ; it requires no pruning, and even the fruit does not require gathering, as it drops as soon as it is ripe.

The Elder is rather a shrub than a tree ; and from its very disagreeable smell and straggling habit of growth, it is rarely planted except in cottage gardens. There are several kinds ; one with white berries, another with green, and a third, which is very ornamental, with scarlet berries. There is also a very handsome kind with cut leaves. A ptisan made of the flowers is reckoned excellent in France for producing perspiration in cases of colds and fevers ; and the fruit of the black-berried kind is used for making wine, and also a kind of jam.

The Pomegranate.—If the elder be considered a plebeian fruit, the pomegranate may be called an aristocratic one, as it is rarely seen in England except in the gardens of persons of rank and wealth. Notwithstanding this, it requires but little care from the gardener, and it is only necessary for him to spare the knife ; since the flowers are produced only on the points of the shoots, and on short slender twigs projecting from the branches, which are exactly what a gardener, whose only care is to

make his tree look neat, would think it advisable to cut off. Pomegranates require very rich and well-pulverised soil, and to be trained against a wall with a south or south-east aspect. When it is wished to throw pomegranate trees into fruit, the blossoms should be shaded during the whole time of their expansion. The Pomegranate of Tabriz, which weighs from fifty to sixty ounces, has very rarely any seeds. This fruit is seldom eaten, but its juice is squeezed into a goblet, and drunk like sherbet.

Nut Trees.—The principal kinds of nut trees cultivated in British gardens are, the walnut, the sweet chestnut, and the filbert. The American hickories and the black walnut are sometimes grown, though but rarely; as are the columna and other nuts. The almond, also, as it is grown only for the kernel of its stones, may be classed among the nuts, though it is, properly speaking, a kind of peach.

The Walnut can hardly be mentioned without bringing with it a host of classical recollections. The Greeks dedicated this tree to Diana, and held fêtes under its shade; and the Romans called its fruit the nut of Jove. Among the Greeks, at weddings the bride threw a quantity of walnuts on the ground as a symbol of her deserting the homage of Diana; and this custom was afterwards adopted not only by the Romans, but by the Gauls. Hence, in some parts of France, walnuts are still thrown among the crowd by the bride, as she returns from the ceremony; and hence the French term for a wedding, "*faire les noces*," is derived from the Latin word *nucēs*, which signifies nuts.

In modern times, the wood of the walnut tree has obtained rather an unpleasant kind of celebrity, as being generally used for making the stocks of muskets. In villages and country places, however, the walnut recalls more agreeable associations, as its noble leaves and spreading branches render it a delightful tree for shade, and formerly it used to be frequently found at the doors of cottages and farm-houses.

There are several kinds of walnut trees cultivated for their fruit; all varieties of one species, and differing principally in the hardness or comparative softness of their shells. Walnut trees are generally propagated by sowing the nuts; and, if the young trees are planted in a light, sandy, and well-drained soil, they will grow rapidly, and bear at an early age.

The custom which prevails among the country people in some parts of England and France, of beating a barren walnut tree to make it bear, is efficacious; as the beating breaks off the points of the too luxuriant shoots, and makes them send out those short spurs which alone produce fruit, though the end would be attained with more certainty by pruning. A decoction of walnut leaves and husks is said to be very efficacious in protecting plants against insects, if sprinkled on the leaves.

The nut of the black walnut (*Jùglans nìgra*) is so hard as to be of little use for the table; and only the nuts of two or three kinds of the hickories can be considered as fruit. The best of these is the peccane nut (*Càrya olivæfórmis*),

of which Washington is said to have been so fond that he used to be continually eating them during his campaigns, being rarely without some in his pocket. The white hickory (*Carya sulcata*), the outer rind of which is very thick and fleshy, is also good to eat.

The sweet Chestnut is frequently called the Spanish chestnut, because the best sweet chestnuts were formerly brought to the London markets from Spain. The tree can, indeed, scarcely be considered as an English fruit tree, as very few of the chestnuts sold for the table are grown in England. In France, chestnut trees are more common; and they are divided there into the *chataigniers* and the *marronniers*; the former bearing about the same relation to the latter as the crab does to the apple. The best chestnuts in France are those called *les marrons de Lyons*. The sweet chestnut is a native of Asia; but it has also been found in the North of Africa and in North America. It is always propagated by seeds, and thrives best in a deep sandy loam; it will grow in even the poorest gravel, but it never does well in either a calcareous soil, or in a stiff clay.

There are several celebrated chestnut trees of enormous size and great age; the most remarkable of which are the *Castagna di Cento Cavalli* on Mount Etna, and the *Tortworth chestnut* in England. Till within the last eight or ten years it was believed that the wood of the chestnut was good timber; but it has lately been discovered that it is absolutely worthless, except while quite young: the wood that was supposed to be chestnut having been proved

to be that of the English chestnut oak (*Quercus sessiliflora*). The wood of the chestnut, when the tree attains a large size, becomes what the English timber-merchants call shaky, or what the French call dialled; that is, instead of forming a solid log of timber, the trunk when cut down is found to fly off in splinters, or to divide into a number of angular pieces, as if shivered by a blow from the centre.

The Filbert is only a variety of the common hazel; and it is supposed to derive its name from the words "full beard," in allusion to the length of its husk. The varieties of the hazel are, indeed, divided into two classes: those with long husks, which are called the filberts; and those with short husks, which are called the nuts. All the varieties grow best in calcareous soils, like those of Kent; in which county the best nuts grown in England are raised. When either filberts or nuts are grown in gardens, they are usually planted in rows from five feet to ten feet apart from each other in the row, according as they are wanted to grow high or to spread. Filberts are generally propagated by sowing the seeds, and nuts by suckers, which the trees throw up in abundance. "The principal art in the culture of the filbert as a fruit tree," says Mr. Loudon in his *Arboretum Britannicum*, "consists in training and pruning it properly, as the blossoms are produced upon the sides and extremities of the young upper branches, and from small young shoots which proceed from the bases of side branches cut off the preceding year. The tree requires to be kept remarkably open, in order

that the main branches may produce young wood throughout the whole of their length. In the filbert orchards about Maidstone, the trees are trained with short stems like gooseberry bushes, and are formed into the shape of a punch-bowl, exceedingly thin of wood." When the trees are pruned, care is taken to eradicate all the suckers. Filberts are always kept in their husks; and, if they lose their colour and appear black or mouldy, their appearance is renovated by the dealers, by putting them into iron trays pierced with holes, and gently shaking them over a chafing-dish full of charcoal, on which a little powdered sulphur has been thrown while the charcoal was red-hot.

The Constantinople Nut, or *Columna* hazel, is a large handsome tree; and the American hazels are shrubs grown occasionally in plantations, but not cultivated in England for their fruit.

The Almond is in fact a peach tree, with a fruit having a leathery pericarp instead of a fleshy one; and what are called almonds are the kernels of the stones of this fruit. The bitter and sweet almonds are varieties of the same species; and there are several other varieties differing principally in the degree of hardness of the stone. The other part of the fruit is in all the varieties quite worthless, except for the prussic acid it contains. The prussic acid used in medicine is, however, made principally from the kernel of the bitter almond, though it does not exist in that of the sweet variety. Almond trees are propagated by

grafting either on almond or plum stocks. They are frequently planted for the beauty of their flowers, which appear before the leaves, but they are seldom grown in England for their fruit; most of the almonds sold in London being imported from Italy or Spain. The Jordan almonds, which are considered the best, are brought from Malaga. The almond requires a dry soil, either sandy or calcareous; and the situation should be sheltered, as the branches are brittle and apt to be broken off by high winds. When the stones are sown, care should be taken to press the sharp ends downwards. The young plants will not bear transplanting, as they will send down taproots two feet long the first season.

FRUIT SHRUBS.—The principal fruit shrubs grown in gardens are, gooseberries, currants, and raspberries; to which may be added berries and cranberries.

The Gooseberry.—The number of varieties of this useful fruit almost exceeds belief, and fresh kinds are originated every year. The principal reason of the great number of gooseberries thus raised may be traced to the gooseberry shows now so prevalent in different parts of the kingdom. At these shows the largest and heaviest berries gain the prize; and it thus becomes an object with the exhibitors to grow berries that shall be as large and as heavy as possible. For this purpose they raise a great many new kinds; and when they have obtained one likely to suit their purpose, they plant it in very rich soil, water it well, and, picking off all the berries except three or four, they nourish

these by putting saucers filled with water under each. By these cares gooseberries have been produced weighing above an ounce and a half each, and one weighing very nearly two ounces; though gooseberries generally, even of large size, seldom weigh above half an ounce.

Gooseberries may be propagated either by seeds or cuttings; and they will thrive in any good garden soil, if it be well drained, well manured, and not under the drip of trees. When gooseberries are wanted large, the ground between the rows should have a coating of rotten manure laid on it every third year. Gooseberry bushes are generally planted in rows, the rows eight or ten feet apart, and the bushes six feet from each other in the rows. They are pruned twice a year: in winter to remove the branches not likely to produce fruit; and in early summer, because gooseberry bushes generally produce more shoots than they can ripen, and these superfluous shoots carry off a portion of the nourishment required for the fruit, which is produced partly on the shoots of the preceding year, and partly on spurs of the old wood. Some gardeners only suffer the fruit on the young wood to ripen, as it is larger in size and finer in quality than that on the old wood; but the spurs produce by far the greater quantity. It is a very good plan to thin the fruit; which is easily done, when gathering green gooseberries for pies and puddings, by taking a few from every branch, and never gathering from the same tree twice. The best Red Gooseberries for general use are perhaps the following: the Warrington, which

is a great bearer, and retains its fruit a long time on the tree; the Champagne, an early gooseberry of very fine flavour; the Early Rough Red, small, but remarkable for its sweetness; the Roaring Lion, the largest gooseberry grown, a good bearer, the berries of which are oblong, and have a smooth skin; the Iron-monger, the fruit of which is almost black; the Crown Bob, a very large gooseberry, equally good for using green or ripe; and the Top-Sawyer, a large, round, and rough gooseberry, with a very thin skin, and an agreeable flavour. The best White Gooseberries are: the White Dutch, the Whitesmith, Wellington's Glory, and the Cheshire Lass, the last two being of a very large size. The best Yellow are: Rum-bullion and Rockwood, the first of which is reckoned the best of all gooseberries for preserving; and the best Green are: Ocean, a large early gooseberry; Massey's Heart of Oak; and the Pitmaston Green Gage, a late variety remarkable for its extraordinary sweetness, and for its hanging on the tree till destroyed by frost. The best early gooseberries are: the small dark Rough Red, and Keens' seedling Warrington, the Early Green Hairy, the Green Walnut, and the Early White. The best late gooseberries are: Leigh's Rifleman, Farmer's Glory, the Warrington, the Roaring Lion, the Yellow Ball, the White Honey, the White Fig, Bright Venus, and the Pitmaston Green Gage.

Currants are very seldom raised from seeds, as there is no particular desire for the production of new sorts. The usual mode of propagation is by cuttings, which are taken off

the strongest shoots in autumn, or early in spring, and planted in rich soil. The cuttings are generally about a foot long; and all the buds are taken off except five or six at the top: the cutting is then firmly inserted in the soil about six inches deep. No other care is required but pruning the young trees every year. The currant bears on spurs of the old and new wood; and, as currant trees when pruned are generally cut in to these spurs, a currant bush after its winter pruning looks like a worthless knotted stump, fit only for the fire. The currant is very hardy, and will grow in any soil or situation, even under the drip of trees. In open situations and rich soils, currants have been grown to a very large size; but not proportionately large to gooseberries. The red, white, and striped currants are varieties of the same species; but the black is another species. All belong to the same genus as the gooseberry.

Raspberries thrive best in a light free loam, moderately rich; and in an open situation. They always bear on the young shoots, so that the principal art required in pruning them consists in cutting out the old wood, and shortening the young. The height at which the bearing shoots should be left is three or four feet. The best raspberries are: the Red and Yellow Antwerp; the Fastolff; and the New Victoria. Raspberries are propagated by suckers, which are produced in great abundance every year. The raspberry belongs to the same genus as the bramble or blackberry.

Berberries.—No fruit tree or shrub requires

less care in its culture than the barberry, or, as it is more properly called, the berberry. The kinds usually grown for their fruit are all varieties of the common sort: they are the common Red, the Stoneless, and the Sweet. Several of the Mahonias or Ash Berberries bear excellent fruit, as do the Nepal species, and that from the Straits of Magelhaen. The common berberry will grow in any soil and situation, and it does not require any pruning.

The Cranberry is generally grown in moist soil or peat earth. It succeeds very well on the muddy margin of a pond; but it may also be grown very well in the common garden soil, like the strawberry. When the cranberries are once planted, they will require no after-care except the occasional trimming into shape of their long runners. The common cranberry is a native of England, Scotland, and, indeed, of all the North of Europe; but its fruit is much smaller than that of the American cranberry, which has also a more delicate flavour.

CHAPTER VIII.

THE FLOWER-GARDEN, AND THE CULTURE OF
FLOWERS.

WHATEVER doubts may be entertained as to the practicability of a lady attending to the culture of culinary vegetables and fruit trees, none can exist respecting her management of the flower-garden, as that is pre-eminently a woman's department. The culture of flowers implies the lightest possible kind of garden labour; only, indeed, enough to give an interest in its effects. This light labour is, in fact, one of the reasons that the culture of flowers is so generally a favourite occupation; as, though it is one of the conditions of our nature that we shall never enjoy what is too easily obtained, it is equally true that we cannot associate the ideas of pleasure with anything that gives us very much trouble. The culture of flowers is exactly in the happy medium between what is too hard and what is too easy. There are difficulties in it, but they are such as may be readily surmounted; and the result at once gratifies our own sense of what is beautiful, and our pride at being the means of presenting so much that is worthy to be admired to others.

Laying out a Flower-Garden.—Very little need be said of the aspect of the flower-garden, as, in most cases, it depends on circumstances quite beyond the control of the cultivator of flowers: when, however, a situation can be chosen, the best is one open to the south or south-east, and sheltered on the north. It must be observed, however, in all situations, that flowers never do well under the shade of trees. Where no ground can be spared for a flower-garden but a spot surrounded by tall trees, it is better to give up at once the idea of growing flowers in it in beds, and to ornament it with rockwork, fountains, vases, statues, &c., interspersed with a few flowering trees and shrubs, so arranged, that, though their flowers, if produced, would augment the beauty of the scene, the want of them may not destroy it, if they should fail. Flower-gardens are of two kinds: those that are called natural, and which are planted without any regard to regularity; and those that are called geometrical, and which consist of beds forming some definite figure.

The natural, or English style, as it is called abroad, however beautiful it may be in pleasure-grounds, is very ill-adapted to a flower-garden, which is essentially artificial. The principal beauty of a flower-garden consists, indeed, in the elegance with which it has been arranged, and the neatness with which it is kept; or, in other words, in the evidence it affords of the art that has been employed in forming it. This being the case, it is quite clear that an artificial mode of arrangement is more suitable to it than any other, as it is best

adapted for keeping up the harmony of the whole. In all cases, therefore, where the garden is large enough to show a formal figure to advantage, the artificial mode of arrangement should be adopted; and, wherever it is adopted, the beds should be planted so as to form masses of different-coloured flowers. Where, however, the garden ground is very small, and no part of it can be set entirely apart for flowers, no attempt should be made to produce masses of colour in regular forms; but the plants should be arranged along the borders singly, or in patches, as may be best adapted to display the individual beauties of each. In some cases, flowers may be planted in borders, so as to form a miniature representation of the Natural System of Botany. For instance, first there might be planted patches of ranunculuses and anemones, intermixed with flos Adonis, larkspurs, columbines, monk's-hood, and other plants belonging to *Ranunculaceæ*; the spring-flowering kinds being mixed with the autumnal ones, so as to produce a succession of flowers. Next should be planted the different kinds of fumitory and the poppies, to represent the order *Papaveraceæ*; and next, stocks, wallflowers, and other *Cruciferous* plants. These might be followed by mignonnette, violets and hearts-eases, pinks and carnations, the different kinds of flax, the mallows; and, in short, the plan might be easily carried through all the orders containing ornamental herbaceous plants, taking care to choose such species as would flower in succession. In this manner, the beds might be arranged, by mixing perennials and annuals,

so as to form an ornamental botanic garden during the whole of the flowering season; and the flower-garden would thus become not merely a source of elegant amusement, but also actually of scientific knowledge, without any appearance of formal arrangement.

When the flower-garden is to be a geometrical one, the best way of designing it is to draw a figure on paper consisting of angular, circular, or serpentine forms, to represent beds, and arranging them so as to form a whole. This may appear easy at first, but to do it well requires a great deal of both taste and ingenuity; as each form should not only harmonise well with the others, but be handsome in itself. Where the space to be laid out is small, the figure may be more complex, and the separate beds more grotesque in their shapes, than when the garden is large: but, where a large space is devoted to flowers, only simply-formed beds should be adopted. The reason for this is, that when the beds are of bizarre shapes, they require to be seen at one *coup-d'œil* to have a good effect; whereas simple and uniform shapes may be seen either together or alone, without producing any disagreeable impression on the mind. Thus, in large flower-gardens, a succession of circles or ovals at regular distances, so as to form continually changing vistas to the spectator who walks through them, will have a much better effect than any geometric figure, the parts composing which appear ridiculous when disjointed. Whatever figures may be adopted, as soon as they have been sketched on paper, each bed should be coloured; to try

what arrangement of colours will be best suited to the form of the beds, &c. The colours, of course, should be those usually found in flowers; for example, yellow, scarlet, blue, pink, orange, and purple: and they should be arranged, not only with a view to effect, but with regard to the practicability of filling the beds with suitable flowers. The colours above mentioned may, however, generally be procured; and a bed of white flowers may be added at pleasure, wherever it may appear necessary.

To understand the best method of combining colours, it is necessary to know that there are three primitive colours, blue, red, and yellow; and four compound ones, purple, green, orange, and violet, each of which is composed of two of the primitive colours. In arranging colours, the great art is never to let a compound colour be placed between the two primitive ones that compose it; as, for example, green should not be placed between blue and yellow, or purple between red and blue, as the effect would be disagreeable to the eye, and the colours would be killed, that is, they would lose their brilliancy. On the contrary, it is found that each primitive colour has a compound colour peculiarly suited to it, which is composed of the other two primitive colours. Thus the harmonising colour of red is green, which is composed of blue and yellow; of yellow, violet or purple, both which are composed of blue and red; and of blue, orange, which is a combination of red and yellow; and hence it will be found, that colours arranged in this order will produce a more agreeable effect to the eye than in any other succession.

Very dark flowers which are almost black may, like white flowers, be introduced anywhere.

The forms of the beds and the colour of the flowers having been decided on, the next step is to mark the beds on the ground, and this is done in several different ways. One is by covering the paper containing the pattern with squares, and then forming much larger squares with packthread over the ground; that part of the outline of the figure contained in each of the small squares is then to be transferred to the corresponding large square, by tracing it on the ground with the point of a stick. When the pattern is regular, it is sometimes marked on the ground by stretching a garden line from one point to another by means of pegs. When this line is so arranged as to form the proper figure, it is chalked, and made to thrill between the pegs, so as to transfer the chalk in the proper lines to the ground. When circles are to be traced, it is done by first fixing a stake in the centre, and then forming a loop at the end of a cord, and putting it over the stake. One end of the cord being thus fastened to the stake, the other end should be stretched out to the extremity of the radius, or half-diameter of the circle, and a short pointed stick should be tied to it, with which the circle may be traced all round. An oval is made by tracing two circles, the outer edge of one of which just touches the centre of the other; a short line is then drawn at the top, and another at the bottom, and this, when the central lines are obliterated, forms the oval. Many other ways will suggest them-

selves, and may be adopted: the essential points in all being to have the ground first dug, and made perfectly smooth and level; and then to have the figure clearly and accurately traced out and tested by measurement, before any of the beds are formed, or the turf or gravel laid down.

Planting the beds and forming the walks require nearly as much care as tracing out the figure. Many persons, however, are not aware of this: they think, if the figure be good and accurately traced on the ground, that nothing more will be required; or, if anything more be necessary, it is only to indicate the proper colours of the flowers to be planted in the beds to the gardener.

This, however, is not enough. Low plants, producing abundance of flowers, must be chosen, and these must be carefully trained, or pegged down, so as to cover the beds entirely, or the effect will be destroyed. If, for example, a bed of scarlet be wanted, a lady would probably think that her gardener would have no trouble in finding abundance of scarlet flowers; and, having told him the colour, she would give herself no further trouble. Now the kind of scarlet flower to be used depends entirely on the position of the bed, and the kinds of flowers used in the other beds. If these flowers have been dwarfs, and trained so as entirely to cover the ground, the scarlet flower used should be the *Verbena Melindres* (or *chamædrifolia*, as it is now called), or some of its varieties, and each stem should be pegged down close to the ground. Thus treated, and supplied with abundance of

water, being grown in rich light soil, on a porous or well-drained subsoil, the verbenas will soon become a splendid mass of scarlet, almost too dazzling for the eye to bear, unless it be relieved by grass walks between the beds. If, on the contrary, the bed in question had been planted with one of the scarlet lobelias, or even with scarlet pelargoniums, the effect would have been quite different, from the taller growth of the plants, and the greater proportion of leaves to their flowers. Where pelargoniums are grown to produce an effect in beds, either the variety called Tom Thumb should be used, or the plants should be kept bushy while in the greenhouse or frame, by continually shifting them into larger pots, or frequently taking off the points of their shoots; and, when planted out, they should be at least a foot or eighteen inches asunder, increasing the distance if the plants are very large. The Frogmore and Dropmore varieties are very suitable for central beds, or for situations where the height is of no consequence; but where a geometrical figure is to be preserved, the Tom Thumb variety is preferable to any other from its low growth. The plants should be well watered, and frequently pruned wherever they throw up long shoots. Other plants should be treated in a similar manner; and great care should be taken to keep all the plants, in the beds which are to combine to form a figure, of the same height, and equally covered with flowers. The centre bed alone may have taller plants. Where the walks are of gravel, a greater proportion of leaves may be allowed to the flowers; but a geometrical

flower-garden never looks half so well on gravel as on grass. Some gardeners spoil the effect of a garden of this kind by putting too many plants in each bed, and when this is the case, the plants frequently produce more stalks than either leaves or flowers. Whenever, therefore, beds of verbenas look overgrown, and of a dingy green, the plants should be examined, and half of them taken up. Three plants are quite sufficient for a bed four feet wide and twelve feet long; and less in proportion. It must never be forgotten that the bed appears fuller when there are only a few plants in it, than when there are many; as, when there are only two or three plants in a bed, there is room to peg the branches down, and this makes them flower profusely; whereas, when there are six or eight plants in the same space, the branches are forced to ascend, and the beauty of the bed is destroyed.

The walks of a geometrical flower-garden, if of grass, may be laid down with turf, or sown with grass seeds; and in either case they should never be pared (as that would enlarge the beds, and destroy their proportion to the walks), unless some part should accidentally project into the bed, when it should be removed, and the turf pressed down, so as to form the same gradual slope from the bed to the walk as in the other part. Where the walks are of gravel, the beds should have a neat edging of box, or of any other plant that may be preferred, kept quite low and narrow by frequent pruning, but which should never be clipped.

The Culture of Flowers.—The ornamental

flowers grown in gardens may be all arranged under the heads of annuals, biennials, perennials, bulbs, tubers, corms, dwarf flowering shrubs, climbers, twiners, trailers, and rock plants; and, as the culture of the plants in each division is nearly the same, I shall say a few words on each, particularising those plants which require a different treatment from the ordinary routine of their kind.

