BEETON'S

GARDENING BOOK.

GARDEN OPERATIONS.

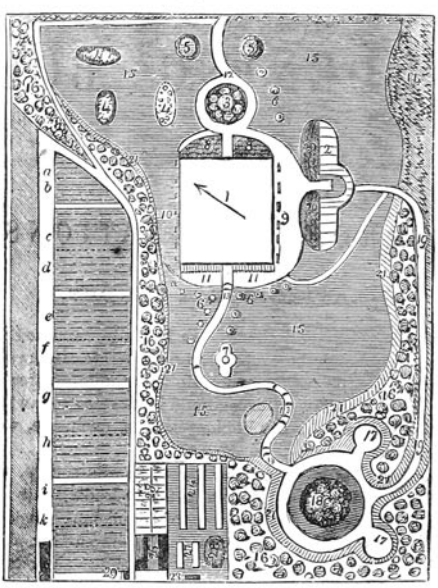
1.—LAYING OUT A GARDEN.

This subject being far too extensive to be fully discussed in these pages, our observations had better be confined to a moderate-sized garden, such as is generally attached to villa residences. We will therefore treat of a garden of a single acre. Here about two-thirds should be devoted to lawn, flower-garden and shrubberies, and one-third to kitchen-garden, exclusive, we will suppose, of the melon-ground.

The melon-ground ought to be about twenty yards square, walled or fenced round to the height of six feet, with a gateway leading into it large enough to admit a horse and cart. The drainage of the melon-ground should be perfect, the water from the pits and houses falling into a tank placed sufficiently deep in the ground to receive all the drainage from the dung-beds and compost heaps. If this tank is within the kitchen-garden, it will be invaluable in the cultivation of flowers and vegetables. Here also are placed the potting-sheds, and sheds for the preparation of composts, which should always be prepared under cover; and as the yard is by no means ornamental, it should be placed as far as possible from the house.

In the plan, 1 is the house; 2, the conservatory; 3, clump of American plants, consisting of some rhododendrons, ledums, and heaths; 4, roses; 5, flower-beds, with coniferæ in the centre; 6, flower-beds; 7, jardinette, with fountain; 8, borders planted with Alpine plants; 9, vines or ornamental climbers; 10, pears, cherries, &c., trained against the wall; 11, verandah with climbers; 12, carriage-drive; 13, arches over path for climbing roses

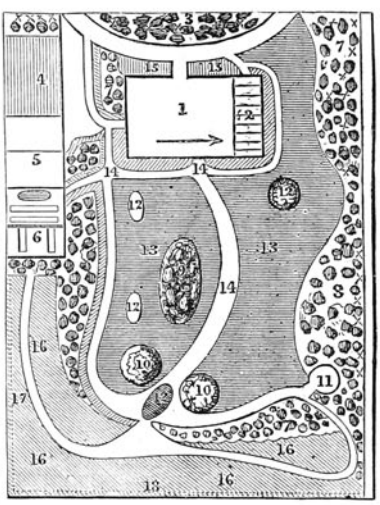
and other ornamental climbers; 14, fernery; 15, turf lawn; 16, shrubberies 17, summer house; 18, flower-beds, with deodar in the centre, surrounded by turf; 19, shady walks; 20, flower-border fronting conservatory; 21, flower-border fronting shrubberies; 22, melon-ground and compost-yard; 23, back-entrance, wide enough for carts to enter; 24, range of three forcing-pits; 25, vinery and forcing-house; 26, tool-house; 27, frames; 28, manure-bed; 29, garden entrance. The kitchen-garden being thoroughly drained, trenched, and manured, and the walls in order, the following will be its first order of cropping:—*a*, Jerusalem artichokes; *b*, gooseberries; *c*, raspberries; *d*, red, white, and black currants in rows; *e*, strawberries, seakale, rhubarb, and globe



artichokes; *f*, a row of plumtrees, asparagus, horseradish, and more strawberries; *g*, pot-herbs, potatoes, and peas; *h*, a row of pyramid apple-trees, parsnips, carrots, and turnips; *i*, cabbages, celery, broad beans, scarlet runners; *k*, pyramid pear-trees, scarlet runners, broad beans, cauliflower, and early broccoli. On the south border, plums and cherries.