Annuals.—Most of the hardy annual flowers should be sown in March, April, or May, in the open border where they are intended to remain. The usual method of sowing in the borders is, first to loosen the ground with a fork, and to break the soil very fine; after which it should be made perfectly level, and raked. A circle is then made by pressing the bottom of a flower-pot saucer, three or four inches in diameter, on the ground, and six or eight seeds are spread over the level surface thus formed: a little soil is then sprinkled over them, and the surface slightly pressed again with the saucer. If the weather or the soil be dry, a slight watering should be given to the seeds after sowing, with a watering-pot having a very fine rose; but this must be done carefully, as too much water would wash the seeds out of their place. It is usual, after sowing, to stick a flat stick into the ground, in the centre of the patch, with the name of the flower upon it; and it is better to write these names very plainly with a rather soft black-lead pencil, than with ink, as the ink is very apt to run, and to render the words indistinct. It is customary with many gardeners, after sowing flower-seeds, to turn a flower-pot

over them ; and this practice is useful in keeping the seeds moist by preventing evaporation, while the hole in the bottom of the pot admits enough light and air for germination. The flower-pot should, however, be removed as soon as the young plants appear above ground ; as, if kept on longer, the plants would be drawn up, and their stems would become so elongated, and consequently so weak, that they would never recover their strength or beauty. Flowering plants should always be kept dwarf and compact ; not only on account of the superior neatness of their appearance, but because tall ill-grown plants never produce fine flowers. For this reason, as soon as annuals attain their second pair of leaves, they should be thinned out ; and again, when about a foot high, if necessary. As the plants grow they should be watered occasionally ; and when of a proper height staked and tied up, if of a kind to require support. As soon as the flowers fade they should be cut off ; unless, as is sometimes the case, the plant has very ornamental seed pods, when they may be left on. It is seldom worth while for any lady to save her own seed ; but, when she does so, the plants for that purpose should be grown in a back garden or reserve-ground, as they greatly disfigure a flower-garden. All annuals, indeed, should be taken up, and carried to the refuse heap as soon as they cease to be ornamental ; as, in their withered state, they only call up unpleasant images in the mind.

Tender annuals are raised on a hotbed, and, though generally sown in February, are not

planted in the open ground till May. When they have been raised in pots, the contents of each pot should be carefully turned out, and put into a hole made to receive them without breaking the ball of earth that has formed round the roots of the plants. As some plants, for example stocks and all the *Cruciferæ*, require a rich soil, a pit may be dug in the border a foot or eighteen inches in diameter, and about the same depth, and filled with a rich compost of equal parts of garden mould, decayed leaves, and well-rotted manure, or, what is much better, with the remains of the trenches in which celery was grown the preceding summer. The pit should be filled with this compost, so as to raise it about six inches higher than the rest of the border, to allow for the new earth sinking, and the annuals should be planted in the centre, and carefully shaded for a few days by a flower-pot being turned over them. The mode of making and managing a hotbed has been already given in the second chapter of this work; but the readiest way for the inhabitant of a suburban villa to obtain half-hardy annuals is, to purchase them from some nurseryman when ready for transplanting. The usual price is from twopence to fourpence for a dozen plants; and thus, for a couple of shillings, a sufficient number of plants may be procured to make a splendid display in a small garden for a whole summer. No one should, indeed, attempt to manage a hotbed, who has not some person to pay constant attention to it; as one day's neglect respecting giving air, watering, &c., will sometimes destroy the hopes of a season.

The Californian annuals require peculiar treatment. These plants are very hardy, and, though many of them are of short duration in flower, they may, by proper management, be contrived to produce a brilliant effect during the whole summer. For this purpose a well-trodden path, or a piece of very hard ground, should be covered about an inch thick with very light rich soil; and the seeds of any of the Californian annuals should be sown in it. These will stand the winter, and in February or March, when the flower-beds have been dug over, and made quite smooth, the annuals should be taken up with the spade in patches and laid on the beds; the spaces between the patches being filled up with soil, and the whole made quite firm and compact, by beating each patch down with the back of the spade. As soon as the patches have been removed, fresh earth should be spread on the hard ground, and fresh seeds sown in it, the plants springing from which will be ready to be transferred to the beds as soon as the first series have done flowering; and in this way a succession of flowers may be kept up nearly all the year, observing to dig over the beds in the flower-garden, and to rake them smooth, every time the old flowers are removed, in order to prepare them for the new ones.

Biennials are plants which do not flower till the second year. They are generally sown in March, April, or May, and are transplanted in September to the situations where they are to flower the following year. The best known of these flowers are, the different kinds of hollyhock, snapdragon, Canterbury bells, wall-

flowers, sweet-williams, œnotheras, and Brompton stocks; but there are many others extremely beautiful, and equally well deserving of cultivation. Most of the biennials may be propagated by layers or cuttings, and, thus treated, they will last four or five years.

Perennial herbaceous plants are so numerous, that few general directions can be given for their culture, and it will be necessary to treat of the principal families separately. Perennial flowers are generally propagated by layers, cuttings, offsets, suckers, and division of the root; for, when raised from seed, many of the kinds do not blossom for several years. When propagated by layers, the earth which is pressed over the pegged-down shoots should not be kept too moist; as layers of herbaceous plants, particularly where the stem has been partly slit through, are very apt to rot. The same remark holds good as to cuttings; and they should generally have fewer leaves left on than cuttings of trees and shrubs. Many plants produce offsets, such as the potentilla, the wild geranium, &c., and these only require separating from the parent, and planting in spring; all the flower-buds should, however, be pinched off the first year to strengthen the plant, and to encourage it to send down roots. Suckers are treated in exactly the same manner as offsets. Division of the roots is, however, the most common way of propagating perennials. To do this the plant is generally taken up, and the roots pulled asunder if dry, or cut into pieces if fleshy, and replanted; care being taken to cut off any part of the fibrous roots that may have been wounded or

broken by the removal. The plant itself is also generally pruned or cut in, and some of its leaves are taken off before replanting ; and it is carefully shaded and watered till it has recovered from the effects of its removal. All perennial plants should be occasionally taken up, thinned, and replanted with the same precautions : and the ground dug over and renovated, before they are replaced.

The most remarkable kinds of herbaceous plants are those called florists' flowers. This name indicates plants grown principally for the purpose of exhibiting at some show to gain a prize, and on the culture of which an extraordinary degree of care has been bestowed. Most of these are either bulbs or tubers, but some few come under the present head ; and of these the most remarkable are, the auricula, the polyanthus, the carnation, the pink, the heart's-ease, and the chrysanthemum.

Auriculas are well-known and favourite flowers ; the wild plant is a native of Switzerland, but it is almost as different from the cultivated kinds, as the wild cabbage is from broccoli or cauliflower. The garden auriculas have almost innumerable names, but they are all divided into four kinds, very distinct from each other. These kinds are, the Green-edged, the Grey-edged, the White-edged, and the Selfs. The beauty of the flowers depends upon their size, the clearness of their colours, and their roundness and flatness ; these last qualities being often assisted by art : the anthers of the stamens should also rise above the stigma ; as when the stigma is seen above the anthers the

flower is called pin-eyed, and is esteemed of little value by florists. The culture of the auricula, when it is to be grown as a prize flower, demands a degree of care and attention that no one but a professed florist would think it worth his while to bestow. The great points appear to be, to make the soil as rich as possible, using the strongest manures; to let the pots be very well drained, by placing about an inch and a half deep of broken pot-sherds in each pot; and to keep the plants well and regularly watered. When the flowers expand, they are generally shaded with square pieces of board, tin, or pasteboard, supported by a stick just over the flower, so as to shelter it from the direct influence of the sun, but to admit a free current of air, and sufficient light. This precaution is said to improve the clearness and intensity of the colours, which otherwise are apt to become dull and clouded. Those persons who grow auriculas for sale generally show them on what is called a blooming-stage, and shade them with an awning like that used for a tulip bed. The plants are propagated by offsets, or by dividing the root; and new varieties are continually being raised from seed. Auriculas are occasionally double or semi-double, but these varieties are considered by florists very far inferior to the single kinds.

The Polyanthus is of the same genus as the auricula, and of the same species as the primrose. It is, however, a very distinct variety of the last; and it is said to take its name of polyanthus, which signifies many-flowered, from its producing its flowers in trusses like

the auricula, while the flowers of the primrose are produced singly, each on a separate stalk rising from the root. The qualities of the polyanthus resemble those of the auricula as to form and shape, but there is not the same variety as to colour, as the polyanthus is always of a very dark brownish red and golden yellow. The best flowers have generally a narrow edging of a bright golden colour, and as clear and distinct as possible, round the margin of each petal; and no flower is at all esteemed that has what is called a pin-eye; that is, as before mentioned with regard to the auricula, when the stigma projects beyond the anthers of the stamens. The polyanthus is propagated by slips, and by division of the root, and new varieties are raised from seed.

The Primrose differs essentially from the polyanthus and the auricula, in being only esteemed when double, while they are not considered to rank as florists' flowers unless they are single. The primrose, indeed, is not a florists' flower; and its pretty double pale yellow, dark scarlet, lilac, and white varieties are only grown as common border perennials. They like a rich loamy soil, rather moist than otherwise, and a shady situation; and are propagated by division of the roots.

The Carnation has long been a favourite florists' flower; and, as it is not quite so difficult to grow to a considerable degree of perfection as the auricula, it is also a favourite border flower. The florists' carnations are of three kinds, viz. the Flakes, which are striped with broad bands of two colours; the Bizarres,

which are striped or streaked with three colours; and the Picotees, which are much the hardiest, and are only bordered with a narrow margin of some dark colour, or dotted with very small and almost imperceptible spots. The carnation, in its wild state, is a native of England, and is generally found on the walls of some old castle or other ruin, or growing in very poor, gravelly, or calcareous soil. The cultivated plant, of course, requires different treatment; and the following directions have been kindly given to me by one of the first growers of carnations in France, whose opinion may be relied upon. "The compost should be a fresh mellow loam, mixed with an equal quantity of *terre de taupinière* (casts from mole-hills); to this mixture should be added a fifth of well-rotted cow-dung, so thoroughly decayed as to have become quite black. The soil thus prepared should be pressed firmly into the pots, more so, indeed, than for any other plant: thus there should be twice as much earth as usual in pots for carnations. The pots are placed in the sun till the 15th or 20th of November, and watered a little at a time, but often. After the 20th of November, at latest, the plants should be kept entirely in the shade, so that they may not be exposed to the sun at any time during the day; and it is also absolutely necessary that they should be kept under a roof where they may be sheltered from the rain and snow; but they must not be put in a hothouse, as a cold situation suits them much better. During frosty weather, they should be very little watered, in

order that the soil in which they grow may not freeze very hard. They are thus left in the shade till the end of April, when, there being no longer hoar-frosts to fear, they may be exposed to the east, so that the sun may shine upon them from its rising to the middle of the day and no longer. Thus treated, they will grow luxuriantly, and produce a magnificent show of flowers."

Carnations are propagated by layers and cuttings, the last of which, as I have before mentioned, are called pipings. The layers are made when the flowers are in full blossom, and several are made at once, as the operation frequently kills the old plant, and consequently cannot be practised with advantage unless a great many plants are ready to take its place. The layers are cut half through, as usual; and covered half an inch deep with mould. As the stalks are very brittle when they are strong and succulent, it is customary to place the plant in the sun for about half an hour or an hour, to render it flaccid before the layers are made. The layers will generally be well rooted in a month or six weeks, and will then be ready to be separated from the parent plant. The mode of treating the pipings has been already described in p. 73. When the buds begin to form they are frequently tied round with a strand of bast mat to prevent them from bursting; and, just as they are opening, a bit of pasteboard curiously cut is slipped under the flower to keep the petals in their proper place. Each flower is also furnished with a paper or tin cap to shade it from the

sun, and a stake to tie it to, in order to keep the stalk erect. Clove carnations bear the same relation to florists' carnations, as unbroken tulips or self-coloured auriculas do to the finer flowers. The tree carnation is a half-shrubby variety of the same species, and the mule pink is generally said to be a hybrid between the carnation (*Diáanthus Caryophýllus*) and the sweet-william (*Diáanthus barbátus*). Both these may be treated as common perennial border flowers.

The Pink.—It is remarkable that, though the pink is a commoner and hardier flower than the carnation, it is not known in a wild state, and it does not appear to have been much cultivated till the latter half of the last century, though it is said to have been introduced in 1629. Its origin is, indeed, very uncertain; some botanists considering it as a variety of the carnation, and others making it a distinct species, under the name of *Diáanthus plumàrius*. There are now many named sorts, and the best laced pinks rank as florists' flowers, their culture being the same as that of the carnation. The other kinds are considered inferior, and are grown like common herbaceous plants in the open borders.

The Heart's-ease has only within the last few years ranked as a florists' flower. It had long been a favourite in gardens, as its innumerable popular names may testify; but it was reserved for a young lady, aided by an industrious and intelligent gardener, to show the world the extraordinary variations of which the flower is susceptible. About the year 1810 or

1812, the present Lady Monck, then Lady Mary Bennet, had a small flower-garden entirely planted with heart's-eases in the garden of her father, the late Earl of Tankerville, at Walton-upon-Thames. The young lady naturally wished to get as many different sorts into her garden as possible; and, at her desire, the gardener, Mr. Richardson, raised as many new kinds as he could from seed. From this small beginning the present passion for heart's-eases took its rise. Mr. Richardson, astonished at the great variety and beauty of his seedlings, showed them to Mr. Lee of the Hammersmith Nursery. Mr. Lee instantly saw the advantages to be derived from the culture of the plant; other nurserymen followed his example, and in a few years the heart's-ease took its place as a florists' flower. The heart's-ease mania was at its height from 1835 to 1838; but since that time it has appeared somewhat on the decline. The most splendid flowers grown for exhibition are generally hybrids, which possess, in a great degree, the qualities of both parents. Thus, though almost every heart's-ease has sprung partly from the wild kind (*Viola tricolor*), its other parent may be traced by its general appearance. The very large dark purple and yellow flowers are descended from *Viola grandiflora*, a species with large yellowish flowers; other large flowers, with dark purple upper petals, and the lower ones of a bluish tinge, are descended from *V. amœna*; and the offspring of *V. lutea* are nearly all yellow, strongly marked with very dark branched lines. The hybrids raised partly

from *V. altàica* are of a very pale yellow, and the petals have an undulated margin; those from *V. rothomagénsis* or *V. hispida* are of a pale blue; and those from *V. bicolor* are white, slightly veined with purple, and tinged with yellow at the base. All these vary exceedingly by continual crossings, but some of the characteristics of the parents always remain.

The culture of the heart's-ease requires much attention. It is the habit of the plant to ripen a succession of seed during the whole of its flowering season; thus it bears flowers and ripe seeds at the same time during the whole summer. The seeds should be sown in a bed of rich garden mould, at least eighteen inches deep, and highly manured, and the young plants should be suffered to remain till they have flowered, when all the plants should be taken up, the best replanted eighteen inches apart if in a bed, or a foot apart if in pots or boxes, and the inferior ones thrown away. The best soil for replanting the heart's-ease, particularly if the plants are in pots or boxes, is rich loam, mixed with one-sixth of sand and one-sixth of vegetable mould; and, in large towns, all these soils may be purchased in small quantities from the nurserymen. The pots and boxes should also be well drained; for it must be remembered, that, though the heart's-ease is very liable to be scorched by the excessive heat of the sun, and will require constant watering in hot weather, it is also very liable to be damped off by cold and wet in winter. The best varieties are propagated by cuttings, taken off in spring, which grow rapidly so as to

flower the same summer or autumn. These cuttings should be taken from the points of the shoots, taking them off immediately below a joint; and they should be struck in pure white sand or charcoal, as when the cutting is put into earth it is very apt to damp off. The cuttings when made should not be watered, but should be covered with a bell-glass, and shaded for several days, on account of the succulent nature of the stems, and the great evaporation from the leaves. Heart's-eases are sometimes propagated by layers, in which case the branch should be only pegged down by a joint, and not slit, on account of its tendency to damp off.

Chrysanthemums are principally winter flowers, and they are valuable for affording a brilliant show at a season when there are few other flowers to be seen. In November and December, when no other flowers are in blossom, these are in full beauty; and the walls even of street gardens are frequently so completely covered with them as to present a most brilliant and dazzling appearance. *Chrysanthemums* may, therefore, be safely recommended as most valuable flowers for both town and country; and their great number and beauty make them particularly interesting. There are, indeed, numerous varieties of every possible shade of yellow, brown, orange, buff, pink, reddish purple, lilac, and white, but not blue. All the different varieties of *chrysanthemums*, and there are nearly a hundred named sorts, may be referred to six distinct tribes, and these are the following: 1. *Ranunculus*-flowered; 2. *Incurved*; 3. *China-Aster*, or *Daisy*, flowered;

4. Marigold-flowered; 5. Tassel-flowered, or Quilled; and, 6. Half-double Tassel-flowered. The ranunculus-flowered have generally small flowers, in clusters, like little roses; but the rest have large handsome flowers, particularly the tasseled kinds, the quilled petals of which are very long, and hang down like tassels. The culture of the chrysanthemum differs according to the use which it is proposed to make of it. When it is to be flowered in pots, cuttings are taken from the tops of the shoots in April; and, as soon as they have taken root, they are transplanted into very small pots, where they are planted in a compost formed of equal parts of sand, loam, and peat. As soon as they begin to grow, and send out plenty of roots, they are removed into other, rather larger, pots; and this shifting is repeated eight or nine, and sometimes ten or twelve, times. This constant shifting will keep the plants bushy, without the cultivator being under the necessity of pinching off the ends of the shoots: a practice which, though it answers the desired end of keeping the plants of a compact habit of growth, has yet the inconvenience of making them throw out so many shoots and leaves as to weaken the flowers. When the chrysanthemums are to be planted in the open border against the wall, their roots should be parted in autumn or early spring, and planted in very rich and highly-manured but light soil, at the foot of a south or west wall, against which they should be trained like a peach tree, and all the superfluous shoots cut off. When planted, they should be carefully watered, not

only at their roots, but all over their leaves, with a fine-rosed watering-pot or garden engine. They should afterwards be watered three times a day, and occasionally with soap-suds or manured water, that is, water in which manure has been steeped. Thus treated, the plants will grow six or eight feet high, and their flowers will not only be produced in great abundance, but they will be of enormous size, and very brilliant in their colours. The best chrysanthemums in London are at Chandler's Nursery, Vauxhall.

Bulbs and Tubers.—The most interesting bulbs in a flower-garden are, the tulip, the hyacinth, and the crocus ; and the most interesting tubers are, the ranunculus, the anemone, and the dahlia. There are, however, many other flowers of both kinds highly deserving of cultivation. The culture of all bulbs is nearly the same ; but that of the tuberous-rooted flowers differs in different plants.

Bulbs are generally planted in autumn to flower in spring ; and are taken up when their leaves begin to wither, to be kept out of the ground a month or two in complete repose before they are replanted. They are generally propagated by offsets, which are produced by the side of the old bulb ; or, rather, by the side of the new bulb, which is formed every year to supply the place of the old one, which wastes away. The new bulb sometimes forms beside the old one, and sometimes below it or above it ; and this is one of the principal reasons why some kinds of bulbs are taken up and replanted every year ; as, when this is not attended to,

those bulbs that form every year below the old bulb sink so low in the course of a few years that they become too far removed from the air to vegetate; while those that form above the old bulb are pushed so high out of the ground that they are often killed by frost or drought. In this way, valuable plants often disappear from gardens, without their owners having the slightest suspicion of the cause. It is, however, not necessary to take up the common garden bulbs, such as the snowdrop, the crown-imperial, the corn flag, and others which form their new bulbs at the side of the old bulb; and even the finest kinds of *Gladiolus* succeed best when left in the ground and covered during frosty weather with dead leaves, litter, or some other substance which may serve not only as a covering, but as a manure. When raised from seed, bulbs are generally from three to five years before they produce flowers; and they are never propagated by layers or cuttings.

Tulip.—Experienced florists raise tulips from seed to obtain new varieties; but, as the young bulbs are frequently from five to seven years before they flower, this mode of propagating tulips does not suit amateurs. Even when seedling tulips do flower they produce only self-coloured flowers for the first two or three years, and in this state they are called breeders. To make them break, that is, produce the brilliant and distinct colours which constitute the beauty of a florists' tulip, they are subjected to the most sudden and violent changes of soil, climate, and management. At one time, they are grown in poor soil, and only allowed enough water to

keep them living ; and then they are suddenly transported to the richest soil, abounding with food and moisture. Sometimes, to change the climate effectually, florists send their tulips to be grown for a year or two twenty miles or more from the place where they were raised, and then they are brought back to their native air. This laborious and unscientific mode of proceeding is, however, now rapidly giving place to a proper method of hybridising ; after which the young bulbs are brought forward by means of bottom heat, water, and frequent shiftings, so as to flower and break the second or third season. Florists' tulips are generally divided into four tribes, viz.—1. Bizarres, which have yellow grounds shaded with dark red or purple, and which are subdivided into flamed, in which the red or purple is in a broad stripe or band, rising from the bottom of the petal ; and feathered, in which the dark colour forms a marginal edging to the petals, descending into them in various little delicate feathery veins : 2. Byblœmens, having white grounds, shaded with violet or dark purple, and also subdivided into flamed and feathered : 3. Roses, having white grounds, shaded with rose-colour or cherry-red, and divided into flamed and feathered : and, 4. Sels, being either a pure white or yellow. In addition to these, the French have Baguettes, very tall-stemmed tulips, the flowers of which are white, striped with dark brownish red ; Baguettes Rigauts, which resemble the former, but have shorter stems and larger flowers ; and Flamands, which are nearly the same as Byblœmens. The Dutch have also a kind they call

Incomparable Verport, a very finely-shaped flower, white, and feathered with bright shining brown. All these kinds are said to be varieties of one species, *Tulipa Gesneriàna*, a native of Italy; and they all ought to have round cup-shaped flowers, clean at the base, and with all the marks and different colours quite clear and distinct. Besides these florists' tulips, several other species are occasionally grown in gardens: the most common of which are, the little Van Thol tulips, which were named after the Duke Van Thol, and which are scarlet, edged with yellow; the wild French tulip, which is a pure yellow, and very fragrant; and the Parrot tulip, which appears to be a variety of the last, and the petals of which are yellow, irregularly striped or spotted with green, scarlet, and blue, and fringed at the margin. Of these, the Van Thol tulips are the earliest; and indeed they are frequently brought forward in frames, so as to be among the first flowers of spring.

The culture of the tulip, as a florists' flower requires unremitting attention and care; but, for common garden purposes, the tulip will be found hardier, and less liable to injury from insects, &c., than most other flowers. Where tulips are grown in a regular bed, the ground should be dug out to the depth of twenty inches or two feet. A stratum of fresh earth is laid at the bottom of the pit thus formed, on that a stratum of rotten cow-dung, and on this a stratum of loam mixed with sand. The bed should be three or four feet wide, and its surface should be slightly raised in the middle. A fresh bed should be made every year, or, rather, the

same bed should be filled with fresh soil every season; as the tulips will soon exhaust the ground, and they will degenerate if the soil be not renewed. The proper distance at which the tulips should be planted in the bed is seven inches apart every way; and their colours and kinds may be arranged according to the fancy of the planter. It is customary, where the tulips differ a good deal in height, to place the tallest in the middle, and the lower ones on the sides; and, when this is the case, the centre of the surface of the bed need not be raised. The bed is protected by hoops and mats, which are contrived to open to admit light, air, and rain at pleasure. When the plants are near flowering, a path is made round the bed; and over the whole is stretched a canvas covering, supported on a wooden frame, and so contrived as to open at the sides or the top, as may be required. The bulbs are planted about two or three inches deep, and are never watered, except occasionally by admitting a gentle rain, till they are in flower. When they have done flowering, the leaves are suffered to remain till they begin to turn brown, when the bulbs are taken up, and laid with the lower part upwards on shelves to dry. When this is the case, the dry leaves and the fibrous roots are pulled or rubbed off; and the bulbs are put into drawers or boxes, divided into compartments so as to keep the named sorts apart, till the season arrives for replanting, which is the last week of October or the first of November.

Mr. Groom of Clapham is the principal tulip-grower in the neighbourhood of London, and he

has an exhibition of tulips of extraordinary brilliancy and beauty every May.

Hyacinths are perhaps the most beautiful of all flowers, and, when grown in a bed like tulips, they are almost equally brilliant in effect. Mr. Corsten, a Dutch florist residing at Shepherd's Bush, had an exhibition of this kind some years ago, and I have seldom seen anything more striking. Under a tent nearly two hundred feet long and thirty feet wide were two beds, each about one hundred and fifty feet long, divided by a walk covered with matting in the centre, and surrounded by a similar walk, with seats at each end of the tent. In these beds were above three thousand hyacinths, the colours arranged so as to form diagonal lines, and the whole presenting a perfect blaze of beauty. Hyacinths are as numerous in their named varieties as tulips, but they are not divided into any distinct tribes, except as regards their colours. The principal distinctions are, the white, the pink, and the blue; but these admit of various modifications, and there are some of a pale yellow, or rather lemon colour, and some of so dark a purple as to be almost black.

The culture of the hyacinth somewhat resembles that of the tulip; but it is more difficult, from the great length to which the roots of the hyacinth descend perpendicularly, and the necessity which consequently exists for preparing the ground for them to a very great depth. There is also another peculiarity in hyacinth culture which is rather difficult of attainment; namely, that the roots require a great deal of moisture, though the bulbs should be kept quite dry.

The roots also require the soil to be very rich, but that the manure used should be of the kind called cold. It will easily be seen, from this enumeration of the essentials for hyacinth culture, why Holland is so pre-eminently the country for hyacinths. The dry sandy soil, raised on the numerous dykes and embankments by means of which Holland has been rescued from the sea, affords at once a proper bed for the bulbs, and a soil easily penetrable by the roots; while the constant evaporation rising from the water, which is everywhere found below the dykes, is just what is required with regard to moisture. Even the manure most easily obtained in Holland is precisely that best adapted for hyacinths, as it is cow-dung unmixed with straw; which thus contains nothing to induce fermentation and consequent heat.

It is impossible in England to obtain the advantages so easily attainable by the Dutch, without incurring a very considerable expense. Our soil is generally so adhesive that it requires to be pulverised to a very great depth to admit of the descent of the roots; and even when the soil is sandy, it is very different from the beautiful silvery sea-sand called *Dünensande* by the Dutch. The only way in which we can imitate this sand is, by mixing nearly in equal parts what we call silver-sand and peat, or by growing the plants in silver-sand, with a very slight admixture of fine vegetable mould. Whatever the soil may be, it can hardly be too light; as the Dutch say that the hyacinth will never thrive, unless in sand so fine as to be blown

away in separate particles by a high wind. When hyacinths are to be grown to the greatest perfection in England, a bed, or, rather, pit, should be dug three or four feet wide and six feet deep, the length depending on the situation, and on the quantity of flowers to be grown. A layer of stale cow-dung, without any mixture of straw or litter, should be laid at the bottom of this pit at least a foot deep, and the pit should then be filled up to within three inches of the top with equal parts of peat and silver-sand, or with a mixture of three parts of silver-sand to one of light vegetable mould perfectly fine and without any stones. About three inches from the top should be spread a layer of pure sand for the bulbs; and the bed is then filled up with the same mixture as the lower part, and a layer about three inches deep of pure peat is laid over the whole, to form a dark background to give relief to the flowers. Dry weather should always be chosen for the planting; and, when planted, the bulbs must be placed at regular distances, and each with the pointed end, which the Dutch call the nose, upwards. They must be covered with the sand, and should be about six inches below the surface of the bed, which ought to be raised at least three inches higher than the surrounding garden to allow for its sinking. The bulbs are planted the last week in October, or the first or second week in November, and they are placed about four inches apart every way. After they are planted, a mixture of cow-dung and water is generally thrown with a scoop over the bed, so as to form a thin coating over the soil, but

not to penetrate into it. When the weather becomes frosty, a covering of dry litter, reeds, or tan, is put over the beds; or hoops may be fixed over them, on which bast mats are stretched. In March the covering is removed, and the beds are cleared of weeds, and covered with a fresh coating of cow-dung and water. In April an awning of thin canvas is erected over each bed, under which the plants are to flower; and by the middle of the month they will be in all their beauty. As soon as the flowers begin to fade, the flower-stalks should be cut off and instantly removed. They should never be suffered to lie on the bed, and should not even be put where by any chance they can mix with the earth intended for a hyacinth bed in another year. Care should also be taken to wear gloves when cutting off the flower-stalks, as they appear to contain a kind of corrosive juice, and the labourers employed in Holland to cut them off the bulbs frequently find their hands and bodies become red and inflamed, and sometimes so painful as to prevent them from sleeping.

When the leaves turn brown at the points, which is generally about the middle of June, the bulbs should be taken up. When this is to be done, the leaves are first pulled off, or, if they will not come off readily by pulling, they are cut off close to the bulb. The bulbs are then taken out of the ground, and laid on the footpath in rows, so as to keep the different kinds distinct. The bed is afterwards raked smooth all over, and a strip about a foot and a half broad is made flat and firm, in the middle

of the bed, by being pressed with a plank or beaten with the back of the spade, and on this the hyacinth roots are laid, still in distinct rows; earth is then drawn over them two or three inches thick, and they are left for two or three weeks. This the Dutch call lying in the Käuil, and the time of remaining in it varies according to the weather and the size of the bulb, the largest bulbs being removed soonest. When taken from the Käuil, the bulbs are placed on shelves or wooden trays, to dry, with the root end of the bulb inclining towards the south.

Where it is not thought advisable to sink the bed so deep as six feet, it may be made four feet deep, and the layer of cow-dung at the bottom mixed with soil a foot deep, leaving only about three feet to be filled with a mixture of peat and river sand, with about the proportion of a third to the whole of vegetable mould. The other treatment is the same as that detailed above. In all cases the soil should be very light and fine, and only cow-dung should be used as a manure. The roots should always be watered very sparingly, and with a mixture of cow-dung and water, though not so thick as that used for coating the bed. When the bulbs are planted, and again when they are taken up, they should be carefully examined, and all that are in any way specked or mouldy should be laid on one side, as they would infect the others. When the infected part is large, the bulb should be thrown away, or burnt with the stalks; but where the speck is small it should be cut out with a sharp knife, and the

bulb planted in dry sand, in not more than four and twenty hours after the piece has been cut out.

Hyacinths are propagated by offsets, by dividing the bulb, and by seed, in which last case they are five years before they flower. When planted in pots or boxes, the pot or box should be very deep, and it should be half-filled with broken potsherds, or some similar material, to insure perfect drainage, and the bulbs should be planted in a compost of peat, sand, and very rotten cow-dung. The bulbs should only be about half-covered with soil; and, if in boxes, they should be kept, if practicable, in a greenhouse, till they are ready to flower. If in pots, they should be plunged into a hot-bed or into a tan-stove; or where this cannot be done, they should be buried in the garden, so that the point of the bulb should be at least four inches below the surface. Here they should remain till about six weeks before flowering, when the pots should be taken out, and placed where they are to flower; the sides of the pots being kept warm with moss, and the flowers brought forward by daily waterings. All hyacinths grown in pots and boxes will require abundance of water, to make amends for the unnatural situation in which their roots are placed. After hyacinths have flowered in pots or boxes or in water glasses, the bulbs are generally planted in the open ground, and, being covered with about an inch of soil, they are left to take their chance. Thus treated, the finer kinds generally perish, but the hardier ones will live and flower for several years, if

allowed every autumn to retain their leaves till their new bulbs are matured. Hyacinths that have been flowered in glasses or pots, seldom, however, flower so well afterwards, at least not for several years, as they scarcely ever quite recover the shock they have sustained, from the unnatural position of their roots; whereas the Dutch florists, by allowing the roots of their hyacinths plenty of room to descend perpendicularly, and taking up the bulbs every autumn, have been known to keep bulbs of their finest flowers twelve, or even twenty, years, and to have them produce splendid flowers every year.

It must be observed, that hyacinths very soon exhaust the soil; and for this reason, the Dutch never grow their hyacinths in the same bed two years consecutively. The usual rotation is, first year, hyacinths; second, tulips; third, polyanthus-narcissus; fourth, crocuses; and, fifth, hyacinths again. The Guernsey Lily, the bulbs of which are generally thrown away in England as soon as they have flowered, will live many years if treated like the hyacinth.

Crocuses may be grown in the open ground, and they do not require taking up every year like hyacinths or tulips. If they are taken up and replanted every fifth or sixth year, it will be sufficient. There are above a hundred named varieties, and they will produce a very good effect if planted so as to form figures with their various colours. When this is the case, however, the corms should be taken up and replanted every year; to prevent the figure from becoming confused by the spreading of the offsets. Crocuses may be grown in glasses,

or in pots or boxes, with very little injury, if planted in the open ground as soon as they have done flowering, and suffered to mature their leaves. In all cases the leaves of the crocus should be suffered to remain till they wither, and not cut off; though many gardeners, from a mistaken desire for neatness, cut the leaves off as soon as the flowers have faded, and thus seriously injure the corms. All the kinds of *Gladiolus*, or corn flag, the bulbous *Iris*es, the *Ixias*, and, in short, most of the Cape bulbs, are corms, and require the same treatment as the crocus. The finer kinds are generally grown in pots, and are kept in a frame, plunged in a slight hotbed during winter; and, when planted in the open ground, some gardeners take them up every year. This is, however, by no means necessary, as the late Honourable and Reverend William Herbert, to whom the floricultural world owes so much, had *gladioli* in the open ground, in his garden at Spofforth, in Yorkshire, which had stood there undisturbed "above twenty years, with the precaution of covering them with leaves from November to March or April." Dr. Herbert found that "they succeeded best when grown into a thick tuft, in which state the profusion of blossom was admirable, the cluster of bulbs and the old skins of the decayed bulbs permitting the wet to drain away, and preventing the earth from lying too close and heavy on the bulbs in autumn and winter." Dr. Herbert adds, "that there is danger in disturbing and parting them, for numbers will rot if reset separately; and if they must be divided,

it is best to do so in April; or, if it be done in the autumn, the roots taken up should be potted, and turned out again in the spring." The above observations are taken from Dr. Herbert's excellent work on the *Amaryllidaceæ*; and they are particularly valuable, as coming from a man of profound science, and also of great practical experience. I may also add that the finest gladioli I ever saw in my life, which were at Blair-Adam, near Stirling, had been treated in the manner above described. Charlwood's, Covent Garden, Groom's, Clapham, and Carter's, Holborn, are the best places in London for procuring all kinds of bulbs and corms.

The Ranunculus.—The same florist who had the kindness to send me directions for the culture of the carnation, has given me the following directions for the culture of the ranunculus:—"In November spread well-rotted cow-dung or thoroughly-decayed leaves, four or five inches thick, over the beds which are to be devoted to the ranunculus, and dig the manure into the ground about four inches deep, going over the bed several times, so as to mix it well with the soil. The surface of the bed is raked smooth, and lines, or rather drills, an inch and a half deep, are traced on it, so as to form squares four inches on the side every way. The ground is then left till the beginning of February, when the ranunculuses are planted four inches apart, just at the point of intersection of the lines, and they are covered about an inch and a half deep (rather less than more) with the compost described above, or with fine

garden mould. The advantages gained by digging the earth in November, though the roots are not planted till February, are, that the ranunculuses are thus planted on a hard bottom, which suits them particularly; and that the gardener is not obliged to dig the earth to mix the cow-dung with it in February, when the ground is generally sloppy, and in a very unfit state for being worked." When the plants are about to flower, an awning may be erected over the bed to protect them from the effects of the sun, which is apt to destroy the brilliancy of their colours. In frosty weather, they should be protected by a mat, day and night, as the sun will do them serious injury if they have been at all affected by the frost. The plants should be constantly watered in dry weather with a weak solution of cow-dung in water. The tubers should be taken up as soon as the leaves begin to turn brown, which will generally be in July. Groom is considered to keep the best ranunculuses.

The Anemones of florists are all hybrids and varieties derived from three original species, viz. *Anemone coronaria* (the Garland or Poppy Anemone), the sepals of which are rounded at the tip, and white, with a red ring round the centre inside the flower; *A. hortensis* (the Garden Anemone), the sepals of which are pointed and purplish, with a white centre; and *A. stellata* (the Star Anemone), the sepals of which are purplish and of one colour throughout. Of these, the best are the Dutch anemones, which are varieties of *A. coronaria*, and

some of which have been known to be upwards of six inches in diameter. The tubers of these anemones are sold in the seed-shops by the hundred, and they resemble little bunches of very small black potatoes. These little balls may be separated from each other, and each will produce a new plant, though some of them will probably be too weak to flower the first year. As *A. coronària* is a native of Syria, where the ground is parched and dry during a considerable portion of the year, the tubers are very ill-calculated to resist wet, and, consequently, they should be taken up in autumn, and kept dry till the season arrives for replanting them the following year. This season is February or March, the latter month, or even the beginning of April, being preferred for the Dutch anemones, which are apt to rot if planted too early. Anemones should be planted three inches deep, and five inches apart every way, in a fresh, sound, yellow loam, without any manure. Care should be taken to keep the frost from them; but they will not need any other attention till the leaves turn brown, when the tubers should be taken up, and treated like those of the *ranunculus* and the tulip. Old varieties are propagated by offsets, and new kinds are raised from seed. The colours of both anemones and *ranunculuses* are rendered much more vivid by mixing charcoal with the soil in which they are grown. The common anemones (which are not florists' flowers) should be planted in autumn, and they will require taking up when they have done flowering.

There are many very ornamental species of anemone, one of which (*A. apennina*) has beautiful pale blue flowers; another (*A. palmata*) has brilliant yellow flowers; and *A. vitifolia* has large white flowers. The most ornamental species is, however, *A. japonica*, a native of China, which was introduced in 1846. It is quite hardy, and does not require taking up in winter. Some varieties of the Japan Anemone have been originated in this country, but they do not rank as florists' flowers.

The Dahlia is so well known, and so interesting a flower, that it appears advisable to say a few words respecting its history, as well as its cultivation. Nearly all the innumerable kinds now grown in British gardens are varieties of *D. variabilis*, which was discovered by Baron Humboldt, in Mexico, in 1788, and introduced into England through Spain the following year. The first plant was received in England by the Marchioness of Bute, and appears to have been soon lost; and this species of *Dahlia* was unknown in England till it was re-introduced in 1804 by Lady Holland, who brought seeds of it in that year from Madrid. In the meantime, another species (*D. coccinea*) had been brought from Mexico to France, from which country it was sent to England in 1802.

Nothing more appears to have been heard of the dahlia (except the introduction of a purple-flowered species, *D. astringiflora*, in 1812) till 1814, when roots of *D. coccinea*, and of several of the varieties of *D. variabilis*, were imported from France and Germany. From this period the dahlia appears to have been gradually

advancing in favour in this country; and about 1827, attention was further directed to it by a paper in the *Transactions of the Horticultural Society of London*, respecting the dwarf dahlias raised in the garden of the late W. Wells, Esq., at Redleaf, and it soon after became regularly established as a florists' flower. From 1820 to the present time several new species have been introduced; but they have all proved so inferior in beauty to the varieties of *D. variabilis*, that after a few seasons they have fallen into oblivion, or at best are only to be found in a few botanic gardens.

It is rather remarkable that the different species of dahlia do not hybridise well with each other; so that nearly all the numerous kinds now in cultivation are varieties or cross-breeds from *D. variabilis*, though their colours vary from purple, crimson, rose-colour, pink, and white, on the one hand, to yellow, orange, and scarlet, on the other. Some of the scarlet kinds have been raised from *D. coccinea*, but they are seldom what florists call perfect flowers; and some with orange and buff shades have been raised from *D. Cervantèsii*. The anemone-flowered dahlias were raised in Ireland from *D. astrantiæflora*; and the ranunculus and globe-flowered dahlias in Paris, from the same parent. These kinds are now, however, rarely cultivated, as they are often deficient in the points that florists consider necessary in a good flower. To understand what these points are, it must be remembered that florists' flowers are of course in a highly artificial state, from the extraordinary care bestowed on their cultiva-

tion; and it is, perhaps, for this reason that they are required to be as different from the same flowers in their natural state as possible. Thus the dahlia, being a composite flower, has in its natural state a yellow centre, like the daisy; but, in the varieties now grown by florists, if the central or disk florets are seen, they are considered to disqualify the flower from contending for a prize. In *D. coccinea* and its varieties, these disk florets are the only ones that bear seeds; but in *D. variabilis* and all its numerous progeny the florets of the ray are fertile.

The root of the dahlia consists of five or six carrot-shaped tubers, springing from a common centre called the crown or collar, and round which are produced the buds, or eyes, as gardeners call them. When the root is out of the ground these eyes are scarcely visible; but as soon as the root is planted they begin to swell, and each sends up a stem. The tubers are, of course, furnished with numerous fibres, which are the true roots of the plant, and through which alone it derives its nourishment from the ground.

The best soil for dahlias is a sandy loam, not too rich; as in rich or moist soils the plant will produce more stalks and leaves than flowers. Where the soil of the garden in which dahlias are to be planted is rich or heavy, a quantity of sand or gravel should be mixed with it. Striped or variegated flowers will soon lose their markings if grown in rich soil. The tubers of the early kinds are planted in April, to flower in

June; but those of the finer kinds are not planted till May and June. When they begin to grow, the side shoots are removed for from one foot to three feet from the ground; the principal stem is then either tied to a stake driven deeply and firmly into the ground, or the whole plant is drawn through a set of dahlia rings. Dwarf plants are frequently suffered to trail on the ground, and are pegged down so as to cover the whole of the bed, with which treatment they look extremely well. In dry weather, the plants should be regularly watered, but not too abundantly. When the leaves and stalks are killed by the frost, they should be directly cut down; but the tubers may be left in the ground a little longer, as, if taken up too soon, they will shrivel, and often become rotten. When taken up, they should be kept in a dry place, and covered with a mat, or buried in sand or sawdust, to exclude the frost.

Dahlias are propagated either by dividing the root, by making cuttings of the stem, or by seeds; and the first is by far the most common method. As, however, the buds are not very perceptible when the tubers are in a dry state, and as very often the ring of buds round the collar is by no means complete, it is necessary to throw the roots into a growing state before they are divided. For this purpose the dahlia roots should be potted early in March, with the crown of each plant above the mould, and the pots should be plunged into a moderate hotbed. The buds will soon begin to develope themselves; and, as soon as they have grown two

or three inches, the tubers to which they are attached may be broken off from the rest with the thumb and finger, or cut asunder with a knife, and each bud with its tuber planted in a separate pot. This operation nurserymen call "starting the eyes;" and it is essential, before dividing the root, as if a tuber be planted that is blind, as the nurserymen call those that have no buds, though it will live many years in the ground, and every year send out fibrous roots, yet it will never produce a stem. As soon as the young plants are potted, their pots are replunged in the hotbed, where they are kept in a moderate degree of heat, and with a moderate supply of water, but with an ample supply of air, till May or June, when they are transferred to the open ground. The cuttings are taken from the tops of the shoots, dividing a joint with a smooth clean cut; they should be planted in sand, and covered with a bell-glass, the pots being plunged in a moderate hotbed, and shaded till they have taken root, which will be in about a fortnight. When raised from seed, the seed should be sown in February, and the young plants planted out in June. The roots should be taken up in October, and replanted in the following spring, when they will flower, and the worthless ones may be thrown away.

The name of *Dahlia* was given to this genus by Cavanilles, Professor of Botany at Madrid, in 1789, in honour of Professor Dahl, a Swedish botanist. This name was afterwards changed by Willdenow to *Georgina*, in honour of a German botanist named Georgi, who resided

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many years in St. Petersburg, in consequence of the genus *Dàlea* having been previously established by Thunberg. As, however, this name is neither spelt nor pronounced the same as *Dáhlia*, and as the name of *Dáhlia* was given long before that of *Georgina*, the plant is now restored to its original appellation.

CHAPTER IX.

MANAGEMENT OF THE LAWN, PLEASURE-
GROUNDS, AND SHRUBBERY OF A SMALL
VILLA.

THE word lawn may probably conjure up ideas of too large an extent of ground to be managed by a lady; but, when I use the term, I do not mean an extensive park-like surface of level turf, but one of those beautiful verdant glades that produce so delightful an effect even in the smallest gardens. In places where the whole extent of garden ground does not, perhaps, exceed an acre, every one must have felt the relief afforded to the eye by a broad strip of lawn, bordered by trees and shrubs, not in a formal line on each side, but running into numerous projections and recesses, and resting their lower branches, frequently covered with flowers, on a rich, smooth, and velvet-like carpet of grass.

Every one possessing a lawn of this description must be aware that its chief beauty consists in its smoothness, and in the fineness and closeness of its grasses. I say grasses, because, strange as it may sound to unbotanical ears, from twenty to thirty different kinds of grasses sometimes enter into the composition of a

square foot of fine turf. Some of the grasses are coarse, and grow high and widely apart; and others are very fine and slender, and grow closely together. This being the case, it is obvious that, when a fine smooth turf is required, the finer kinds of grasses should be chosen, and the coarser ones not only rejected from among the grass seeds sown, but, if possible, destroyed whenever they appear, if they should chance to come up accidentally.

Botanists have distinguished and arranged nearly fifteen hundred different species of grasses; and of these, probably, more than three hundred kinds are now cultivated in England. These grasses differ widely in their appearance, habits of growth, &c.; and, to ascertain their different qualities exactly, a series of experiments was instituted some years ago by the late Duke of Bedford, the results of which were published in the *Hortus Gramineus Woburnensis*. The qualities of the different kinds of grasses having been ascertained, the next thing to be considered is, which kinds are most suitable for sowing on a lawn; and to discover this, it must be remembered that the proprietor of a lawn does not want a crop of hay, but a fine, smooth, level turf, the grass on which shall entirely conceal the earth. For this purpose it is evident that slow-growing grasses, the roots of which will retain permanent possession of the soil, and which are sufficiently succulent not to be burnt up when closely mown in hot weather, are preferable to those which grow rapidly and produce an abundant crop of herbage, particularly as the

roots of the last kind are generally easily withered up in dry weather. Very fast-growing grasses are, indeed, exceedingly annoying to the possessor of a small lawn, as they require constant mowing, and are thus a constant source of expense.