In all theoretical gardening it is forbidden to crop the border on which wall fruit is planted; but this is rare in practice: the crops indicated here generally occupy such borders; but probably a line might be drawn beyond which such crops should not approach the wall. Supposing such border to be 16 feet, 12 feet might be devoted to such crops in the kitchen-garden as require a warm sunny border.

The following is another illustration of a convenient villa garden.



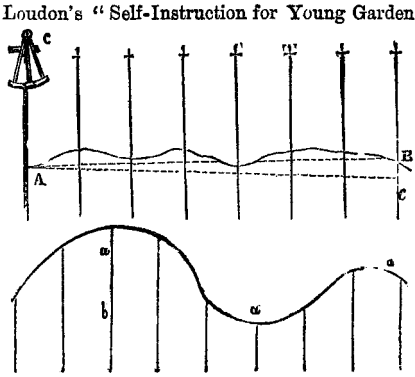
Where it can be so arranged, the garden should be an oblong square; 100 yards from east to west, and 70 yards from north to south, about the proportions laid down in the accompanying plan. This allows the vegetables to range from north to south, which is always to be preferred, otherwise they get drawn to one side by the side-light of the sun.—1, The site of the house; 2, the conservatory, 3, a clump of trees and shrubs fronting the main entrance; 4, coach-house and stables; 5, tool-house; 6, manure and frame-yard; 7, flower-borders and shrubberies; 8, ferns and American plants; 9, rose clumps; 10, circular beds for hollyhocks, dahlias, and other free-blooming plants in summer, and thinly planted with evergreens to take off the nakedness in winter; 11, arbour; 12, flower-beds; 13, lawn; 14, paths; 15, beds for placing out flowers in pots; 16, kitchen-gardens; 17, peach-wall; 18, east wall for plums, cherries, and pears.

It is sometimes advantageous to have buildings and even groups of large trees contiguous to gardens. Where these are situated to the north, they not only break and turn aside the cold winds, but concentrate the heat of the sun; they also preserve the crops during winter. Buildings have this advantage over trees, that they afford the shelter without robbing the soil of the food necessary for its legitimate crop. In the accompanying plan it will be observed that the whole frontage north of the house is laid out as lawn, and to the south, that the breadth of the house and offices is disposed in the same way; a single winding path running through it. East of the house lie the conservatory and offices, sheltered by a belt of shrubbery, which runs round the whole lawn. The kitchen-gardens occupy the north-west side of the ground, and adjoining, at the southern extremity, are vineries, forcing-houses, and orchard-houses. The northern boundary is a dwarf wall with green iron railings.

2.—LEVELLING.

For levelling any tract of country, a theodolite, which is a spirit-level raised on three legs and furnished with a telescope, is the instrument employed. A quadrant is also frequently used for the same purpose, and for determining the level of drains, &c. The following diagram and remarks are taken from

Loudon's "Self-Instruction for Young Gardeners":—"Suppose it were required to run a level through the ground indicated, A B, from the point A. Provide a few staves proportioned in length to the work in hand, and let them have cross-pieces to slide up and down; then, having firmly fixed the staff in the ground, to which the quadrant is attached at the point A, set the instrument in such a position that the plumb-line shall hang exactly parallel to the perpendicular limb of the quadrant: the upper limb will then be horizontal. This done, direct the eye through the sights, and, at the same time, let an assistant adjust the slides on each staff so as exactly to range with the line of vision. Then suppose the height A C to be five feet downwards from the upper side of the slide upon each staff, so shall the dotted line A B represent the level line required. Suppose the operation had been to determine a cut for a drain, to have a fall of 3 inches in every 20 feet, the distance between each staff in the above figure may be supposed to be 20 feet; then 5 feet 3 inches would have to be measured down the first staff, 5 feet 6 inches down the second, 5 feet 9 inches down the third, &c. &c. The dotted line A B would then represent the line parallel to the bottom of the intended drain."



Where hills or mounds are to be thrown up, stakes should be inserted of the desired height, and a line stretched across their tops to show the conformation of the surface, as in the cut. These stakes, in all garden operations, should range from 10 to 20 feet apart, 15 being a good average: they are not only necessary for ascertaining the levels, but enable the men to perform their work with the utmost ease and certainty as to the result.