Some philosophers assert that the chief thing that hinders the attainment of our desires is, that very few of us know exactly what we want; and it is to save my readers from being in this unpleasant predicament with regard to lawns, that I have been thus particular in describing what qualities are requisite in grasses, to make them suitable for producing soft turf. The next thing is to tell them, as well as I can, what kinds of grasses appear most likely to answer the end in view. Of all these, one of the most permanent appears to be the fox-tail meadow grass (*Alopecùrus praténsis*), which is one of the principal grasses in rich natural pastures, and which should always form one-fourth part of the seeds used for laying down a lawn. The sweet-scented vernal grass (*Anthoxáanthum odorátum*) grows best in deep moist soil, but it is worth sowing in every situation, for its fineness, its dwarf growth, and for its habit of continuing to vegetate and to throw up fresh stalks nearly all the year. It is this grass which gives so delightful a fragrance to new hay. The common meadow grass (*Pòa praténsis*) is also suitable for lawns, as, though of slow growth, it has creeping permanent roots; and the short blue meadow grass (*Pòa cærùlea*) may be added, for its deep blue tint, which gives a

richness to the general colour of the turf, and because it sustains no injury from dry weather. The crested dog's-tail grass (*Cynosùrus cristatus*) is, however, the best for sustaining drought and heat, as its roots penetrate so deeply into the ground as to keep its blades green while all the grasses around it are quite brown, from being burnt up. The hard fescue grass (*Festùca duriúscula*) is another kind which will stand the effects of dry weather; it is also a very fine dwarf grass, and springs early. Many other grasses might be named, but these will suffice. The proportion in which they ought to be mixed is another and an essential point; but, at the same time, it is one rather difficult to ascertain, as the seeds of the finer kinds of grasses are very often imperfect, and do not germinate; and thus a larger quantity must be sown of these, than of kinds all the seeds of which are generally good. The seed of the meadow fox-tail grass (*Alopecùrus praténsis*) is very often so bad that not above one seed in three will germinate; consequently, a much larger proportion of seed of this grass must be sown than of any of the other kinds. This seed is very light, and consequently a pound of it, if bought by weight, will appear a great deal more than a pound of the crested dog's-tail grass (*Cynosùrus cristatus*), the seed of which is very heavy: and yet, as the latter seed is generally all good, it will cover more ground with grass than the other. The best place to procure grass seeds in the neighbourhood of London is at Cormack's Nursery, New Cross: but, generally, it will be

sufficient to write down the botanic names of the grasses, and to send them to a respectable seedsman, with directions to return enough of the seed of each to produce an equal quantity of grass of each respective species on the lawn. The whole quantity required of the mixed grasses is, generally, not more than four bushels and a half per acre; but, if an immediate effect be wanted, about a bushel and a half of the common white clover may be added. This quantity of seed will be sufficient to sow the ground very thickly, as when ground has been dug over and rendered perfectly smooth the seeds will go farther, and cover it more completely than when the surface is uneven; and, if the seeds are sown in dry weather, then rolled in, and afterwards watered, the ground will be as green and covered with as fine a sward the first season, as though it had been laid down with turf.

From the experiments before alluded to, which were tried by the late Duke of Bedford at Woburn, it was found that the best soil for producing an equal and permanent crop of grass was a sandy loam; and, accordingly, when the ground which is to form the lawn has been marked out, care should be taken to bring the soil to this state as nearly as possible. For this purpose, if the soil be too sandy, a quantity of clay should be procured to mix with it; and, if too clayey, it should be mixed with sand. In both cases, the new soil should be spread over the ground, and it should then be dug in about a foot deep. Care should be taken to do this in dry weather, as the two soils to be mixed

should be both in a state of dryness. No manure should be dug in, unless the soil happens to be very poor indeed; as manure will tend to produce a larger and taller-growing crop of grass, which, of course, will increase the trouble and expense of mowing, without being of any use. The ground being dug, and raked to remove all the large stones, the surface should be rolled, and then the seeds sown; after which it should be rolled again, and watered with a garden-engine having a very fine rose. This watering may be repeated occasionally if the weather should be very dry; and, if any mole-hills or worm-casts appear, they should be levelled and the rolling repeated.

When the ground is to be covered with turf, instead of being sown with grass seeds, the turf should, if possible, be procured from some meadow or downs where sheep have been fed; as these animals bite so close to the ground as to kill the coarser grasses, which have generally weak fibrous roots, while the finer grasses, which have deep roots, remain uninjured. The turf is then cut with a turf spade, and rolled up for removal. When it is to be laid down, and the ground is ready to receive it, it is spread out, and the different rolls carefully joined to each other; little bits being cut off or pushed in where the pieces do not exactly fit. It is then watered and rolled, and will require no other care. With regard to after management, a lawn can never be kept neat without frequent mowing, and this is an operation which a lady cannot very well perform for herself; unless, indeed, she has strength enough to use one of Budding's

mowing-machines. In whatever way, however, the operation may be performed, it should be repeated very frequently. In large establishments, the lawn is always mown every week during summer; and, even in the smallest gardens, the grass should never be suffered to remain more than a fortnight during summer without mowing. The roots will thus become weakened, and will not be able to send up any but dwarf and fine blades of grass, which will form in a few years that beautifully smooth and soft velvet-like turf which it is the principal merit of a lawn to possess. "It is a great mistake," says Mr. Loudon in his *Villa Gardener*, "to suppose that anything is gained in the way of economy by suffering the grass of lawns to grow long before mowing, in order to save the expense of once or twice mowing during the season; for, in proportion as the grass is allowed to grow long before mowing, in the same proportion are the roots strengthened, and enabled to send up still longer leaves and stems; whereas, if a lawn were kept short by frequent mowing for two or three years in succession, the plants of grass would at last become so weak that not one half the mowing usually required for even slovenly-kept lawns would be necessary, and the turf would be much finer and neater in appearance."

I have dwelt longer than I otherwise should have done on the management of lawns, not only because I am a great admirer of a smooth green turf, but because I believe it is a subject not generally understood. Most persons imagine that if they lay down turf, or sow grass

seeds, they have done all that is requisite; and my object is simply to impress upon the minds of my readers, that this is not enough: for, as there are different kinds of turf and grasses, it is as necessary to choose which to take, as to select flowers for the flower-garden. I have only to add that the reddish-brown hue sometimes observed on the brows of hills in pleasure-grounds is produced by *Hólcus lanàtus*, a kind of couch grass that wastes all its strength on its fleshy roots, and produces only a thin and wiry herbage. This species, the different kinds of *Agróstis*, or bent grass, the brome grasses, particularly *Bròmus arvénsis*, and the cock's-foot grass, *Dáctylis glomeràta*, should never be sown in lawns.

Grass seeds should be sown either in spring or autumn; and May and August or September are considered the best months. In very old lawns, moss is apt to predominate, and when it is wished to destroy this, the surface of the lawn is dressed, as it is called, in May with lime. Dressing with lime will also destroy the worms, which are often very troublesome in lawns (particularly where the ground has been manured with dung), in throwing up casts, which make the ground uneven and very difficult to mow.

The Walks in Pleasure-Grounds should be hard and dry; and they should also be sufficiently wide to admit of three persons to walk abreast occasionally; as nothing can be more disagreeable than the situation of the third person, whom the narrowness of the walk obliges to walk before or behind the others; and who is obliged either to remain silent, or to carry on a

most uncomfortable and disjointed kind of conversation. The minor evils of clothes being caught by branches, and leaves discharging on the pedestrians the remains of a recent shower, would likewise be avoided by broader walks.

The Laying out of Pleasure-Grounds embraces a wide field; and, when they are extensive, they require the eye of a painter, as well as the taste and skill of a landscape-gardener. Even in small places, so much depends on situation (particularly as regards the house, and whether there may or may not be any distant prospects); on the taste of the occupier; and on the expense to be incurred, not only in laying out and planting, but in after keeping, that few directions can be given that would be generally applicable. It may, however, be observed, that in all places, whether large or small, the walks should be so contrived, that no person passing along one should see the persons walking on another. Indeed, if more than one walk be ever seen at a time, it gives an idea of want of space and confinement; and this idea is one which the landscape-gardener always endeavours as much as possible to avoid. For the same reason the boundary fence should never be seen, if it can possibly be disguised. Even in a small street garden, with three low walls on three of the sides, and the house on the fourth, a very pleasing effect may be produced by effectually concealing the boundary walls with ivy, and thus permitting the imagination to fix the boundary where it will.

Another general rule in laying out pleasure-grounds is, to avoid monotony or sameness as

much as possible. Nothing is more wearying to the eye than a place every part of which is alike, and which leaves nothing to the imagination. A place regularly dotted over with trees at equal distances is quite featureless, has nothing to attract the eye, and nothing to interest the mind: but if the same trees are planted on the same ground in masses, with a broad expanse of lawn between; the trees sometimes projecting, and sometimes showing a smooth glade of grass running in among them, the end of which the eye cannot reach; the imagination becomes excited, and a degree of interest is instantly created. Where the lawn is large, a few single trees may be introduced; but few things in landscape-gardening require more taste. Indeed, in laying out pleasure-grounds, however small they may be, it is generally the best, and also the most economical, way, to have the advice of a professional landscape-gardener at first; instead of groping on in the dark, from a mistaken idea of economy, till at last it is discovered that all is wrong, and must be done over again. Thus, in the end, the work is generally found to have cost twice as much as would have been expended if it had been begun properly at first; besides the loss of time, and the annoyance always occasioned by having any thing to undo.

The Trees and Shrubs.—In all places sufficiently small to be managed by a lady, without the aid of a regular gardener, the trees and shrubs should be of the choicest kinds. It is quite the fashion of the present day to plant arboretums; and, though a place of the kind I mention

would not admit of a complete one, a lady might take some genus or some small natural order to illustrate (as for example the genus *Ribes*, or the order *Berberideæ*), and fill up the rest of her grounds with hollies or other evergreens, so as to form a background to the ornamental trees. The genera *Magnolia* and *Liriodendron* form the hardy trees of another small order, which it would be easy to cultivate, taking care to plant *Magnolia conspicua*, and any other kind that produces its flowers before it does its leaves, with a rich background of evergreens. The almond, which flowers in the same manner, should be placed in a similar situation; and standard roses may also be so placed as to have the unsightliness of their long naked stems greatly lessened by a mass of evergreens behind.

Another very interesting mode of arrangement, where the ground will admit of it, is to plant particular situations with certain trees which are not to be found in any other part of the grounds; and thus to form what the landscape-gardeners call scenes. Thus, for instance, there might be an American ground, formed in some shaded hollow, and planted with rhododendrons, azaleas, and kalmias. All these plants require a light peaty soil, and a shady and somewhat moist situation. In another part of the pleasure-grounds there might be some alpine scenery, with pines and firs, and particularly larches, interspersed with a few birch trees, planted in dry sandy soil, on hilly ground. The deciduous cypress and weeping willow should be near water, as should the common willow,

nearly all the poplars, and the alders. In another place might be a thicket of the different varieties of hawthorn, with a few of the fine large-fruited foreign kinds of *Cratægus* planted in striking situations. In short, there are no limits to the numerous and beautiful scenes that might be laid out by a woman of cultivated mind, who possessed fancy and taste, combined with a very slight knowledge of trees; and I think I may safely add that I do not know a more delightful occupation than this kind of landscape-gardening. It is landscape-painting, but on the noblest and boldest scale; and it is a source of constant enjoyment, from the daily improvement that it displays. What a difference it makes in the pleasure we have in returning home, if we have something to visit that we know has been improving in our absence! We regard the trees and shrubs we have planted, and the scenes we have laid out, with almost a parental fondness; and a new and daily increasing interest is given to life. I would, therefore, most earnestly entreat my readers to study trees and shrubs; and I do assure them that they will find themselves amply repaid, not only by the pleasure they will have in landscape-gardening, but in the additional enjoyment their accession of knowledge will give to every country walk and ride that they take.

There is, however, one great drawback to the pleasure that may be anticipated from planting an arboretum, or even an illustration of any particular order or genus; and this is, the very great difficulty that exists in procuring plants true to their names. Nurserymen put down a

great many more names in their catalogues than they have different kinds of plants; and thus the same plants, like the actors in a country theatre, are often made to perform under a great many different names in the same piece. I have heard of instances where twelve or fourteen species were named in a catalogue, though the nurseryman only possessed three or four, which, when wanted, were made to do duty under all these different names. It is true that all nurserymen are not alike in this respect; and the rapidly increasing knowledge of trees and shrubs on the part of the purchasers, will soon render it impossible to impose false kinds upon them.

In planting masses of trees and shrubs, great care should be taken to hide the dug ground around them, which always forms a scar in the landscape. The best way of doing this is, to cover all the space between the shrubs with grass, and to tie down the branches of the trees to pegs or stakes fixed in the earth, so as to make the trees feather down to the ground. Where this cannot be accomplished, on account of the expense of clipping the grass, for it cannot be mown among the trees, ivy may be pegged down over the dug ground, or evergreen trailing roses, of which there are many kinds especially adapted for this purpose. There is one general rule relating to the planting of trees and shrubs, which can never be too often repeated, or too strongly enforced; it is, never to suffer them to be planted too thickly. This may appear a very simple rule, but it is one which it is very difficult to put in practice, as all

the persons employed in planting are generally opposed to it. The nurseryman, of course, wishes to dispose of his plants, and the gardener to produce a good effect as soon as possible, nay, even the proprietor cannot help feeling the bare and desolate appearance of a new plantation, where the shrubs are placed at proper distances. There are but two remedies for this: either planting so as to produce an effect at first, and then thinning out half the plants, beginning the second or third year; or planting the shrubs at the proper distances, and covering the ground between them with some trailing plant pegged down.

Nothing can look worse than a row of tall trees, which were evidently planted for a screen; but which, so far from answering the intended purpose, admit the light between their slender naked stems, which afford no more concealment than the open rails of a paling. Mr. Loudon observes, in one of the volumes of the *Gardener's Magazine*, that the quickest way of thickening a plantation in this state is, if the trees are deciduous, to cut every alternate tree down, in order that the stools of the fallen trees may send up young shoots; but, if any of the trees have branches within six or eight feet of the ground, the plantation may be thickened by tying these branches to the stem, without cutting down any of the trees.

A weeping ash is a very ornamental tree on a lawn, but unless it is well trained it loses its effect. When trained to a wooden frame, the hoops and rods of which it is composed are seldom strong enough to sustain the weight of

snow which falls on the summit of the tree in severe winters, and if they give way in any place the boughs are frequently broken. In the arboretum which the late Joseph Strutt, Esq. most liberally presented to the town of Derby, there is a very fine weeping ash, for which Mr. Strutt had an iron framework made. The iron rods are light and elegant, and yet so strong that they are in no danger of giving way under any weight of snow that is ever likely to fall on the tree. The iron framework has been coated over with gas tar, to preserve it from rust, and it looks exceedingly well.

Roses.—These beautiful shrubs are so generally admired, and they are grown so universally in all gardens, that I think I ought to give some especial directions for their culture. In the first place, roses are said to require removing every third year; as they rapidly exhaust the soil, and their fibrous roots are few, small, and not widely extended from the bole of the plant. It is not, perhaps, necessary to take this rule strictly *au pied de la lettre*, but it is as well to keep it in view, and to remember that when rose trees look sickly, or fail to produce a due proportion of flowers, removing them to a fresh soil will, in most cases, restore their vigour.

It is not, perhaps, generally known, that there are nearly two thousand species and varieties of roses. Among such a chaos it would be almost impossible to choose, had not florists arranged them in about twenty general divisions. One of the principal of these contains the Cabbage Roses, and their beautiful descendants the Moss Roses; of which last there are more than twenty

kinds, some of which are very striking, and particularly the dark crimson moss rose, generally called the *Rouge de Luxembourg*, and the white moss, though the latter is rather too delicate for a town garden. The crested moss is also a curious variety, and it is said to have been found growing out of an old wall in Switzerland. All the kinds of moss roses should be planted in warm dry situations, and in March a little manure should be laid on the surface of the soil round their roots. Should the season prove dry, the plants should be frequently watered, and the result will be a brilliant display of flowers. There are twenty-five or thirty other kinds of cabbage or Provence roses, all of which are very fragrant, and, indeed, they are the kinds used for making rose-water, &c.; they are all quite hardy, and require no particular culture.

The Autumn-flowering, or Perpetual, Roses, are also remarkable both for their beauty and their fragrance. There are more than fifty sorts; one of the most beautiful of which is Lee's perpetual, the *Rose du Roi* of the French. The Pæstum roses, mentioned by Pliny, are supposed to belong to this family; as does also the well-known *Rose des Quatre Saisons*. Among the Hybrid Perpetual Roses may be mentioned the *Duchess of Sutherland*, a very valuable rose, from the length of time it continues in flower, and *La Reine*, which is remarkable for the large size of its buds and flowers. The *Comte de Montalivet* is also a very beautiful rose. All these roses should be pruned twice a year, in November and in June;

and, after pruning, the ground about their roots should be loosened with a fork, and then covered two or three inches deep with manure, the manure being covered over with some fresh green moss, to prevent it from having an unpleasant appearance. The roses of all the perpetual kinds frequently fade without losing their petals; and, when this is the case, the faded flowers should be instantly removed. They are all propagated by budding on the common dog rose, as they do not readily take root from layering. These roses are particularly valuable, as, with a little management, they may be kept in flower eight months in every year.

The French, or Provins, Roses are generally widely-opened flowers, like the rose in architecture. The striped and marbled roses belong to this division. These roses have scarcely any fragrance; but they have generally showy flowers, and they are very hardy. The druggists use them for making conserve of roses; and for this purpose they are grown in great quantities near the little town of Provins, in France, whence their name, which is often confounded with that of the Provence Roses from the South of France. The handsomest of these roses is the *Géant des Batailles*, the flowers of which resemble a rich crimson velvet, so dark as to look almost black in some lights. The Bourbon Roses are also remarkable for their velvet-like appearance: they are generally large and cup-shaped, the inside of the flower being much the darkest, and they grow best in sandy soils. Among the most beautiful of this family may be mentioned Paul Joseph, and the Coupe

d'Hébé, the latter, which is a most lovely rose, being a Hybrid Bourbon. The White Roses are hardy, and bloom abundantly with very little care. The Scotch Roses are also remarkable for their hardiness, for their blooming generally a fortnight earlier than any others, and for their ripening abundance of seed, from which new varieties may continually be raised. The yellow Scotch rose is very beautiful. Williams's double yellow sweetbriar, and the Austrian yellow, or copper-coloured, rose, are also well worth cultivating. The latter is yellow on the outside of the petals and red within. This rose will not succeed well in a smoky atmosphere, but it flowers beautifully in Mrs. Marryat's flower-garden at Wimbledon, and in that of R. H. Jenkinson, Esq., at Norbiton House, near Kingston. The common double yellow rose, which seldom flowers well, should be grown in a rich soil and warm situation, and it requires abundance of air.

Of the Climbing Roses, the Ayrshire roses, particularly the beautiful white-flowered kind called the Queen of the Belgians, and *Rosa ruga*, a very handsome and fragrant tea-scented variety, are perhaps the best for training upon frames, to form what are called pillars and pyramids of roses, as they are quite hardy. For sheltered situations, *Rosa multiflora*, and its near ally the Seven Sisters' Rose, may be chosen; as they grow very fast and very high, and produce myriads of flowers, though they are easily killed by frost. The most valuable climbing roses are, however, the descendants of *Rosa sempervirens*, the evergreen roses; and

these are the only kinds that should be used for pegging down over the dug ground of a shrubbery. They are of the easiest culture, as they will grow under the drip of trees, and they ought never to be pruned. They may be planted in spring, the ground being first dug, and cleared from the roots of weeds, &c. It should then be manured with the remains of an old hotbed, and the roses should be planted about five feet apart. The following autumn a good coating of manure should be laid on the surface of the ground; and the plants will require no after culture, but pegging down the shoots to prevent them from leaving any part of the ground bare. The *Triomphe de Bollwyller* is one of the most useful roses for this purpose. The *Boursault* division (the handsomest of which is the *Rose de Lisle*) may be treated in the same manner.

The *Noisette* Roses are known by the great clusters of flowers which they bear at the extremities of their shoots. Their branches should never be shortened, but the dead flowers should be removed as soon as they fade. The *Yellow Noisette* Roses are very beautiful, particularly *Solfaterre* and the *Cloth of Gold*. The *Bank-sian* Roses, the *Tea-scented* kinds, and the *Macartney* and *Musk* Roses, are rather tender, and succeed best on a south wall.

Roses are generally propagated by layers, or by budding on briars of the common wild dog rose, which are found in the hedges; they are also propagated occasionally by cuttings and seeds. The layers ought to be formed of shoots of the current year, laid down in July, which

in most cases, will have rooted, so as to be removed in autumn. The blossom buds are pinched off the shoots when they are laid down, in order to throw the strength of the plant into the root. Briars for budding are purchased by the nurserymen from country people, who find them growing wild in the coppice woods and field hedges; and these are used for standard roses, the buds being inserted about five or six feet from the ground. These standard roses, though now so common, were unknown till about 1803, when some briars that had been budded in this manner were sent from Holland into France, and afterwards introduced into England. According to the old method, when roses were to be raised from seeds, the hips were thrown together in a rot-heap, and left for twelve months to decay; but a more rapid mode is now adopted of disengaging the seeds, by rubbing the hips between coarse hair-cloths. The seeds should be sown in February, in a soil composed of vegetable mould and sand, in a shady situation, and they should be kept tolerably moist till the young plants come up. The following spring they should be transplanted into rows a foot apart every way, but they seldom flower till the fourth summer.

Roses are frequently planted in what are called rose gardens or roseries, that is, in a series of beds forming some regular figures, with walks between, and only filled with roses of different kinds. The form of the beds, and the mode of planting them, must depend entirely on taste and fancy; the only rule to be attended to is, to keep the roses forming the outer beds

lower than those in the centre. Rose baskets may also be formed on a lawn, either raised on pedestals, or formed merely by fixing wires in the ground; the lower part being covered with roses pegged down, and their branches covered with moss, and the handles to the basket being formed of wire, over which climbing roses have been trained.

The best roses in the neighbourhood of London are to be found at Lee's, Hammersmith, and Loddiges's, Hackney. There are also very fine collections at Paul's, Cheshunt, and Rivers's, Sawbridgeworth; at Wood's, Maresfield, and Hooker's, Brenchley, both near Tunbridge Wells; and at Lane's, Berkhamstead; most of these nurserymen contriving, by means of forcing, to have abundance of roses beautifully in flower from the latter end of January to the middle of November every year, and a few in pots even during the depth of winter.

CHAPTER X.

ROCKWORK, MOSS HOUSES, RUSTIC SUMMER-
HOUSES, RUSTIC BASKETS, AND FOUNTAINS.

Rockwork, though composed of somewhat ponderous materials, is very frequently arranged according to female taste; and one of the most remarkable examples in England (that at Hoole House, near Chester) was designed by a lady, and executed entirely under her direction. There are many kinds of rockwork; but they may be all described as collections of fragments of rocks, stones, flints, vitrified bricks, scoriæ, and similar materials, so arranged as to afford a striking object in the landscape; and, at the same time, so as to form a number of little nests or crevices for the reception of alpine plants. The mode of arranging these materials depends entirely upon taste, and, of course, varies widely. The most natural kind of rockwork is like that at Redleaf, near Tunbridge Wells; where the late Mr. Wells, the former proprietor, taking what Mr. Loudon called the key-note from the natural scenery of the neighbourhood, made his rocks appear "to crop out" of the soil, as though naturally, in such situations as to give the best effect to the scenery.

The plants deposited in the hollows between these rocks are so admirably placed, and the art with which they are cultivated is so skilfully concealed, that no illusion can be more complete; and we may fancy ourselves in a scene of nature, but of nature in her greatest beauty and highest luxuriance.

Very different is the rock-garden of the late Duke of Marlborough, in his private gardens at Blenheim. It is, perhaps, more beautiful than the rocks at Redleaf; but no one could possibly mistake it for anything but a work of art, and it owes its chief beauty to the plants grown in it. It is formed on a scar in the natural rock, which is hewn into zigzag paths; on one side of each of which are numerous niches to receive the plants. These plants are planted and kept with great care; and they grow so luxuriantly, as almost to hide the paths, and to make the rock look at a little distance like a bank of flowers. Mosses of different colours are interspersed, and the whole has a peculiarly rich and sparkling effect.

The rockwork at Syon has been compared to the scenery of a Highland glen; but I must confess there does not appear to me the slightest resemblance. In fact, the Syon rockwork is so overpowered by the magnificent conservatory in front, with its splendid terrace, and the geometric flower-garden at its base, with its myriads of beautiful flowers, that it becomes quite a secondary object, and its real beauties are very apt to pass unnoticed. It consists of masses of granite, intermixed with broken capitals of columns and other carved

stones, thrown together in a natural manner, and planted with ornamental flowering plants, principally exotic. The rockwork at Norbiton Hall is disposed in the same manner as that at Syon; but it is on a smaller scale, and its principal use is to keep moisture round the roots of the plants which are planted among it.

At Elvaston Castle, the seat of the Earl of Harrington, near Derby, is a kind of rockwork which certainly resembles the scenery of a Highland glen much more than that at Syon. It is constructed on a gigantic scale; and, as it is placed on the banks of a long winding lake, with the masses of rock sometimes rising into steep precipices, and sometimes apparently broken and torn asunder by some convulsion of nature, it has a wonderfully natural effect. Narrow winding paths, which appear, when seen, like gullies worn by a mountain stream, conduct the visitor by a gentle ascent to the summit, from which a magnificent view is obtained of the valley of rocks, the lake, and the "trim garden" beyond, with its grassy terraces, clipped trees, and numerous statues, looking like a fairy land.

The rockwork at Chatsworth is remarkable for its close imitation of nature. Some of the masses of rock weigh upwards of 370 tons each, and in one place they are put together in exact imitation of the Strid, a wild mountain torrent at Bolton Abbey, the banks of which, as represented at Chatsworth, are about thirteen feet high and 300 feet long. There are also some fine specimens of rockwork in the large conservatory, the rocks being planted so

as to give the idea of rocky scenery in hot climates.

The rockwork of Lady Broughton, at Hoole House, near Chester, is, again, quite different from the rest. The design for this rockwork was taken from a small model, representing the mountains of Savoy (including Mount Blanc), taken from the valley of Chamouni; and the rocks are made sufficiently large to give a person walking among them an idea of their reality. The labour of forming this rockwork was very great; not only from the large size of the stones to be removed, but from the difficulty of getting them of the proper colours and shapes. Besides this, it was very troublesome to make them stand against the weather. "Rain washed away the soil, and frost swelled the stones; and several times the main wall failed, from the weight put upon it. The walls and foundations are built of the red sandstone of the country; and the other materials have been collected from various quarters, chiefly from Wales." The part that represents the outer circle of rocks is principally composed of the red sandstone of the neighbourhood, in which little niches have been made for plants, and filled with exactly the kind of soil in which alpine plants grow naturally; viz. broken fragments of stones, clean-washed river gravel, the debris of decaying moss and other plants, crumbling rocks, &c. The plants are all strictly alpine, the only liberty taken being the mingling of the alpine plants of hot and cold countries, or, rather, of different elevations, together; and this is contrived very in-

geniously, by placing fragments of dark stone, to absorb the heat, round those that require most warmth, and fragments of white stone, to reflect the heat, round those that require to be kept cool. In all the trees and shrubs planted among the rocks, the same care is taken to keep up the illusion: they are all alpine plants; and dwarf species, or those of a very slow growth, are generally chosen, to prevent them from becoming too large for the rocks. The part which represents the "Mer de Glace," is "worked with grey limestone, quartz, and spar. It has no cells for plants; but the spaces are filled up with broken fragments of white marble, to look like snow; and the spar is to imitate the glaciers." I have already mentioned that Lady Broughton was her own artist; and I may add that the rockwork was six or eight years in progress, before it was completed.

Many other specimens of rockwork on a large scale are to be found in different parts of the kingdom; but the finest I have seen, besides those I have already described, are those in the Botanic Garden at Manchester, at Lower Boughton Hall near that place, at Ealing Park, at Endsleigh, and at Woburn.

Whatever kind of rockwork may be erected, the first thing to be done is to make a secure foundation; as, unless this is effected, the stones will gradually sink into the earth by their own weight; and thus, in a few years, the mass will either have become half-buried, or tottering and insecure. It is, therefore, most prudent, unless the rockwork be actually

erected on a solid rock, to prepare a foundation for it of brickwork; not suffering, however, any of the wall to appear above the surface of the ground. To prevent the possibility of this foundation wall being seen, it will be best not to carry it higher than to within six or eight inches of the surface. All being prepared, the stones may be arranged, the largest at the base, and the upper ones diversified according to the taste of the designer.

The following general rules will apply to all the different kinds of rockwork. Never to let the stones rest against any kind of building; as, when so disposed, they give ideas of disorder and insecurity. Never to mix up decaying materials, such as roots of trees, &c., with durable materials, such as rocks and stones; or things evidently natural with those evidently formed by art. Never to let the rockwork rise abruptly out of the turf, like a great mass of stones discharged from a cart; but gradually to prepare the way for it, by sinking some fragments of stone half-way in the ground, and letting them become larger and more numerous, till the spectator at last arrives at the principal mass. Never to begin to work without having some fixed design, whether avowedly artificial or apparently natural: and, when the design is to make what may be called a natural rock-garden, like that of the Duke of Marlborough at Blenheim, always to take care that the stones are very large, and piled upon one another so as to imitate the stratification of a rocky country.

“In general,” says Mr. Loudon in his *Villa*

Gardener, "rockwork, to be truly natural, can only show the rock on one side, or at most on two sides; as scars, cliffs, and precipices are seen in rocky districts." This abrupt side or face of the rock should be represented as projecting into ledges or shelves, to imitate the terminations of the different strata; and the flowering plants should be introduced in what may be supposed to be the clefts and fissures of the natural rock. The summit of the rock and the sloping side should be covered with turf, and may be planted with trees, some of which may hang over the rockwork; or the line of junction between the stones and the turf may be concealed by the luxuriance of alpine plants inserted in the fissures, and suffered to climb over the top. It must be observed, however, that in granite, basalt, or other unstratified rocks, the fissures are generally vertical, and consequently very ill adapted for forming ledges for plants. The best materials for a natural rock-garden in ledges are, therefore, sandstone and limestone, the lines of stratification in which are chiefly horizontal, with occasional dips.

It will be evident, from what has been said, that to make good rockwork requires the eye of an artist; and it may be added, that rockwork should never be attempted without first making a coloured drawing of it on paper, or a small model with a child's box of bricks, or some similar materials, to try the effect.

Moss Houses are interesting as garden buildings, because they afford great scope for the exercise of the fancy; not only in the design

for the entire building, but for the arrangement of the moss in different patterns. The first thing to be considered in carrying the design into execution is the foundation; and this, if the soil be damp, should be dug out two feet deep, and nearly filled with concrete. In this must be fixed the rustic pillars which are to support the roof; and these are generally composed of the trunks of young larches or spruce firs with their bark on, which should be chosen as nearly as possible of the same size. The number of pillars, and the manner in which they are to be arranged, depend, of course, on the design; but the general number is from eight to twelve. Great care must be taken to drive the posts firmly into the ground, and all to the same depth. The rafters for the roof are then fixed on, and narrow laths or hazel rods nailed between them, and also between the uprights. Between these laths or rods the moss is pushed with a wedge-shaped piece of wood; the pattern having been first rudely traced with chalk on the outside of the rods. The mosses and lichens to be used should be first collected and sorted, all of the same kind being put together; and, when they are used, the root end should always be the part pushed in between the rods.

The best Mosses for this purpose are, for the green, some of the kinds of thread moss (*Brýum*), and feather moss (*Hýpnum*), which are common everywhere, and frequently very beautiful. If gathered in summer, some of the seed-cases will be scarlet, as in *Brýum cárneum*; but they are purple in *B. bícólor*, and

green in *B. cuspidatum*. The red alpine thread moss (*B. alpinum*) is sometimes almost black in moist situations; and, where it can be procured, it may be introduced with very striking effect. Most of the kinds of feather moss are loose, and require to be pushed in farther than the thread mosses; they are generally green, but the red mountain feather moss (*Hypnum rufescens*), which is found principally in the Highlands, is of a reddish brown, and *Hypnum lutescens* and *H. nitens* are yellowish, the latter having a brownish tinge. *H. proliferum* is of a beautiful pea-green, and a tuft of it looks like a plume of feathers; it is generally found on the trunks of trees, and it is a very common species. The wolf's-claw moss (*H. rugosum*) is of a very beautiful reddish brown, but it is only found in bogs in the North of England and Scotland, and, consequently, cannot always be procured. Many other kinds of moss might be mentioned, but what I have said will be sufficient to direct the attention of my readers to the subject; and any of them who may reside near a wood or common will find it an amusement to gather mosses and lichens of different colours, and to dry them for use. The most common kinds on the heaths and commons near London are generally of a pale or dingy hue; but farther north more brilliant colours are found, some of a very dark brown, some of a rich brownish purple, some of a very bluish green, and some so white as to look like snow: and, when the prevailing mosses and lichens of the district have been discovered, the pattern and colours for the moss house can be

arranged accordingly. A very rich, and at the same time original, effect might be produced in a moss house, by arranging the moss in an arabesque pattern, with different colours combined something like those of a Turkey carpet; and, instead of paving the ground with pebbles, the floor might be formed with moss in the same manner as the walls: or the walls might be of some plain colour with only the crest of the family, or the initials of the designer's name in white or in colours, and the ceiling and floor in arabesque.

In all cases, the outside of the roof is thatched or covered with shingles, and the outside of the walls is either boarded or covered with a thick coating of moss. Where the house is large, or if there are glass windows, it is best to have the framework made by a regular carpenter; but, where the moss house is small, and open in front, it may be put up by the gardener, or any intelligent servant. In many cases, the roof is finished with a circle of pine cones fixed round it as a cornice; and the floor is either laid with other pine cones, or with small pebbles, some of which are white, and are arranged in a kind of pattern. Sometimes, however, it is paved with pieces of wood cut off horizontally, and sometimes with the small bones from sheep's trotters, but the latter appears to me decidedly in bad taste. The windows are frequently of coloured glass; and a curious effect is sometimes produced by having those in the back of the building purple, which makes the ground and every object seen through them look as if covered with snow; and those in front of the building

filled with yellow glass, which gives every object the rich glow of summer.

Rustic Summer-houses are sometimes made by filling up the framework with hazel rods nailed together, which have been varnished with the bark on. Sometimes the rods are dyed of various colours and arranged in a kind of pattern, in the same way as the moss is in the moss houses; and if done with taste they produce a good effect. The windows in these houses are generally of stained glass.

Open Summer-houses, or Covered Seats, are sometimes formed of rustic work, in the manner shown in *fig. 22*. To form this seat, three young larch trees with the bark on are fixed in the ground in the manner shown in the ground plan (*a*); and there may, if thought necessary, be a fourth placed in the centre. To give the work a more finished appearance, each tree may have a plinth (*b*) and capital (*c*) nailed

FIG. 22. RUSTIC SUMMER-HOUSE.

on, as shown in the figure. Three curved pieces of wood may serve as a floor, and similar pieces, fixed at about eighteen inches from the others, will form the seats, with a slight frame of rustic work for the back. Pieces of hoop may be bent from the capitals of the columns to form arches, and the roof may be thatched. In *fig. 22.*, a kind of drapery of pine cones hangs from each arch, and the tops of the trees project through the roof, a large cone of the stone pine being placed on the summit; but these decorations may be omitted if thought unnecessary, or they may be varied according to the taste of the proprietor.

The Uncovered Seats, in a garden or pleasure-ground, are generally purchased ready made; but an agreeable variety may be occasionally produced, by having the stump of an old tree formed into a seat, and twining ivy and creeping flowering shrubs round it. Where it is an object to save trouble, a plant of the Virginian creeper may be planted with one of the giant ivy; and if both are left to nature the effect will be very good, as the brilliant deep red of the Virginian creeper in autumn will be relieved by the dark green of the ivy. A few moveable seats, one large to wheel about from one part of the garden to another, and others of the folding kind imported from Norway, are very convenient. Where there is a terrace, a seat may be erected at each end, of wood, but of a somewhat massive design, and painted white, being strewed, while the paint is wet, with very fine sand, which will make it a good imitation of stone. Seats may also be decorated by nailing upon a wooden

framework hazel rods with the bark on, of the same kind as those used for the rustic summer-houses. In situations where there is a fine prospect on two sides, the back of the seats may be made to turn on a pivot, so as to face either way at pleasure, as is the case on the ramparts at Geneva and other places on the Continent.

Rustic Baskets.—There are, perhaps, few things over which the alchemy of taste has more power, than the apparently worthless materials of which these elegant ornaments are constructed. An old cask, a few pine cones, and a few pieces of rope, combined by skilful hands, will produce an almost magical effect. The baskets at Dropmore were all constructed in this manner from designs by Lady Grenville. As an example of what may be done with the

FIG. 23. RUSTIC BASKET.

commonest materials in this way, *fig. 23.* is an old Chinese tea-chest, with part of a tree sawn through as a pedestal, and some pieces of rope nailed on as decorations; and *fig. 24.* is an old basket with all its interstices stuffed with moss.

FIG. 24. MOSS BASKET.

Many other articles might be devised, which any person of taste and invention would find it an agreeable occupation to design, and to superintend the execution of. In addition to these rustic baskets, a few wirework frames might be designed of much more elegant forms than those commonly sold, which an intelligent gardener might be easily instructed to make at his leisure hours; and, indeed, a lady, with two pairs of small pincers, would find no great difficulty in twisting the wire herself. The principal point is to exercise our own skill and ingenuity; for we all feel so much more interested in what we do ourselves than in what is done for us, that no lady is likely to become fond of gardening who does not do a great deal with her own hands.

Fountains.—Though fountains are more suitable to a hot country than to a weeping climate like that of England, yet it must be confessed they are generally a great improvement to garden scenery. The first thing to be considered before erecting one is, where to make the reservoir; as on the elevation at which that is above the garden depends the height to which the water of the fountain will ascend. The length of time which the fountain will play depends on the quantity of water contained in the reservoir; but this has nothing to do with the height to which the water will rise. If a cistern be formed on the top of a summer-house ten feet and a half high, and a pipe from that be carried down to a sufficient depth in the ground to secure it from frost, and thence horizontally to the orifice which is to form the fountain, that orifice, if it be only half an inch in diameter, will throw up a jet of water ten feet high, and will continue playing till all the water in the cistern is exhausted. The conducting pipe for such a fountain should be two inches and a quarter in diameter, and it should be furnished with a valve or stop-cock, which may be turned at pleasure, and by which the water may be either suffered to ascend through the orifice, or retained in the conducting pipe. The reservoir cistern must be kept full by a forcing pump, or hydraulic ram; or, in the neighbourhood of London, by high service from the water company which supplies the dwelling. Any cistern sufficiently high above the garden will do. Where a cistern in the roof is well supplied with a high-service pipe, a fountain with a jet thirty or forty feet high, according to the height of the house,

might be had in the garden, at no other expense than that of fixing descending and horizontal conducting pipes. Fountains may be erected of almost any size, where there is a sufficient quantity of water. The highest that is known is one called "The Emperor" at Chatsworth, which, from a single jet, throws a column of water nearly 300 feet high, and which requires such an abundant supply, that in one hour it will lower an acre of water the depth of one foot.

When fountains do not play properly, the fault will generally be found to lie in the horizontal conducting pipe, in which an accumulation of earthy matter deposited by the water, or of air, has taken place. To avoid the danger of the earthy deposit the conducting pipe should be made gently slanting towards the orifice from which the water is to ascend; and to prevent any stoppage arising from air, small air-cocks should be affixed to the pipe in suitable places. When a fountain ceases to play, it may generally be restored to action by clearing the pipes with water forced through them by a forcing pump. Should this fail, the plumber should be sent for, as probably one of the pipes has burst.

The water in a drooping fountain may be made to form various designs, by means of little tubes of brass, called *ajutages*, which are screwed on the orifice of the upright pipe. Some of these designs imitate a convolvulus, some a wheat-sheaf, some a basket, and some a globe. In short, they are very numerous; and, after exhausting the fancy of the English plumbers, a variety of different and very elegant designs may be obtained from Paris.

Portable Fountains have been lately invented

by a manufacturer named Plasse, in the Rue St. Honoré, Paris. These fountains require to be wound up with a key, as some kinds of lamps are; and when wound up, they will continue going for an hour. They are made of various materials, and some have the pedestal and basin painted to imitate marble; while others have the pedestal formed of rustic work. In *fig. 25.* the pipe for the water passes through a crystal globe, ornamented with leaves, and in which there are several coloured globules, which show a great variety of light as the water falls upon the globe. Some of these fountains are so contrived as to have a box for flower pots on each side of the water; and some of

FIG. 25. PORTABLE FOUNTAIN.

them are made large enough to play for three hours after being wound up. All these portable fountains are furnished with a cover to fit on the basin, to preserve it from dust when not in use.

CHAPTER XI.

WINDOW GARDENING, AND THE MANAGEMENT
OF PLANTS IN POTS IN SMALL GREENHOUSES.

PLANTS kept in living-rooms are either grown in glasses of water or in pots. The plants grown in water are, hyacinths, which are generally kept in glasses intended solely for that purpose; crocuses, which are usually grown in earthenware vessels, with holes for the flowers to come through; Van Thol Tulips; and Polyanthus Narcissus. Of these the hyacinths are by far the most common and the most certain of success. The best time for procuring these bulbs is October, and the water should just reach the bottom of the bulb. When it is wished to hasten the growth of the plants, warm water should be used; and many persons advise boiling the water before putting it into the glasses, to prevent its becoming bad by standing. Many persons advise keeping the glasses in the dark till the roots have developed themselves, but this is rather a doubtful practice, and is not always attended with success. Various expedients have been devised for keeping the hyacinths upright, as when there is a heavy flower it sometimes falls over and over-balances the roots.

The management of plants in pots when kept in living-rooms is extremely difficult from

the want of proper light and moist air : though this latter want may, in some measure, be obviated, by opening the window in front of which the plants stand, whenever circumstances will permit. It should never be forgotten that atmospheric air is as essential to plants as water ; and that they are seriously injured by being forced to inspire air at their breathing pores that is in too dry a state for them. I have often observed the healthy appearance of plants belonging to cottagers ; and I believe it arises principally from the habit that most poor people have, of setting their plants out in the rain whenever there is a shower. This, by clearing the leaves of dust, enables them to perform their various functions, and to take in nourishment both from the rain and the atmospheric air. Without a sufficiency of air and light, plants will soon become weak and sickly, and their leaves will turn yellow : but, if a little fresh air be given to them every day when the temperature is not too cold, they will grow nearly as well in a room as in a greenhouse.

Another reason why plants kept in rooms are generally unhealthy is, that they are watered in a very irregular manner. Sometimes they are suffered to become so dry that the mould in which they grow will crumble under the pressure of the finger, and the spongioles of the roots are quite withered ; and then water is given to them, quite cold from the pump, though they have probably been standing in a temperature of from 60° to 70° ; and part of this water is suffered to remain in the saucer for a day or two, till even the healthy part of the roots is

thoroughly chilled, and the plant, if of a delicate nature, is destroyed. The reverse of all this should be the case. The plant should never be suffered to become so dry as to have the mould in a crumbling state; but, if such a circumstance has occurred, it should be well watered with water at least as warm as the temperature of the room, and better if rather warmer. Enough of this water should be given to fill the saucer; in order that every part of the mould and of the roots may imbibe some benefit from the moisture; but, as soon as this has been done, the pot should be lifted out of the saucer, and the water thrown away, as nothing can be more injurious to the roots of most plants, than to have the pot they grow in kept standing in water. There are, however, some exceptions to this rule, such as all the kinds of *Mímulus*, the *Hydránga*, *Cálla* (or *Richárdia*) *æthiópica*, and some kinds of *Calceolària*. All these, and all marsh plants, require abundance of water, and will not flower well unless the saucer be kept half full; but even with them the water should be changed every day.

It is also a common fault to put plants kept in rooms into too large pots; or, as the gardeners express it, to over-pot them. This has always a bad effect. If the soil be good, and not over-watered, the plants will, indeed, grow rapidly; but it will be to produce leaves and branches instead of flowers: and if the soil be over-watered, the mass of soddened earth round the roots has the same effect upon them as stagnant water in the saucer. The soil should always be in such a state as to admit air with

the water to the roots; and this it cannot do when it becomes a blackened paste by being saturated with water. At the same time, frequent repotting is often absolutely necessary to keep the plants in a dwarf compact habit of growth, and to prevent them from being drawn up. The way in which gardeners ascertain when repotting is necessary is, by turning the plant out of its pot with the ball of earth attached; and, if they find the roots look white round the outside of the mould, then the plant should be transferred to a larger pot; but only one size larger: afterwards it may be repotted again if necessary, but always in a pot only a little larger than the one it was taken from. By persevering in this mode of treatment for a good while, and never advancing more than one size at a time, a plant may be grown to a large size, and made to produce abundance of flowers; while by the contrary treatment, that is, suffering it to remain in a very small pot, or shifting it suddenly into a very large one, the stem will become weakened and elongated, and the flowers will be few and very poor. In short, on the skilful management of repotting, or shifting, as the gardeners call it, a great deal of the art of growing plants in pots depends.

The best soil for plants in pots was formerly considered to be peat, mixed with vegetable mould and sand; but it is now found that turfy soil chopped loosely up and mixed with charcoal roughly broken, is incomparably better. In the case of heaths and other hair-rooted plants, the soil should be mixed with broken stones and pebbles, some of the latter being

laid on the top. It was formerly the practice to sift the soil for plants in pots, so as to exclude every stone, and even every lump; and the consequence was, that in those plants which require a loamy soil, such as the pelargoniums, the earth in the pot became a solid mass, which it was scarcely possible for water to penetrate. Where the new system is not adopted, the pots should be filled nearly a quarter of their depth with little bits of broken pots, called potsherds, so as to insure complete drainage. When plants are shifted, they are turned out of their old pots with their balls of earth entire; the roots are then examined, and if any are wounded or decayed they should be cut off. The new pot having had a layer of potsherds put at the bottom, with a little earth laid over them, the plant is placed in the centre, so that the bole or collar may be just above the level of the rim, and the new earth being put in, the pot is shaken to make it settle; the plant is then slightly watered, and set aside in the shade for the rest of the day. Plants should never be repotted when in flower; the best time is, indeed, when they are growing, before their flower buds begin to swell, as,

FIG. 26. POT-HOE.

when the flower buds have appeared, they should be allowed to remain undisturbed till the flowering season is completely over. Sometimes the soil in a pot becomes covered with moss. When this is the case, the moss should be taken off, and the soil loosened with a pot-hoe (*fig. 26.*). This little hoe is also very useful when the soil in a pot has become hard and caked together, so as to be

impervious to the air. Sometimes the soil in a pot looks black from over-watering; and when this is the case, the plant should be turned out of the pot, and the black sodden earth shaken off the roots, which should be cut in, and should have all their decayed parts removed. A clean dry pot should then be procured, of the same, or nearly the same, size as the one the plant was taken from, and a quantity of potsherds (old pots broken into small pieces) having been put in so as to fill about a quarter of the pot, it should be filled up with a compost of vegetable mould, sand, and peat, mixed with lumps of charcoal. Thus treated, and only moderately, but regularly, watered with warm water, which should never be allowed to stand in the saucer, the plant will soon recover: and, if judiciously pruned, should the stem have been elongated, it will become handsome, and what gardeners call well grown.

Rough potting.—The advantage of admitting air in small quantities to the roots of plants no sooner began to be understood, than plans were devised for mixing various substances with the soil, so as to prevent it caking together. The first person who practised this system to any extent was the late Mr. M'Nab of Edinburgh, who mixed large pebbles with the soil with which he potted his heaths, and his plan was attended with decided success. Many years afterwards, Mr. Barnes, gardener to Lady Rolle at Bicton, in Devonshire, introduced a system of potting plants in a soil composed of chopped turf, sand, and charcoal. This system, which he called rough potting, was found to

answer admirably with some kinds of plants, but not to succeed in all cases.

Another mode of potting plants, called the one-shift system, was introduced about the same time, but it is scarcely worth mentioning, as it has proved a decided failure. It consisted in removing plants at once from small pots into very large ones, and though it succeeded in some cases, it was in very few.

One great objection to growing plants in rooms is, the difficulty that exists in keeping them clear of insects; particularly of the aphis, or green fly, and the kind of mite commonly called the red spider (*Acarus telàrius*). These are generally destroyed by fumigating them with some kind of fumigating bellows. Washing with a sponge, and syringing with abundance of water, are better modes, particularly the latter; as it has been often observed that neither the green fly nor the red spider will ever infest a plant that is frequently syringed.