One of the chief things to be attended to in levelling, is to retain all the best soil for the surface: this increases the labour and expense, but is of the first importance in all garden operations. However, if judgment be exercised in the performance of the work, the surface-soil can generally be passed over on to the new level without the intervention of carts or barrows. This will be obvious from the section above, in which *a* is the desired level, *b* an open trench to get rid of the worthless subsoil, and *c* the section of the next ground to be levelled. Of course, the surface-soil would be thrown from *c* into the trench *b*, up to the level of the line *a*; the subsoil would then be carted or wheeled where it was wanted, and the same process be repeated throughout the entire section. The new level would then be furnished with a depth of from two to three feet of good soil, fit for all cultural purposes.

3.—DRAINAGE.

However high and apparently dry a situation may appear, it is quite possible that it requires to be drained. The object of draining is not only to get rid of superfluous moisture, but also to prevent the little there may be from remaining stagnant. It is quite a common occurrence to find a piece of ground that is never too wet, but which is, nevertheless, sour and unfitted for the cultivation of delicate flowers. It should, therefore, be the first care of the florist to make drains from the highest part of the ground to the lowest, three feet from the surface, dug the shape of a V; and if there be no outlet at the lowest part, to dig a hole, or well, or pond, into which all these should lead, even when there is no apparent means of getting rid of the water. At the bottom of these drains a row of common 2-inch earthen pipes may be placed, end to end, and covered up again with the soil. These are too deep to cause any danger of disturbance in ordinary operations; and the effect is to let air into the soil, if there be no surplus moisture, and to prevent the lodgment of water anywhere. About a rod apart, in parallel lines, will be sufficiently close for the drains, and a larger drain along the bottom, or a ditch, may lead at once to the outlet or the receptacle for the water. Suppose, however, the soil is really surcharged with water, and there is no place but the pond made for the purpose into which this water can pass, and suppose, while we are imagining evils, that this pond or hole fills higher than the bottoms of the drains, it is obvious, in such cases, that the drains cannot empty themselves. Still, even such drains are of use; if they can only discharge all the water in the driest season, immense good is done by them. If the pond be not too large, a garden engine may be set to work to lower the water by throwing it over the surface; and although it may fill as fast as the water is taken away, there is a circulation of water going on in the soil, instead of moisture being stagnant, and the ground made sour.

The rationale of drainage is very well explained by Mr. D. S. Fish. "Drainage," he says, "as popularly understood, means the art of laying land dry. This, however, is a very imperfect definition, both of its theoretical principles and practical results. Paradoxical as it may appear, drainage is almost as useful in keeping land moist as in laying it dry. Its proper function is to maintain the soil in the best possible hygrometrical condition for the development of vegetable life. Drainage has also a powerful influence in altering the texture of soils. It enriches their plant-feeding capabilities, elevates their temperature, and improves the general climate of a whole district, by increasing its temperature, and removing unhealthy exhalations. It lays land dry, by removing superfluous water; it keeps it moist, by increasing its power of resisting the force of evaporation; it alters the texture, by the conduction of water, and by filling the interstices previously occupied by that fluid with atmospheric air; it enriches the soil, by separating carbonic acid gas and ammonia from the atmosphere, and by facilitating the decomposition, absorption, and amalgamation of liquid and solid manures. It heightens the temperature of the earth, by husbanding its heat, and surrounding it with an envelope of comparatively dry air, and by substituting the air

for water withdrawn through the interstices of the soil; for while the tendency of excessive moisture in the soil is to bind the whole mass into an almost solid substance, the tendency of air is to separate its particles into atoms, and render it porous: and the more porous a soil is, the greater is its power of resisting evaporation. For this reason porous soils are more moist in hot weather than those of a more tenacious character.

Drainage enriches soils in another way. All rain water is more or less charged with carbonic acid gas and ammonia. Now, the larger the quantity of rain water that passes through the soil, the greater will be the amount of these gases brought in contact with the roots of plants. Nor is this all: solid manures of the richest quality are comparatively useless on wet, heavy soils; for, while a certain amount of moisture is essential to the decomposition of manures, an excess arrests the process, and all the most soluble portions are washed out long before it is sufficiently decomposed to enter into the composition of plants. Judicious drainage, therefore, places the soil in a proper hygrometrical condition for performing its important functions."