Flower-pots are of many different kinds, but those of the common red earthenware are decidedly the best, because they are the most porous, and consequently do not retain the moisture so as to be injurious to the plants they contain; but they should always be washed clean and suffered to become quite dry before they are used. Pots glazed inside were recommended some time since, but they are found not to succeed. Flower-pots are of various sizes, which are designated by the number made out of a certain quantity of clay called a cast. Thus the largest size, which is a foot and a half in diameter, is called a two,

because there are only two made out of a cast; and the smallest-numbered size, which is only two inches in diameter, is called a sixty, because there are sixty pots made out of one cast. When I was in my gardening noviciate, I used to be very much puzzled when I was told that rooted cuttings should be potted in thumbs or in sixties, and that a plant which required transplanting should be put in a twelve or an eight. Thumbs are still smaller pots than sixties, for there are eighty to the cast; but they are not described by their number, and are called thumb-pots, because they will not hold more than a large-sized thumb. Besides the common flower-pots, there are double pots, one of which has been sent me by Captain Mangles, which are very useful for balconies, as the roots of the plants are apt to be injured by the outside of the pot in which they grow being dried by the wind, or heated by the sun. When double pots are used, the interstice between the pots may be stuffed with moss kept moist. It does not do, however, to keep plants long in these pots without changing the moss, as if it is suffered to cake together, it prevents the air from entering through the pores of the flower-pot, which it should do to keep the roots in a healthy state. China or any kind of glazed pots may also be used for balconies, as the material of which they are composed does not permit evaporation; but they are liable to the same objection as pots glazed inside, though in a less degree, and when used they should always be filled at least a third of their depth with broken crocks, or potsherds, to insure drainage. A very elegant Etruscan

FIG. 27. ETRUSCAN FLOWER-POT.

INNER POT OF EARTHENWARE.

flower-pot (*fig. 27.*) has been lately manufactured of china by Messrs. Copeland and Garratt, with an inner pot of earthenware to prevent injury from the want of evaporation. Another china pot, with an inner pot of earthenware, is made like a basket (see *fig. 28.*). In

FIG. 28. BASKET POT.

INNER POT OF EARTHENWARE.

these flower-pots the inner pot is made with holes for drainage, and the outer pot serves as a saucer. Another kind of flower-pot, manufactured in Derby of the common red porous earthenware, combines the beautiful form of a vase with all the convenience of a flower-pot and saucer (see *fig. 29.*). Hunt's flower-pot

FIG. 29. THE VASE FLOWER-POT AND SAUCER.

and saucer are also so contrived as to leave a sufficient space between the bottom of the pot and the saucer to prevent the water in the latter from injuring the roots of the plants.

All pots should be well drained, by having a layer of potsherds at the bottom, to prevent the hole from becoming choked up with the earth pressing against it; and hair-rooted plants, such as heaths, and most of the Australian shrubs, if the earth in which they are grown is not mixed with stones, should have the pot filled to a third of its depth with potsherds. Succulent plants, such as the Cactaceæ and the

mesembryanthemums, should be drained with cinders; as the potsherds, being of a porous material, would retain too much moisture for their roots.

Portable greenhouses. — The French, who generally excel us in contrivances for portable luxuries, have lately invented a kind of greenhouse which may be kept in a room, and in which plants, in very small pots, may be forced into flower. Many of these curious little pots with plants in them, looking like fairy flowers, have been lately exhibited for sale in the London flower markets; and they may be easily grown by any one who chooses to take the trouble, in a portable greenhouse like that shown in *fig. 30*. This consists of three pieces of earthenware: viz. *a*, the foot, on which stands *b*, the

FIG. 30. CIRCULAR PORTABLE GREENHOUSE.

basin, which is surmounted by the plate *c*. In the foot, *a*, is placed a tin or earthenware lamp, *d*. Three or four inches above the wick is placed a short iron cistern, *e*, supported by three feet, which rest on the bottom of the basin, *b*; it is three inches deep, seven inches in diameter, and is fed by a pipe and funnel, *f*, into which water is poured until it can be seen at the bottom of the funnel, which shows that the cistern is full. The plate *c* is formed of common red earthenware, and consists of two circular trenches, *g g* and *h h*, four inches broad, and as much deep. These trenches are filled with sand, and in the trench *g* are placed, in two rows, eighty-six very small pots. In the trench *h* are forty more pots; so that in the two nearly 130 cuttings may be struck at one time. In the foot, *a*, is a door, fastened by a button, to admit of taking out the lamp, and of replacing it when needful. The lamp is supplied with the air necessary for combustion by eight holes bored at *i*; by eight still smaller ones at *k*; and by eight or ten in the plate at *l*. There is a metal plate pierced with holes at *m*, through which the greater part of the heat rises; so that the trough *h h*, is much hotter than the trough *g g*, which is warmed principally by the hollow spaces at *n n*. The difference of heat between the two troughs is so great, that it is said hothouse plants may be struck in the trough *h*, and greenhouse ones in *g*. The frame is covered with the hand-glass, *p*; which, of course, may be removed at pleasure.

The cuttings that are struck in the small pots are taken from the ends of the shoots, with

flower-buds on them, so that they produce flowers though only a few inches in length.

The management of plants in a common greenhouse differs very little from that of plants in rooms. Whenever the weather will permit, air should be given, if only for half an hour, in the middle of the day. The house should be kept clean, and free from dead leaves; and the plants should not be too much crowded. Nothing can look worse than pale, sickly greenhouse plants, drawn up to an unnatural length, and so weak that their stems will not stand upright without the aid of a stick. When greenhouses are crowded with plants, some of which are too far from the light, this must be the case; and, should it be so, it is quite hopeless to expect either healthy plants or fine flowers. Though it is advisable to have saucers to the pots of plants kept in rooms, for the sake of cleanliness, it is much better for those kept in the greenhouse to be without them. All persons having a great number of plants in pots should be provided with a small watering-pot, having a very long spout, for the convenience of reaching the different pots; and care should be taken to give water to each pot in succession, by resting the spout of the watering-pot in turn on each. The watering-pot may have roses of two

FIG. 31. WATERING-POT FOR GREENHOUSE PLANTS.

or three different kinds, to screw on as wanted (see *fig. 31.*).

As different greenhouse plants require a somewhat different treatment, the following directions for the management of a few of the most popular may be useful to my readers.

Camellias.—The camellia is a plant which requires abundance of water, and is yet soon killed by suffering stagnant moisture to remain about the roots. When grown in pots there should be abundant drainage; that is, the pots should be about a quarter filled with potsherds. The soil should be peat-earth and sand, which may be mixed with a little vegetable mould and charcoal, if it is desired to have the plants of very luxuriant growth; and they should be potted high, so as to let the collar of the plant be quite above the rim of the pot. The pots should not have saucers, or, if they have for the sake of cleanliness, the water should be carefully poured out of them immediately after the plants have been watered. The plants should be watered abundantly every day while their flower-buds are swelling; as, if this be neglected, the buds are very apt to drop off. When the flowers begin to expand, the watering is not of so much consequence, though it should be continued in moderate quantities; and abundance should be again given when the plants are making their young shoots. After they have done growing, watering once or twice a week will be sufficient till the flower-buds again begin to swell. During the growing season, the plants should be set out and syringed all over the leaves once or twice a

week; but care should be taken not to do this when the sun shines, or at any rate not to set the plants in the sun while they are wet, as the heat of the sun acting on the water will scald the leaves, and make them appear blotched and partially withered. The roots of camellias are seldom very strong, and they are very easily injured. Great care should, therefore, be taken, when the plants are repotted, not to bruise the roots, or to cut off all that are in any way injured. If, on turning out the plants previously to repotting, the ball of earth has no white roots appearing on the outside, the earth and decayed roots should be shaken or cleared away, till good roots are seen; and these should be carefully examined, and all the bad parts cut away. The plants should then be repotted in pots not exceeding by more than an inch the diameter of the ball of earth left round the sound roots; and they should be well drained at the bottom with very small potsherds or clean gravel. Small camellias should not be shifted oftener than once in two years; and large ones, that is, those above five feet high, not oftener than once in three or four years: but if the earth in the pot appears to have sunk, a little vegetable mould may be laid on the surface. The usual time for shifting camellias is just when they have done flowering, before they are beginning to send out their young shoots. When planted in the free ground in a conservatory, they will require no other care than regular watering, and syringing the leaves once or twice a week. When planted in the open air, the roots should be carefully

protected by straw during frosty weather. There are some camellias in the Vauxhall Nursery (Messrs. Chandler's) which have been treated in this manner, and have stood out for several years. The hardiest kinds, and the most suitable for planting in the open air, are, the Single Red, the Double Red, and the Double White. The magnificent *Camellia reticulata* is also said to be tolerably hardy. The tenderest of the common kinds are, the beautiful apple-flowered variety of *C. Sasánqua*, and the single variety of this species, the flower of which resembles that of the tea plant. These plants are both of low growth, and ought always to be kept in pots. Camellias are very often infested with insects, particularly a kind of black aphid, the only remedies for which are fumigation and constant syringing. The leaves of camellias should be always syringed on the under side, as well as on the surface, as they curve inwards a little, and thus afford a shelter to insects, from which it is very difficult to dislodge them. For an account of the new method of grafting the camellia, now practised with great success at Knight's Exotic Nursery, King's Road, Chelsea, and some other places, see p. 90.

Geraniums, or Pelargoniums.—The beautiful greenhouse shrubs which we are accustomed to call geraniums, have, in fact, been long separated from that genus, and formed into a new one called *Pelargonium*. The principal difference is in the shape of the seed-vessel; that of the *Pelargonium* being like a stork's bill, and that of the *Geranium* like a crane's bill. Both

are nearly allied to the touch-me-not; and, when the seed is ripe, the valves of the seed-pod burst asunder and curl up. There are almost innumerable species, hybrids, and varieties of Pelargoniums grown in our greenhouses, so mixed up together by hybridising that it is very difficult even to class them. One of the hardiest kinds, which has numerous descendants, is the Horse-shoe Geranium (*Pelargonium zonale*); and another, *P. inquinans*, is the common Scarlet. The Rose-scented Geranium (*P. graveolens*) and the Oak-leaved (*P. quercifolium*), with their numerous descendants, the flowers of which are all crimson, striped with brown so very dark that it looks almost black, are also tolerably hardy. All the shrubby kinds, which are generally kept in greenhouses, require a rich loamy soil, that is, about half very rotten dung and half sandy loam, to make them produce fine flowers. When the flowering season is over, the plants are cut down, and cuttings made from them. (See page 69.) When these have struck, they are potted in a compost of vegetable mould and sand, and kept in this soil till February or March, when they are repotted in rich soil for flowering. When the plants are wished to flower particularly well, they are put into hotbeds after repotting in February or March, to bring them forward; and they are tied down to little sticks placed round the pot, to keep them bushy. Some gardeners throw away the old plants as soon as they have made the cuttings; but others take the old plants out of their pots, |

and, shaking the earth from them, cut in the roots, and repot the plants in smaller pots; or tie them up by the roots, and hang them in a cellar till the time for repotting in spring. Some persons, after taking them out of the pots, lay them in rows in a cellar, and cover the roots with sand, till February, when they are repotted and placed in a hotbed to start them, as the gardeners call it, that is, to make them begin to grow. No plant has been more improved than the pelargonium by the new system of rough potting, and mixing the soil with charcoal. According to the old plan, the loamy soil in which the geraniums were planted soon caked together, and became so hard as to be alike impervious to water and air. I have myself found the ball of earth of a geranium hard and dry in the centre, though I had watered it every day. When this is the case, the plants, being deprived of their proper supply of carbon, become weak and etiolated, and are more disposed to produce stems and leaves than flowers. By the system of rough potting, on the contrary, air and water are admitted freely to the roots; and the consequence is that the plants are compact in shape, and covered with superb flowers. Pelargoniums require a great deal of air; and when about to flower they should have a great deal of water, but at other seasons very little. They are killed with the slightest frost; and they are very liable to damp off, if watered too much, and not allowed sufficient air, in winter. Air is, indeed, quite essential to them. The best

geranium-growers in or near London are Mr. Catleugh of Hans Place, Chelsea, and Mr. Gaines of Battersea.

Heaths.—The kinds grown in greenhouses are all natives of the Cape of Good Hope, and they are very numerous: but they may be classed under six heads, which are named from the shape of their flowers. These divisions are, tubular-shaped, ventricose, spreading or salver-shaped, with an inflated calyx, globular, and ovate. They all require to be potted high, and to be grown in three parts of peat-earth to one of fine white sand, or in what is emphatically called heath-mould. According to the late Mr. M'Nab's system, pebbles or broken stones are mixed with the whole of the soil for heaths, and to these Mr. Barnes adds charcoal with astonishing success. The pebbles are laid also on the surface of the earth in the pot, and on removing them abundance of delicate white roots will be found under each. In potting, the collar of the plant should always be kept above the soil, as it is very easily rotted by moisture. Heaths require good drainage and frequent waterings; and, though the water should never be allowed to stand in the saucer, the roots should not be allowed to become quite dry, as, when once withered, they can never be recovered. Heaths also require abundance of free air, and no plants are more injured by being kept in rooms. They should not be shifted oftener than once in three or four years. They are propagated by cuttings taken from the tips of the shoots, and then struck in pure white sand. The pots containing

the cuttings should be plunged up to the rim in a hotbed, and each should be covered with a bell-glass. Heaths are easily killed by frost, which acts upon them by splitting, or rather shivering, their stems; and they are very apt to become elongated, and bare in the lower part of the plant. The remedy for the last evil is, tying the branches down to little sticks painted green, so as to be scarcely seen, and by this treatment the heaths become dense masses of flowers. Mr. Barnes practises this mode to a great extent at Bicton; and the consequence is, that his heaths are some of the finest in the kingdom. The best heaths near London are those of Messrs. Rollisson of Tooting; but there are also very good collections at Messrs. Henderson's, Pine-apple Place, Lee's, Hammersmith, and Chandler's, Vauxhall.

Verbenas.—No family of plants better rewards the care of the cultivator, and none can be more beautiful, than the verbenas. The old scarlet Verbena Melindres, or, as it is frequently called, *V. chamædrifolia*, is the most brilliant of all the kinds, though it is one of the most tender. It is a prostrate plant, and, when pegged down, it is well adapted for covering a bed in a geometric flower-garden; or it may be planted in a vase or rustic flower-basket, to hang down over the sides. Verbena Tweediana is an upright-growing plant, and though the flowers, which are crimson, are not half so brilliant as those of *V. Melindres*, the plant has the great advantage of being one of the hardiest of all the kinds. *V. Melindres latifolia* and *V. M. splendens* are both hardier than their parent,

and they unite its brilliant colour with the upright habit of *V. Tweedieana*. *V. incisa* has pale pink flowers, and an upright habit of growth. It is tolerably hardy, and grows freely, but its flowers have a faded look. *V. Arraniàna* has an upright habit of growth, and purple flowers, with very dark bluish-green leaves. It is very tender, and very apt to be attacked by a kind of aphid and other insects. *V. pulchella*, *V. Aubletia*, *V. Lamberti*, and *V. Sabini* are prostrate tufted half-herbaceous kinds, and all hardy. *V. Neillii* has lilac flowers, and rather an upright habit of growth; and *V. teucrioides*, which has been much more praised than it deserves, is a coarse-growing plant, with a long spike of white flowers, which turn pinkish in dying off. There are also *V. sulphurea*, a yellowish kind; *V. venosa*, a very strong-growing species, with purple flowers; and many other species, with innumerable hybrids and varieties that are increasing every day. All the verbenas require to be grown in sand and peat, or heath-mould, and to be kept moderately watered: they all strike readily from cuttings or layers; and, indeed, when pegged down, even without any slitting or twisting, most of the shrubby kinds will throw out roots at every joint. When worm-casts are observed on the surface of the earth in the pot, as will very often be the case, the plant may be turned out with its ball of earth entire, and the worms, which will always be found on the outside of the ball, may be picked off. Worms do considerable injury to plants, especially such as are in pots, by rupturing the

fibres, and impeding the free percolation of the water, besides giving the surface of the earth in the pot a very unpleasant appearance. The flowers of the verbenas should always be cut off as soon as they wither. The Lemon Plant (*Verbena triphýlla*, now called *Aloysia citriodora*) is remarkable for the sweetness of the odour of its leaves. It is tolerably hardy, but requires great care in watering; as the leaves will soon curl up and wither if it has too little water, and they will drop off if it has too much. The flower has no beauty; and the only recommendation of the plant is the delightful fragrance of its leaves. In Devonshire I have seen bushes of this plant ten and twelve feet high in the open garden.

Petunias may be raised either from seed or cuttings, as they seed freely, and strike readily. The first kind introduced was *Petunia nyctaginiiflora*, which produces a great abundance of large, white, fragrant flowers; *Petunia phœnicea*, or *P. violacea*, is another original species; and from these two nearly all the hybrids and varieties now found in gardens have arisen. These petunias hybridise freely with each other, and most of the kinds produce abundance of seed; but *P. bicolor* is a distinct species, which does not either mix well with the others, or seed freely. Petunias may be treated as annuals, and raised on a slight hotbed every year from seed; and, thus treated, they will do very well in the open ground. In warm dry situations, they may even be suffered to sow themselves every year, when they will come up and flower abundantly. Treated as greenhouse plants,

they are, however, all shrubby, and will last several years. When intended to be kept in pots, the seed should be sown on a slight hot-bed in February, and the young plants should be pricked out into very small thumb-pots, while they are in the seed leaf. In these pots they should remain either in the frame of the hotbed, or in a room or greenhouse, for about a week or ten days, and they should be then shifted into somewhat larger pots. These shiftings, always into somewhat larger pots, should be repeated six, eight, or ten times, if the plants are wanted to be bushy; and not more than four, if the plants are wished to grow tall. The bushy plants will flower abundantly without any support; but the tall-growing plants, which are suffered to flower in comparatively small pots, must be trained to some kind of frame. When the tall plants appear to be growing too straggling, the extremities of the shoots should be taken off and made into cuttings. Petunias may be grown in any good garden soil; and they require no particular attention as to watering, &c. In fact, they are, perhaps, the best of all plants for a lady to cultivate; as they will afford a great deal of interest and amusement, with the least possible amount of trouble.

Fuchsias are another family of plants that may be cultivated with very little trouble. *Fuchsia globosa* is perhaps the hardiest kind for general purposes; though the Port Famine Fuchsia (*F. discolor*) will bear the greatest degree of cold. In the summer of 1841 I saw several large bushes of this fuchsia, from ten

to twelve feet high, growing in the gardens between Edinburgh and Stirling in the open air, without any protection during the winter; but, to my great surprise, on my return home, I found that this fuchsia does not always succeed so well near London. *F. globosa*, however, will live many years in the open ground near London; as, though it is killed down to the ground every winter, it shoots up again in spring. *F. virgata* is also tolerably hardy. All the fuchsias require a light rich soil, or a mixture of rich sandy loam and peat, and regular watering; as when the outer roots are once withered, either by want of moisture, or by exposure of the pot to the direct rays of the sun, the plant generally dies. For this reason the fuchsia is not so well adapted for a window plant as many others. *Fuchsia fulgens* differs considerably from the other species, and will not flower well unless in the open air, and with a sunny exposure. It is also tuberous-rooted, though woody in its stem. It is easily propagated; and even a leaf, taken off without injuring the part of the petiole which was attached to the stem, has been known to grow and form a plant. Several handsome hybrids have been produced by applying the pollen of *F. fulgens* to the stigma of *F. globosa*, *F. conica*, and *F. gracilis*; and the reverse, as *F. fulgens*, seeds freely. It may here be mentioned, that, whenever hybrids are to be raised by fertilising one plant with the pollen of another, the anthers of the flower that is to produce the seed should be removed with a pair of scissors, before they burst. The pollen from

the other flower which is to form the hybrid should be afterwards applied, with a camel-hair pencil, to the stigma of the flower which is to produce the seed; and a bit of thread should be tied round the flower-stalk, in order that the seed-pod may be saved, and set apart. All hybrids may be obtained in the same manner; but it must always be remembered that flowers will not hybridise properly, unless they are naturally nearly allied. Another very showy species is *F. corymbiflora*, which is quite as hardy as *F. fulgens*, and will grow six or eight feet high in the open ground, producing numerous long drooping spikes of flowers, which have the tube part of a bright rose colour, and the petals of the richest and darkest carmine. The flowers continue for a long time opening at the extremity of the spike, as those which first opened fade and drop off. This species does not seed freely; but it agrees with *F. fulgens* in growing best in the open air, and in requiring an exceedingly rich soil. Another very remarkable fuchsia is *F. radicans*, a climbing species, which throws out roots at every joint. This plant also appears tolerably hardy, and will be a valuable acquisition when it becomes more common. *F. cordifolia* is remarkable for the rich green which terminates its scarlet flowers, and for its large and handsome leaves, which are heart-shaped at the base. The berry, in a wild state, is frequently an inch and a half long, and it is eaten by the inhabitants of Guatemala, of which country this species is a native, growing at the height of 10,000 feet above the level of the sea. *F. macrantha* and

F. serratifolia have their flowers also greenish at the tip. The flowers of *F. macrantha* are exceedingly long, and though they are of a pale colour, they are produced in such abundance upon small plants as to be very ornamental, though they have no petals. This species was found in its native country (Peru), climbing on trees growing on lofty mountains, and in this country it only requires a greenhouse. *F. serratifolia*, on the contrary, though also a native of Peru, requires a hothouse in this country, as it grows in a wild state in moist shady valleys. The flowers of this species are very ornamental, and the stalk is of a bright red. Another red-stalked species is *F. spectabilis*, which has been called the Queen of the Fuchsias, as it is supposed to be the handsomest kind ever introduced. The leaves are of a dark green, and of a rich purple on the under side; and the flowers are of a brilliant scarlet, with whitelobed stigmas. *F. arborea* is a greenhouse species which will not bear the open air near London. The flowers are rather small and purplish, they are produced in clusters, and their shape resembles that of the flowers of *F. coccinea*. Of the small-flowered kinds, the best are *F. microphylla* and *F. cylindracea*, and they are both tolerably hardy; but they require a little protection in the neighbourhood of London. The best fuchsia for rearing as a standard is *F. gracilis*, and the mode of treating it is to keep a plant under glass growing for three or four years, and always rubbing off the side shoots, only leaving those at the top. Treated in this

manner the plant will rapidly elongate, and will take the form of a small tree with a weeping head. I have seen standard fuchsias of *F. grácilis* six feet high; and, if it is thought desirable, the head may be cut off, and the stem grafted with any other species. The principal fuchsia-growers near London are, Mr. Standish of Bagshot, Messrs. Chandler of Vauxhall, Mr. Catleugh of Hans Place, Chelsea, and Mr. Groom of Clapham Rise.

Calceolarias.—Perhaps no plants have ever been hybridised more extensively than these. The principal parents of the numerous and splendid plants that we are continually seeing produced, are *Calceolària corymbòsa* and *C. arachnóidea*, the one bearing a yellow, and the other a purple, flower; but there are many other species that have been crossed and re-crossed with these, so as to form a very great variety. *C. bicolor*, with pale yellow and white flowers, and *C. crenatiflòra*, with spotted flowers, have also been the parents of some very fine hybrids and varieties. All the calceolarias require rather a rich soil; and the usual compost is two parts of thoroughly rotten dung, one part of leaf mould or old turf, and one part of white sand. The ingredients of this compost should be well mixed together, and broken fine, but not sifted. They also require plenty of water, and abundance of light and air; and they will all flower best when allowed plenty of room for their roots. They are, however, very subject to be attacked by a kind of aphis; and, when kept in pots, they should be frequently syringed. The best

calceolarias near London are those of Mr. Catleugh of Chelsea.

Myrtles should be grown in a soil composed of peat and loam, in which the former predominates; they should be regularly watered, and frequently syringed. Some persons nip off the tips of the young shoots, to make the plants grow bushy: but, though it has this effect, it is a bad practice with the flowering kinds, as it prevents them from producing flowers. A better plan is to make cuttings, and first to plant them in very small pots, gradually changing them into larger ones, till the plants have acquired a bushy habit of growth. *Myrtles* will seldom flower well when of a large size, unless they are planted in the open ground, and when kept in pots they should be allowed plenty of room.

Mimulus.—Some of the plants belonging to this genus are very handsome, particularly the hybrids raised by the nurserymen from *M. cardinalis*, *M. roseus*, *M. luteus*, and *M. guttatus*. These species are all herbaceous, and all natives of South America, Mexico, and California. *M. tricolor* is a very beautiful annual species, which was introduced in 1848 from California. They are all nearly hardy, and, though generally grown in a greenhouse, they will stand quite well in the open air, the perennial kinds dying down to the ground in winter, but sending up fresh and very vigorous shoots in spring. When these plants are grown in the open ground, it should be in a shady moist situation; and, when they are kept in pots, they should always stand in saucers half-full of water.

This water should, however, be changed every day, and when given to the plants it should always be as nearly as possible of the same temperature as themselves. The little musk plant (*Mimulus moschatus*) requires the same treatment as its more showy brethren. As all the species of *Mimulus* have been found, in their native habitats, growing in coarse sand or gravel on the brink of a river, this kind of soil should be chosen for them in pots; and the soil in which they are grown can hardly be too poor, provided they have abundance of water. In Chili, the inhabitants eat the leaves as a kind of vegetable. The shrubby kinds of *Mimulus*, viz. the common monkey plant (*M. luteus*) and the scarlet-flowered species (*M. puniceus*), are now considered to belong to a new genus called *Diplacus*. They are both natives of California; and in their treatment they should be considered as greenhouse plants, and have rather a better soil, and less water, than the true kinds of *Mimulus*.

Hydrangea Hortensia is another plant that, when grown in a pot, requires to have the saucer kept half-full of water. There are several species of *Hydrangea*, most of which are hardy shrubs; but *Hydrangea Hortensia*, the kind usually called the *Hydrangea*, is a native of China, and only half-hardy, though it will live in the open air in sheltered situations, or with a very slight protection. This plant was named *Hortensia* by the botanist Commer-son in compliment to Madame Hortense Lapeaute, the wife of a French watchmaker. The *hydrangea* should be grown in a rich loamy soil, and pruned every year; all the old wood

being cut out, so that the wood which is to produce the flowering shoots should never be more than two, or at most three, years old. Cuttings strike readily at any season when the plant is in a growing state; if put into a rich soil and kept moist, they will root in a fortnight, and flower in a month. The flowers of the hydrangea, though generally pink, are sometimes blue; and the art of making them blue at pleasure, has long been a desideratum among gardeners. A great number of recipes for this purpose have been given in gardening books; but, though all of them are occasionally successful, none of them will insure success. Sometimes, transplanting hydrangeas that have been grown in loam into peat will have the desired effect; and, at others, watering with water in which iron has been steeped will change the colour of the flowers. The ferruginous yellow loams of Hampstead Heath and Stanmore Common are almost always efficacious, but even these have been known sometimes to fail. All that is known with certainty is, that the change of colour is only a variation, and not permanent; as cuttings taken from a blue hydrangea, and planted in common soil, almost always produce pink flowers. In Devonshire and Cornwall the hydrangeas grow to an enormous size in the open ground, and frequently produce blue and pink flowers on the same plants; and in the latter county, near the lead mines, the flowers are generally of a most brilliant blue, without any care being taken to make them so, though the soil does not appear to have any effect on the colour of other pink or rose-coloured flowers.

The Japan Hydrangea (*H. japonica*) is very ornamental, particularly the beautiful blue variety.

Mesembryanthemums.—There are very few things in gardening respecting which gardeners appear more to disagree than in the treatment of succulent plants; particularly of the mesembryanthemums, which are mostly natives of the sandy plains near the Cape of Good Hope, where they are subjected to alternate seasons of extreme wet and extreme dryness. Cultivators, attempting to imitate these peculiarities, have grown these succulents in poor sandy soil, and kept them entirely without water at one season, while they have been inundated with it at another: but the fact is, that when we attempt to imitate nature, we should remember that the attempt is useless, unless we can do so in every particular; and also that the plants we have to cultivate have been nursed up into so very artificial a state, that if they were transplanted to their native plains they would probably perish, like a poor Canary bird which from mistaken kindness has been turned out of the cage in which it has long lived. For this reason, we must adopt the mode of treating succulents which the best gardeners find most successful, without troubling ourselves to discover why it is so different from the natural habit of the plants. This mode of treatment is, then, to grow the plants in a rich loamy soil, kept open, as it is called, by the addition of lime rubbish; and to give the plants water all the year, but more moderately when they are in a dormant, than when they are in a growing, state. They should also have as

much air and light as possible. The water should never be suffered to stand in the saucer of any succulent plant; but it should be given regularly, diminishing the quantity a little every day as the season for rest approaches. If the water be suddenly stopped, the leaves of the plants will shrink and become flaccid, and, when this is the case, the plant generally dies. A deficiency of air, on the other hand, will cause the plant to damp off. All mesembryanthemums are very soon affected by frost, but will thrive in the open air in summer.

The Cactacææ, which are also succulent plants, are arranged in several quite distinct groups, which require different treatment. The first of these comprises the various kinds of Tree Cereus, which have long slender stems thirty or forty feet high, without either branches or leaves. These singular-looking plants grow on the summit of the mountains of Brazil, in a poor, dry, stony soil, and exposed on every side to the cold breezes of the lofty regions they inhabit. In England they should be kept in only greenhouse heat, even in winter; and they should have abundance of light and air; while they should be grown in pots well drained with cinders, and filled up with a mixture of loam and pounded brick and lime rubbish. The Mammillarias and Echinocácti, forming the group called the Porcupine Cácti, grow in the valleys of the temperate regions, generally in loamy soil, and among thick short grass, passing half their year in continual rain. The Opúntia, sometimes called the Prickly Pear, and sometimes the Indian Fig, is known by its flat oval leaves or rather stems, and its prickly but

eatable fruit ; and it is always found on almost barren hills, growing in narrow chinks among rocks, where there does not appear sufficient soil to nourish a blade of grass. In some cases these plants grow nearly to the verge of perpetual snow. The *Pereskias*, which have leaves distinct from their stems, grow in similar situations, and require only a moderate degree of heat ; but the *Melocácti* and the *Rhípsalis* are only found in the hottest part of the tropics.

All the *Cactæcæ* should be grown in pots well drained with cinders, and in soil composed of a little sandy loam mixed with lime rubbish. They should all be watered regularly and abundantly when they are growing, or coming into flower, and kept nearly dry during their season of repose ; and they all enjoy having their pots plunged in a slight hotbed, which makes them throw out abundance of roots.

The Australian Plants, of which so many beautiful kinds have been introduced within the last few years, should nearly all be grown in a mixture of sand and peat : and they should have their pots filled one-third with potsherds. They require abundance of water, but they will perish if water be retained about their roots. Most of the Australian plants (particularly the acacias) are very tenacious of life, and, if cut down when they appear dead, they will generally spring up again from the collar of the root.

The principal herbaceous Climbing Plants grown in pots are the *Maurandyas*, the *Lopho-*

spermums, the Passion-flowers, the *Rhodochiton*, the *Eccremocarpus*, or *Calámpelis*, the *Thunbergias*, the *Ipomœas*, and the *Cobœa*. There are, however, several others, all of which are very handsome. The greater part of these require a rich light soil to make them grow rapidly, and to be planted in the ground of the conservatory. The *Thunbergias* are very liable to be attacked by the red spider; and, like many of the other half-hardy climbers enumerated, they may be treated as annuals, and raised from seeds every year in January, and planted out in June; but they do still better treated as biennials, and sown one year to flower the next. The *Bignonias*, or *Tecomas*, are shrubby, and should be grown in equal parts of loam and peat; and this compost will suit the *Polygalas*, and other shrubby showy climbers. The *Sollyas* and *Billardieras* should be grown in peat, and frequently syringed to keep off the green fly.

All the most beautiful hothouse climbers, such as the *Allamánda cathártica*, the *Ipomœa Horsfalliæ*, *Passiflora Loudoni*, and *Petræa volùbilis*, may be grown in the open air by keeping their roots in heat; that is to say, if the roots are grown in a stove, or in a pit heated by hot water or flues to stove-heat, the stems may be brought through some opening purposely contrived, and trained over a trellis in the open garden. A very striking effect may be thus produced by having a bed heated by hot-water pipes concealed under ground, at the foot of a veranda, over which these beautiful tropical climbers may be trained.

CHAPTER XII.

CALENDAR OF OPERATIONS.

JANUARY.—January may be called the digging-month, as almost the only gardening operation that can be performed in it is digging, or rather trenching, the ground; and even this cannot be done unless the weather is open and the ground free from frost. Nothing can be imagined more desolate than the appearance of the flower-garden in this month. Perhaps the Christmas rose may be in flower, and a few lingering blossoms may remain on the *Pyrus*, or *Cydônia*, *japónica*; but this is generally all, except a few red berries that the birds may have left on the holly or the *pyracantha*. January, however, is an excellent month for the destruction of snails and insects. The snails will be found in their winter quarters, sticking to the trunk of some ivy-clad tree, or hidden beneath the coping of a wall. They are quite in a torpid state, and appear dead; but might soon be revived, by bringing them into a warm room and sprinkling them with water. Of course, however, if they are to be destroyed, it should be done without rousing them from their stupor. The eggs of insects should also be sought for and destroyed. Those of the lackey moth will be found on twigs, fixed firmly round

them like bracelets of small beads. These should be burnt, as they are too hard to be crushed. The eggs of the vapourer moth will be found on the outside of the cocoon, looking like a bag of spider's eggs. A very small scale-like insect will also sometimes be found on the branches of the rose trees, which should be carefully removed. Indeed, as a precautionary measure, it is well to brush the branches of all the rose trees in this month with soft soap and water, to destroy any eggs that may be adhering to them. Sometimes trees and shrubs are planted in January, if the weather be favourable, but this it very seldom is, as, if not frosty, it is generally very wet.

In the kitchen-garden, the fruit trees and shrubs, particularly the gooseberries, should be carefully examined for the eggs of insects; and the trunk and branches of all suspected trees and shrubs should be brushed with soft soap and hot water.

February.—In this month, if the weather be favourable, the gardeners “dress” their beds; that, is they dig and rake them, manuring them if necessary. In the flower-garden, the Californian annuals, that had stood the winter in some waste part of the grounds, are now brought forward by spadefuls, and laid over the beds intended for them. The early bulbs, such as the snowdrop and the Scotch crocus, begin to appear; and here and there a splendid cloth of gold crocus glitters among them, in its rich livery of yellow and brown. The winter aconite and the beautiful hepaticas are now in full glory; and, in short, all nature appears

awakening from the sleep of winter. This is pre-eminently the season for spring planting; and all the trees and shrubs, and even herbaceous plants, that are to be removed, are put into the ground. The garden rose trees, and other hardy flowering shrubs, are pruned; care being taken always to cut them in a slanting direction, and to a bud. When the rose bushes have sent up long untidy shoots, every alternate shoot may be cut down to within a few inches of the ground. Thus treated, the shoots that are left will flower, and those that were cut down will send up strong and vigorous shoots for flowering the succeeding year, when the present flowering stems may be cut in. The bushes will thus be kept of moderate size, and of a compact habit of growth, without the flowering being materially checked. In February the ranunculus roots are planted that are to flower in the following May, and a hotbed is made for the tender annuals. In short, the business of the gardener's year has commenced.

In the kitchen garden, if the weather be open, the gooseberries and currants should be pruned, and also such of the fruit trees as have been left for spring pruning. If the winter has been very hard, the gooseberries and currants should be left as long as possible unpruned; because the birds, when driven to distress for want of food, very often pick off the buds; and, should the number of buds have been previously diminished by pruning, the hopes of the season for a good crop of fruit are generally destroyed. Radishes and lettuce should be sown in February, and spinach; also the first crop of peas

and beans. The strawberry beds are pruned and dressed, and the raspberry shoots are shortened and cut in.

March.—This is the sowing-month. In the flower-garden the seeds of hardy annuals are sown in the open border. Turf is laid down where wanted, and grass seeds are sown. Rose trees are sometimes planted in this month, and the climbing kinds are pruned and trained. The best sorts for training as pyramids of roses are the Noisette and Boursault kinds, and some of the hybrid China. The box-edgings are taken up and replanted; and the gravel walks are raked or turned over, and new gravel added, if requisite. Whenever this is done, the walks should be well watered; and afterwards, as soon as the surface has become quite dry, they should be rolled. Unless the gravel be well watered, the rolling will do but little good; and, unless the surface be allowed to become quite dry before rolling (which it soon will, when exposed to the drying winds of March), the gravel will adhere to the roller, and the surface will be rendered rough instead of smooth. March is the first month that displays the cheerfulness and brilliancy of spring, for the flower-garden is gay with crocuses, and the bees are buzzing about them, while the birds are singing on every tree. The weather is often very fine and warm in March; but there are frequently frosty nights, during which the tree-pæonies and other half-hardy early flowering shrubs should be protected by a kind of beehive-like covering, made sufficiently large to put on and take off without injuring the

plants. In the country, these coverings may be made of platted rushes sewed together; and the gathering and platting of them will afford employment to poor old women and children in winter. Biennials, such as hollyhocks, Brompton stocks, &c., are generally transplanted in this month.

In the kitchen-garden the principal crops of all the culinary vegetables are sown, and potato sets are planted. The spring pruning and planting are also finished.

Forest trees are planted in the parks and pleasure-grounds, and trees are cut down. In short, in large places, March and April probably form the most laborious period of the gardener's year.

April.—In the first week of this month many gardeners transplant their biennials, instead of putting them into the ground in March. The hollyhocks should have a hole dug for each plant two feet deep, at the bottom of which should be thrown three or four spadefuls of strong stable manure. Many gardeners also plant their dahlia roots in this month, though others delay this operation till May, or even June. Whenever the dahlias are planted, the tubers of the dwarf kinds should be about three feet apart, but the larger sorts should be four or five feet from each other every way. The soil should be a sandy loam, not too rich, lest the plants should produce more leaves than flowers; and not too poor, lest the flowers should be poor also. A bed, dug about two feet and a half deep, with a layer of rubbish at least six inches thick at the bottom, and filled

with two parts of fresh sandy loam, and one of thoroughly rotten dung, is admirably adapted for these plants. In planting the tubers, care should be taken to arrange them in such a manner that the colours of the flowers they produce shall have a harmonious effect. In this month the auriculas generally begin to come into flower in pots, and the polyanthuses and primroses in the open ground. Tuberoses, some of the kinds of gladiolus and ixia, and other showy autumn-flowering bulbs, may be planted towards the end of April, or the first week in May. A bed should be prepared for their reception, by digging the ground about a foot deep, and taking out about half the soil, which is to be replaced by equal parts of vegetable mould and well-rotted dung. When this is well dug over and mixed, drills should be drawn in it, about three or four inches deep and eighteen inches apart, in which the bulbs (after first taking off their offsets) are to be placed about nine inches apart. The bulbs should be made quite firm in the soil, and then covered with mould an inch or an inch and a half deep. They will not require any water till a week or ten days after planting, when the roots have begun to grow, but after that they should be watered regularly. Heart's-eases for autumn flowering may be sown this month, or cuttings may be made of favourite kinds. The heart's-ease requires a shady situation, and a rich loamy soil, plentifully supplied with water. The box-edgings may be pruned in this month, but they should never be clipped. A garden-line should be stretched along the edging, at

the proper height, generally about four inches from the ground, above which the highest point of the box should not reach; and the box should be cut down to this line, every shoot being cut in a slanting direction to a bud, and only every alternate shoot suffered to reach the line. Hardy annuals also may be sown in this month, if the sowing of them was neglected in March. The ornamental kinds of *Ribes* and *Bérberis* will begin to come into flower about this time, as will *Magnòlia conspícua* and the common almond.

In the kitchen-garden, April may be called the grafting-month, though many gardeners begin to perform that operation in March. In the culinary department, those vegetables that require transplanting, such as celery, sea-kale, cauliflower, &c., are generally planted out in April. The peas and beans are hoed up, as are the potatoes; the asparagus and artichoke beds are dressed; and the onions, turnips, &c., are thinned. If potatoes for the main crop were not planted in March, they should be now. The peas should be staked when they are hoed up; and this is the best season for dividing roots of thyme and other aromatic herbs.

May. — In the flower-garden, this is the month for planting out the tender annuals which have been raised on a hotbed. The seeds of hardy annuals may still be sown, and also those of biennials for planting out the following spring. In this month, ornamental perennial plants may be propagated by slips and cuttings; and, if any were made in April

for striking in a hotbed, they may be transplanted. The leaves of the rose trees should be examined for a little brown grub which infests them at this season, and which should be picked off and destroyed. The flower-garden will now be in all its splendour. The hyacinths will be in full bloom, as will also the different kinds of *Ribes*, *Berberis*, and *Mahonia*, among the shrubs; and several kinds of *Magnolia*, the Judas tree, *Edwardsia*, &c., among the trees. The *Pæonia Moultan* will likewise expand its magnificent blossoms; and the spring heart's-ease will be coming into flower, as will the *Nemophila insignis* and several of the other Californian annuals.

In the kitchen-garden, the operations continue nearly the same as the last month. Peas and beans may be sown for the late crops, and spinach, &c. This is the proper season for sowing kidneybeans. If the first crop of peas has not been staked, it should now be done, and the tops should be taken off the common beans; both may also be hoed up. The blossoms of the fruit trees should be examined, and those attacked by insects should be instantly removed, and the insects they contain destroyed. All leaves that are found rolled up should be taken off and destroyed.

In the park and pleasure-grounds, oak trees are generally felled in May, because the movement of the sap at this season makes the bark separate more easily from the wood.

June.—In the flower-garden, this is the month for making pipings and layers of pinks and carnations, and also for making cuttings

of the tenderer kinds of roses. The hardy roses will be probably much infested with the green fly, or aphid, which should be destroyed with tobacco water. Great care should, however, be taken in using it, or the tobacco water will disfigure the plants more than even the aphid itself. Half a pound of the best shag tobacco should be put into a gallon of hot water, and the decoction suffered to stand till it is quite cold. The infested shoots should then be dipped in the tobacco water, and suffered to remain in it a few seconds, and then immediately washed in clean water. Two persons should perform this operation; one carrying a saucer or bowl with the tobacco water, and the other a jug of clean water and a saucer, to wash the shoots immediately. As, however, this operation is troublesome, I have substituted for it washing the infested shoots in clear water, with the greatest success. The aphides are thus removed with very little trouble, and the tender shoot remains so completely uninjured, that it generally expands its flowers; while the buds on shoots dipped in tobacco water almost always either drop off or become deformed.

In the kitchen-garden there is very little to do, except to sow what are called succession crops of culinary vegetables, and to continue the operations of the last month where necessary. June is, indeed, rather a month of enjoyment in a garden, than one of labour. The fruit trees, however, may be pruned of their summer shoots; and towards the end of the month, budding commences.

July.—The bulbs of hyacinths and tulips are generally taken up in this month, and put into a proper place to dry; as are the tubers of ranunculuses and anemones. The stalks of those herbaceous plants that have done flowering should be cut down, that they may send up fresh shoots, and produce a second set of flowers. The dead roses, &c., should be cut away as soon as they fade, as nothing more completely destroys the beauty of a flower-garden than a number of dead flowers mingled with the newly-expanded ones. Cuttings of verbenas and other greenhouse or window plants may be made in this month: and those that were made early in spring may be planted in the beds to supply the place of the bulbs and other plants that have quite done flowering. Roses, pinks, and carnations are in their greatest splendour in June and July. Roses are generally budded in this month; though, if the weather be moist, any time will do from June to September. The essential point is, to have the weather sufficiently moist and warm to stimulate the dormant action of the bud.

In the kitchen-garden, the shallots should be taken up; but in other respects there is nothing particular to do, except the routine culture of keeping the garden neat, and sowing the seeds of culinary vegetables for succession.

August.—The box-edgings are again pruned in this month, as they were in spring. The pinks and carnations, having done flowering, should have the layers which were made in June cut away, if they have rooted; and some German stocks and other plants, which have been

purposely raised in pots, should be planted amongst the carnations, to prevent the beds from looking bare of flowers.

The seeds of most of the annual flowers are now ripe, and should be gathered. The ever-greens and other plants in the shrubberies should be pruned, and their summer shoots cut in, if they have been too luxuriant. The bulbs of crown imperials, lilies, and all the scaly kinds, which generally remain several years in the ground without being taken up, should be planted in this month. They will grow under the shade of trees, and in any situation not too dry. If too much exposed to the sun, the flowers will fade almost as soon as they expand. Scaly bulbs that have been long planted may also be taken up, their offsets taken off, and the bulb removed to a new situation; but no scaly bulb should be kept long out of the ground.

In the kitchen-garden, this is the gathering month, as most of the fruits and vegetables are now ripe.

September.—The dahlias are now the principal ornaments of the flower-garden; and they should be kept neatly tied up, and all the dead flowers removed as soon as they fade. The autumn-flowering bulbs are now in full bloom; and all the greenhouse and frame plants that were turned out are also in flower. The beds for hyacinths and other spring bulbs should be dug over and manured.

In the kitchen-garden, spinach may be sown for use in spring; and the potatoes and other roots should be taken up. This is considered the best month for planting strawberries. The

wall-fruit will require protection from birds, wasps, and flies. Some worsted, twined backwards and forwards from projecting nails, is said to be the best protection from birds; and bottles of sugar and water, hung from the twigs, will attract the wasps and flies from the fruit. After the fruit of the wall-trees is gathered, the borders are usually lightly forked over, and what is called a top-dressing of fresh compost is spread over them.

October.—In the flower-garden, the tender greenhouse plants should be taken up. Seeds of the hardy annuals that will stand the winter should be sown, particularly those of the heart's-ease, rocket-larkspur, coreopsis, eschscholtzia, and all the Californian annuals. The best way of managing these is to choose a portion of hard ground, on which a little light earth, six or eight inches deep, has been laid; in this the seeds should be sown, and the young plants will be ready to remove by spadefuls, to the beds prepared for them, in spring.

This is the best season for putting hyacinths, tulips, crocuses, and other spring-flowering bulbs and corms, in glasses, to flower in rooms, and for planting in the ground the different varieties of *Anemone hortensis*; taking care, when planting the latter, to keep the eye of the tuber uppermost. All the kinds of *pæonies*, as well the *Pæonia Moultan* as the herbaceous species, should be planted in this month. The leaves, which fall in great abundance in October and November, should be regularly swept up, and carried to a rotting heap, that they may decay, and, when mixed with a little soil, make the earth so valu-

able to florists, which is generally called vegetable mould.

In the kitchen-garden, the remaining fruit should be gathered. Towards the end of the month some fruit trees may be planted, if their leaves have dropped; and the autumnal pruning may begin, unless the trees should be still in a growing state.

November.—In the beginning of this month, the appearance of the flower-garden is extremely desolate. The dahlias have generally been seriously injured by the frost, but not quite so much as to warrant their removal; and a few lingering flowers of other kinds recall melancholy ideas of what has been, but is past. A mild November is, indeed, the old age of the floral year; and a sharp frost, that kills all the remaining flowers, is felt positively as a relief. The stems of the dahlias should be cut down as soon as the frost has changed their flowers, and the tubers taken up soon afterwards. The names should be written on thin pieces of wood, and attached to the roots by string, or the Chester metallic wire; and they should be laid on dry boards in a cellar, and covered with sand; or in some dry place, not too warm, in a greenhouse. When the names are written on paper they are frequently destroyed by vermin; snails, in particular, are very fond of devouring paper. The temperature at which the tubers should be kept should be between 35° and 45° . The autumn-flowering bulbs should be taken up in the same manner, and kept in dry sand or moss. All the plants that require protection should be carefully covered or matted up.

In the kitchen-garden, the beds should be cleared of all haulm, &c., and dug over and dressed; and the trees which were not before planted should be put into the ground.

December.—This month is a perfect blank, both for the flower and the fruit garden; except for collecting soils, making composts, preparing labels for names or numbers, sticks or stakes for tying up plants, nails and list for fastening them; and, in mild weather, for pruning the larger and more hardy deciduous trees and shrubs, &c.

INDEX.

Acacias, 321.
 Air necessary to plants, 37.
 Allamanda, to grow in the open air, 322.
 Almond, 199.
 Aloo Bokhara, a new Syrian plum, 179.
 Alumina, or clay, 23.
 Aloýsia, 310.
 American blight, 111. 187.
 ——— ground, 261.
 Ammoniacal gas, 25.
 Anemones, 243.
 Animal manures, 25.
 Annuals, 214-217. 329.
 Aphides, 109.
 Apples, 185.
 Apricot, 176.
 April, 327.
 Arboretums, 260.
 Artichokes, 126.
 Ashes of burnt wood, useful as manure, 31.
 ——— of plants, 23.
 Ash-leaved kidney potato, 141.
 Asparagus beds, 123.
 ——— kinds of, 123.
 August, 332.
 Auriculas, 219.
 Australian plants, 321.
 Autumn radishes, 147.
 Ayrshire roses, 268.

B.

Banded snail, 113.
 Banksian roses, 269.
 Barren soil, 24.
 Basil, 158.
 Basket flower-pot, 297.
 Basketwork protectors, 104.
 Beans, 133.
 Beds, how to mark, on the ground, 210.
 Beehive-like covers, 106. 326.
 Beetles on asparagus, 124.
 Beet, red, 146.
 Berberry, 185. 203.
 Biennials, 217.
 Bignonias, 322.

Billardiéra, 322.
 Birds, 106.
 Blackened soil in pots, 292.
 Blenheim, rock-garden at, 273.
 Blooming-stage, 220.
 Bone-dust, 30.
 Border for fruit trees, 167.
 Borecole, 135.
 Bottom heat, 72.
 Bourbon roses, 267.
 Boursault roses, 269.
 Box-edgings, 121. 328.
 Briars, for budding, 270.
 Bricks of mushroom spawn, 161.
 Broad beans, 139.
 Broccoli, 132. 134.
 Brown's patent fumigator, 110.
 Brussels sprouts, 131, 132.
 Budding, 74.
 ——— points to be attended to in, 78.
 ——— uses of, 93.
 Budding-knife, 78.
 Budding's mowing machine, 256.
 Bulbs, 39. 229. 333.
 Burnet, 154.
 Burnt weeds, useful as manure, 31.
 Burying manure, 14.
 ——— seeds too deeply, 36.
 Butterflies, 106.
 Butter squash, 160.

C.

Cabbage butterflies, 108.
 ——— roses, 265.
 ——— tribe, 129.
 Cabbages, 130.
 Cactaceæ, 320. 321.
 Calámpelis, 322.
 Calceolarias, 315.
 Calendar of operations, 323.
 Californian annuals, 217. 324.
 Camellia, inarching the, 83, 89.
 Camellias, 81. 104. 302-304.
 ——— Belgian modes of grafting, 90, 91.
 Carbon, 20. 21. 37.
 Carbonic acid gas, 20. 37.
 Carnation, piping of a, 73.
 Carnations, 221.

Z

Carrots, 145.
 Cauliflowers, 132-134.
 Celery, 154.
 Cereus, 320.
 Chamber for fruit trees, 168.
 Charcoal, 32, 70, 149.
 Chatsworth, rockwork at, 274.
 Cherry, 180.
 Chervil, 156.
 Chicory, 153.
 China flower-pots, 296.
 China-rose, a cutting of the, 71.
 Chinese cherry, 180.
 — mode of layering, 62.
 Chives, 151.
 Chopped turf, 32.
 Chrysanthemums, 227.
 Clay, 21.
 Cleft-grafting, 83.
 Climbing plants, 321.
 — roses, 263.
 Cobæa, 322.
 Cockchafer, 112.
 Cold manures, 30.
 Coleworts, 131.
 Collar of a plant, not to be buried, 44.
 Colours for a flower-garden, 209.
 — how to combine, 209.
 Columna hazel, 199.
 Composts, 34.
 Constantinople nut, 199.
 Corms, 40, 241.
 Corn flag, 241.
 — salad, 154.
 Covered seats, 282.
 Covering seeds, 36.
 Cow-dung, 30.
 Cranberry, 204.
 Crategus, 262.
 Cress, 154.
 Crocuses, 240, 289.
 Cropping a kitchen garden, 122.
 Crops, permanent, 122.
 — rotation of, 128.
 — temporary, 122, 128.
 Crown-grafting, 84.
 Cucumbers, 158.
 Currants, 202.
 Curtain of bunting, 170.
 Cuttings, 64.
 — of cacti, 73.
 — points to be attended to in making, 74.

D.

Dahlia, 245.
 Dahlias, 327, 335.
 — budding, 77.
 Darkness promotes germination, 37.
 Decay, 26.
 Decayed leaves, 31.
 December, 336.

Deciduous plants, when to transplant, 42.
 Delacroix's mode of striking cuttings, 68.
 Derby Arboretum, 265.
 Destroying insects, 106-114.
 Dibber, use of the, 45.
 Digging, 3.
 — common mode of, 7.
 — operation of, 10.
 — practice of, 7.
 — simple, 11.
 — time for, 11.
 — uses of, 5.
 Diplacus, 317.
 Disbudding, 98.
 Draw-hoe, 17.
 Dried aromatic herbs, 158.
 Düdensande, 235.
 Dwarf apple of Armenia, 186.

E.

Early peas, 135, 136.
 Earths which enter into the composition of plants, 23.
 Earth-worms, 113.
 Eceremocarpus, 322.
 Echinocacti, 320.
 Edgings of box, 121.
 Eggs of insects, 323.
 — snails, 114.
 Elder, 185, 194.
 Elvaston Castle, rockwork at, 274.
 Endive, 153.
 Erminemoth, 108.
 Espaliers, 181.
 Etruscan flower-pot, 297.

F.

February, 324.
 Fennel, 156.
 Fermentation, 26.
 — of dung, use of, 25.
 Fertile soils, 24.
 Fig trees, 180.
 Filbert, 185, 198.
 Finocchio, 156.
 Firming the ground, 35.
 Fixing with water, 47.
 Flies, to protect fruit from, 334.
 Florists' flowers, 219.
 Flower-garden, 205.
 — pots, 295-299.
 Flowers, culture of, 205, 213.
 Flute-grafting, 77.
 Food of plants, 20.
 Forking, 16.
 Formation of hotbeds, 27.
 Fountains, 286-288.
 French grafting-clay, 92.
 — roses, 267.
 — spinach, 148.

Fruit shrubs, 200.
 ———— trees, border for, 167.
 ———— management of, 166.
 ———— planting, 168.
 ———— reasons why they do
 not bear, 168.
 Fuchsias, 311-315.
 Fumigating plants, 110.
 Fumigator, 110.

G.

Gaffer long-legs, 113.
 Garden fork, 16.
 ———— mould, 2.
 ———— scissors, 96, 97.
 Garlic, 151.
 Gauntlet for ladies, 70.
 Gelatine, 30.
 Georgina, 249.
 Geraniums, 304-307.
 ———— cuttings of, 69.
 German greens, 133.
 Germination of seeds, 4, 37.
 Gladiolus, 241, 323.
 Gnats, 108.
 Gooseberry, 200-202.
 Gourds, 160.
 Gourmands, 100.
 Grafting, 79.
 ———— by approach, 87.
 ———— points to be attended to
 in, 93.
 ———— season for, 81.
 ———— the pine and fir tribe, 85.
 ———— uses of, 93.
 Grafting-clay, 92.
 ———— wax, 92.
 Grass seeds, rolling in, 36.
 ———— sowing, 255, 259.
 Grasses, best kinds of for lawns, 253.
 ———— different kinds of, 252.
 Gravel walks, 326.
 ———— renovating, 121.
 Green crops, useful as manure, 31,
 32.
 ———— fly, 109, 331.
 Greenhouses, management of plants
 in, 301.
 ———— portable, 299.
 Greffe des Belges, 91.
 ———— étouffée, 90, 91.
 Grey slug, 113.
 Guano, 30.
 Guernsey lily, 240.

H.

Haricot beurre, 140.
 ———— d'Alger, 140.
 Hazel, 185, 193.
 Heart's-ease, 224.
 Heat, average, for a hotbed, 29.
 Heath mould, 23.

Heaths, 307.
 Herbaceous grafting, 84-87.
 ———— plants, 218.
 Hickory, 196, 197.
 Hoeing, 17.
 ———— up plants, 18.
 Hoes, 17.
 Hollyhocks, 327.
 Hoole House, rockwork at, 272, 275.
 Horn carrots, 145.
 Horse-dung, 25.
 Horseradish, 128.
 Hotbed, average heat for a, 29.
 ———— quantity of manure re-
 quired for a, 28.
 ———— size of a, 28.
 Hotbeds, formation of, 27.
 ———— of decayed leaves, 29.
 ———— of spent tanners' bark, 29.
 Hothouse climbers, 322.
 Hot manures, 25, 30, 31.
 Humboldt's mode of obtaining new
 trees, 63.
 Hyacinths, 40, 234.
 ———— in glasses, 40, 239.
 Hybrids, 312.
 Hydrangea, 317-319.
 Hydrogen, 20, 21.

I.

Inarching, 87.
 Indian fig, 320.
 Inosculation, 88.
 Insects, 106, 323, 324.
 Ipomœas, 322.
 Irises, 241.
 Ixias, 241.

J.

January, 323.
 Japan anemone, 245.
 ———— hydrangea, 319.
 Jefferson plum, 179.
 Jerusalem artichoke, 144.
 Jordan almonds, 200.
 July, operations for, 332.
 June, operations for, 330.

K.

Kaisha, a new Syrian apricot, 177.
 Kernel fruits, 171, 185.
 Kidney beans, 139.
 Kitchen-garden, best soil for a, 117.
 ———— form and extent
 of a, 115, 116.
 ———— situation of a, 116.

L.

Lackey moth, 107, 323.

Lady-bird, 113.
 Lady's gauntlet, 70.
 — spade, 8.
 — wheelbarrow, 10.
 Lamb's lettuce, 154.
 Large trees, removal of, 49.
 Late peas, 138.
 Lawn, management of the, 251.
 Layering, 61.
 Layers, 60.
 Laying down turf, 256.
 — in by the heels, 49.
 — out a flower garden, 206.
 — pleasure-grounds, 259.
 Leaf-rollers, 108.
 Leeks, 150.
 Leguminous tribe, 135.
 Lemon plant, 310.
 Lemon-scented verberna, a cutting
 of the, 67.
 Lettuces, 152.
 Liber, 79.
 Light, effects of, on plants, 37.
 Lime, 23. 32, 33.
 Limestone, 21.
 Lime-water, 109.
 Linings for hotbeds, 29.
 Liquid animal manure, 30.
 — manure, 30.
 — tank, 26.
 Long carrots, 145.
 Lophospermum, 321.
 Love-apple, 161.
 Lupines for manure, 31.

M.

Macartney roses, 269.
 Magnesia, 23.
 Magpie moth, 107.
 Mammillarias, 320.
 Mammoth gourd, 160.
 Manure should be exposed to the
 action of the air, 27.
 Manures, 24.
 — animal, 25.
 — mineral, 32.
 — rules to be observed in
 applying, 33.
 — theory of, 25.
 — vegetable, 31.
 March, 326.
 Marigold, common, 156.
 Marjoram, 157.
 Marrons de Lyons, 197.
 Maurándya, 321.
 May, 329.
 Medlar, 192.
 Melocácti, 321.
 Melons, 160.
 Mesembryanthemums, 319.
 Mice attack peas, 137.
 Mímulus, 316.

Mineral manures, 32.
 Mint, 157.
 Mixed manures, 34.
 — soils, 34.
 Monkey plant, 317.
 Morass, 23.
 Morello cherry, 180.
 Moss basket, 285.
 — houses, 278-282.
 — on lawns, to destroy, 258.
 — roses, 265.
 Mosses, best kinds of, for moss
 houses, 279.
 Mould, 22.
 Mouldering, 26.
 Mowing, 256.
 — machine, 257.
 Moxa, 110.
 Mulberry, 185. 192.
 Mule pink, 224.
 Mushroom beds, 162.
 — spawn, 161.
 Mushrooms, 161.
 — on lawns, 165.
 — to grow, in houses or
 sheds, 164.
 — in the open
 air, 162.
 Musk plant, 317.
 — roses, 269.
 Mustard and cress, 154.
 Myrtles, 316.

N.

Nails and shreds, 102.
 Nectarines, 172.
 New Zealand spinach, 148.
 Night-soil, 31.
 Nitrate of potassa, 33.
 — soda, 33.
 Nitrogen, 20.
 — gas, 20.
 Noisette roses, 269.
 November, 335.
 Nut trees, 195.

O.

Oak-galls, 108.
 Oak trees felled, 330.
 October, 334.
 Offsets, 59.
 Onguent de Saint Fiace, 92.
 Onion tribe, 148.
 Open summer-houses, 282.
 Operations, calendar of, 323.
 Opúntia, 320.
 Orange and lemon trees, cuttings
 of, 67.
 Oxalic acid, steeping seeds in, 39.
 Oxygen, 20. 37.

P.

- Pæony, grafting the, 84.
 Pæstum roses, 266.
 Parsley, 156.
 Parsnep, 146.
 Passiflora, 322.
 Passion-flowers, 322.
 Peaches, 172.
 Peach trees, management of, 173.
 Pears, 187-191.
 — seedling, mode of testing, by
 Van Mons, 94.
 Peas, 135.
 — to protect from mice, 137.
 Peat bog, 22.
 — earth, 22.
 Peccane nut, 196.
 Pelargoniums, 212. 304-307.
 — cuttings of, 69.
 Perennials, 218.
 Pereskias, 321.
 Permanent crops, 122.
 Perpetual roses, 266.
 Persian mulberry, 192, 193.
 — quince, 191.
 Petræa, 322.
 Petunias, 310.
 Phosphate of lime, 30.
 Phosphorus, 23.
 Pickling cucumbers, 160.
 Picotees, 222.
 Pigeons' dung, 30.
 Pigs' dung, 30.
 Pin-eyed flowers, 221.
 Pink, 224.
 Pipings, 73.
 Pits for choice soil, 16.
 — for receiving plants, 16.
 Planting a flower-garden, 206. 211.
 — bulbs and tubers, 39.
 — fruit trees, 168.
 — trees and shrubs, 261-264.
 Plants in greenhouses, manage-
 ment of, 301.
 — in pots, 52.
 — management of,
 289-294. 301.
 — mode of protect-
 ing, 105.
 — in rooms, 289.
 — in very small pots, 66.
 — kept in living rooms, 289.
 — that will bear to be hoed
 up, 18.
 — not bear trans-
 planting, 44.
 — to supply, with food, 20.
 — with spreading roots, trans-
 planting, 44.
 Pleasure-grounds, laying out of,
 259.
 — management of,
 258-264.
 — walks in, 258.

- Plum, 179.
 Pointing, 14.
 Pois sans parchemin, 136.
 Polyanthus, 220.
 — narcissus, 289.
 Polygalas, 322.
 Pomegranate, 194.
 — of Tabriz, 195.
 Pomeranian cabbage, 131.
 Porcupine cacti, 320.
 Portable fountains, 287, 288.
 — greenhouses, 299.
 Potash, 23. 31, 32.
 Potato, 141.
 — disease, 143.
 — murrain, 143.
 Potherbs, 156.
 Pot-hoe, 293.
 Pots for cuttings, 72.
 Potting, 293-295.
 Poudrette, 31.
 Pricking out, 45.
 Prickly pear, 320.
 Primitive earths, 24.
 Primrose, 221.
 Propagation, modes of, 58.
 Protecting apricot trees, 178.
 — from frost, 103.
 — wall trees, 171.
 Provence roses, 266.
 Provins roses, 267.
 Pruning, 95.
 — box-edgings, 122.
 — time for, 97.
 — to improve the form of
 the tree, 98.
 — to produce flowers and
 fruit, 99.
 — uses of, 98.
 — with a knife, 96.
 Pruning-shears, 95.
 Puddling plants, 47.
 Pulverising the ground, 6.
 Putrefaction, 26.

Q.

- Quagmire, 23.
 Quartz rocks, 21.
 Quicklime, 33.
 Quince, 191.

R.

- Radish, 147.
 Raking, 19.
 Ranunculus, 242.
 Raspberries, culture of, 203.
 Raspberry seeds found in the body
 of an ancient Briton, 38.
 Red beet, 146.
 — cabbage, 131.
 Redleaf, rockwork at, 272.
 Red spider, 113.

- Refuse of culinary vegetables, 31.
 Removing a tree or shrub, 16.
 — large trees, 49.
 Renovating gravel walks, 121.
 Repotting, 292.
 Rhípsalis, 321.
 Rhodochiton, 322.
 Rhubarb, 127.
 Ridging, 15.
 Rockwork, 272-278.
 Root, uses of the, 4, 5, 41.
 Rose baskets, 271.
 — beetle, 112.
 — chafer, 112.
 — des quatre saisons, 266.
 — gardens, 270.
 Roseries, 270.
 Roses, 265.
 Rose trees, mode of budding, 76.
 — to protect from insects, 111.
 Rotation of crops, 123.
 Rough potting, 294.
 Rules for budding, 78.
 — grafting, 93.
 — making cuttings, 74.
 — manuring, 33.
 — transplanting, 44.
 — to be observed in watering, 56.
 Runners, 59.
 — of strawberries, 127.
 Rustic baskets, 284.
 — summer-houses, 282.
- S.
- Saddle-grafting, 84.
 Sage, 157.
 Salad plants, 151.
 Salsify, 147.
 Saltpetre, 33.
 Sandy soil, 24.
 Savory, 158.
 Savoys, 131.
 Saw-flies, 108.
 Scaly bulbs, 333.
 Scarlet runners, 139.
 Scion, 74, 79.
 Scissors for gardens, 97.
 Scorzonera, 147.
 Scotch kale, 135.
 — roses, 263.
 Sea-kale, 125.
 Seats, 282, 283.
 Sécateur, 96.
 Seedling pears, mode of testing, 94.
 Seeds, sowing, 35.
 — vegetation of, 4.
 September, 333.
 Shading, when necessary, 41, 43.
 Shallot, 151.
 Shell slug, 113.
 Shreds for training, 102.
 Shrubbery, 260.
 Shrubs, 260.
 Shuker Para, a new Syrian apricot, 177.
 Silica, 23.
 Silver sand, 68.
 Skirret, 147.
 Slip to the kitchen garden, 117.
 Slips, 73.
 Slugs, 113.
 Smoothness in digging, 13.
 Snails, 113, 323.
 Soapy water, 52.
 Soda, 23.
 Soil for a kitchen garden, 117.
 — for plants in pots, 292.
 — kinds of, 21-24.
 — preparation of the, for seeds and plants, 3.
 — stirring the, 3.
 Soils, the most productive, 24.
 Solid bulbs, 40.
 Sóllya, 322.
 Soot, 32.
 Sorrel, 148.
 Sowing grass seeds. 255. 258.
 — seeds, 35, 214.
 — on a hotbed, 29.
 Spade for a lady, 8.
 Spanish chestnut, 197.
 — tinder, 110.
 Spinach, 148.
 Spongioles, 5, 41.
 Spring cabbages, 130.
 — radishes, 147.
 — water, 55.
 Spurs, 102.
 Squamose bulbs, 39.
 Stable dung, when in the most fit state to use as manure, 26.
 Staking trees, 48.
 Standard fruit trees, 184.
 — roses, 270.
 Stanwick nectarine, 172.
 Steeping seeds in oxalic acid, 39.
 Stirring the soil, 3.
 Stock, 74, 79.
 — and scion prepared for inarching, 87.
 Stone coping, 167.
 — fruits, 171, 172.
 Stool, 62.
 Strawberries, 126.
 Straw rope, 104.
 Striking cuttings, 72.
 Subsoil, 21.
 Succory, 153.
 Succulent plants, 319-321.
 — cuttings of, 73.
 Suckers, 58.
 Suedia green-gage apricot, 177.
 Sugar peas, 136.
 Sulphur, 23.
 Summary of rules for manuring, 33.

Summer-houses, 282.
 Summer pruning, 97.
 Surface soil, 21, 22.
 Sweet chestnut, 185, 197.
 ——— herbs, 156.
 ——— kernelled peach, 172.
 ——— marjoram, 157.
 Syon, rockwork at, 273.
 Syrian apricots, 177.
 ——— plum, 179.

T.

Taffo, 31.
 Tan, 31.
 Tansy, 154.
 Taprooted plants, transplanting, 44.
 Tarragon, 156.
 Tart rhubarb, 127.
 Tears of the vine, 98.
 Tea-scented roses, 269.
 Tecomas, 322.
 Teltow turnip, 145.
 Temporary crops, 122, 128.
 Tender annuals, 215.
 Thrips, 113.
 Thrust hoe, 17.
 Thunbérghia, 322.
 Thyme, 156.
 Tobacco water, 109, 331.
 Tomatoes, 161.
 Tom Thumb pelargonium, 212.
 Tongue-grafting, 82, 83.
 Training, 101.
 ——— espaliers, 183.
 ——— fruit trees in various ways, 184.
 ——— objects of, 101.
 Tramp for digging, 9.
 Transferring a design from paper to the ground, 210.
 Transparent pea, 136.
 Transplanter, 45.
 Transplanting, 41-50.
 ——— uses of, 45.
 Tree carnation, 224.
 ——— cereus, 320.
 ——— pæonies, to protect, by coverings of basket-work, 104.
 Trees and shrubs, 260.
 ——— removing, 49.
 Trenching, use of, 6.
 Trowel, 19.
 Tuberoses, 328.
 Tubers, 39, 229.
 Tulip, 230.
 Tunicated bulbs, 39.
 Turf, to lay down, 256.
 Turnip, 144.
 Tying up plants, 103.

U.

Uncovered seats, 283.
 Underground buds, 39.
 ——— stems, 40.
 Unfertile soils, 24.
 Uses of transplanting, 45.

V.

Van Thol Tulips, 232, 289.
 Vegetable manures, 31.
 ——— marrow, 160.
 Verbena, layer of a, 61.
 Verbenas, 308-310.
 Ver blanc, 112.
 Vital knot, 4.

W.

Walks in a flower-garden, 213.
 ——— in a kitchen-garden, 118.
 ——— in pleasure-grounds, 258.
 Wall fruit trees, 166, 171.
 Walls of a kitchen-garden, 166.
 ——— use of, 169.
 Walnut, 185, 195.
 Warm water, 56.
 Wasps and flies, 334.
 Water, kind of, 55.
 ——— quantity to be given, 53.
 Water-cress, 155.
 Water-shoots, 100.
 Watering, 50.
 ——— plants, time for, 54.
 ——— use of, after transplanting, 43.
 Watering-pot, 301.
 Weeds, to destroy, 121.
 Weeping ash, 264.
 Weevils, 112.
 Wheelbarrow, 9, 10.
 Whip-grafting, 82, 83.
 White hickory, 197.
 White mulberry of Iran, 192.
 Window-gardening, 289-299.
 Winter cress, 154.
 ——— pruning, 98.
 ——— radishes, 147.
 Wire-worm, 112.
 Wooden coping, 167, 170.
 Wood-lice, 113.
 Woolly aphis, 111, 187.
 "Worm i' the bud" of the rose, 109.
 Worms in pots, 300.
 Worst soil for a garden, 24.

Y.

Yellow roses, 268.

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