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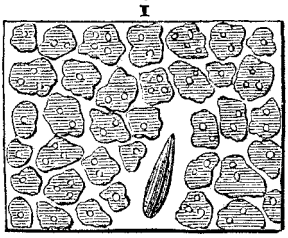

This will be rendered still more obvious by the accompanying diagrams, which prove the beneficial influence exercised by drainage upon the soil, and were exhibited before the Highland Agricultural Society by Dr. Madden, of Penicuik, in 1844. They are highly magnified sections of soil in three different conditions. Under the microscope, soil is seen to be made up of numerous distinct porous particles. Fig. 1 represents it in a perfectly dry state; both the soil and the channels between being quite dry. Fig. 2, on the other hand, represents a soil perfectly wet; the particles themselves are full of water, and so are the channels between them. In fig. 3 the particles are moist, while the passages between them are filled with air. These diagrams show that soil in the condition exhibited in figs. 1 and 2 was totally unfit for the germination of seed. In fig. 1 there is no water; in fig. 2 there is no air; in fig. 3 both are present, in the proportions favourable to the growth of seeds, and these are requisite to ensure the vigorous growth of the plant throughout all its stages; fig. 3, therefore, is the condition of soil desirable for all cultural purposes, and exhibits that congenial admixture of earth, water, and air, that plants delight in, and which efficient drainage only can provide.

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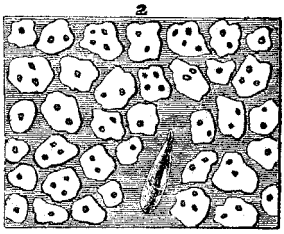

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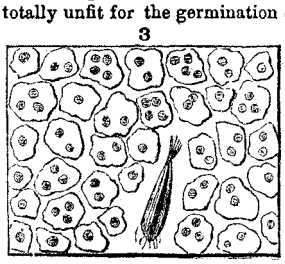
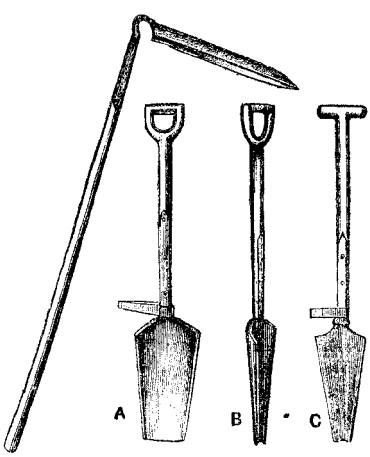


4.—DRAINING MATERIALS.

The materials employed for drains are very varied; brushwood, rubble, stones, bricks, and pipes being all in use. In clay countries it is no unusual thing to form pipes with the clay itself, by inserting an arched framework of wood, and withdrawing it when consolidated. The best and cheapest drains, however, are drain-pipes, which are now obtainable everywhere on moderate terms.

5.—DRAINING IMPLEMENTS.

The implements used in draining are a spade, and in deep draining, and in a clay soil, a series of two or three spades, varying in size and each sloping to the point, and slightly rounded, so as to make a circular cut; a spoonlike implement also is required for lifting the loose soil clear out of the bottom of the trench: and a level, which may easily be formed by fixing three perfectly straight-edged boards in an upright position and in a triangular form, held together by a vertical board in the centre, with an opening at its base for a line and plummet.



6.—DRAINAGE OF GARDEN POTS.

The effectual drainage of pots does not consist so much in the quantity of drainage, as in the arrangement of it. A potsherd should be placed over the hole; some pieces of pot broken rather small, over that; and these again covered with a layer of peat-fibre or rough earth. These give efficient *drainage*, and need not occupy more than an inch and a half of the pot.

7.—ROCK-WORK.

Few ornaments of a garden have a better effect than rock-work properly disposed; while at the same time it is also very useful. By means of it, not unfrequently, an ugly corner may be turned to very good account, and very many plants will be found to flourish and do well upon rock-work which can hardly be kept alive elsewhere. Sometimes, when the garden or pleasure-ground is very extensive, a piece of rock-work may appear to be needed on its own account, to form a break in the scene; in which case it will be desirable that the work be constructed of the stone of the county, to give to it as

natural an appearance as possible; but, in a general way, for rock-work which is intended to be covered with plants, any material that comes most readily to hand may be made use of. The flint stones from the chalk and marl pits, where they can be had, form excellent rock-work; and so, of course, do the different spars of Devonshire and Derbyshire also. As a general rule, rock-work should never be raised on grass, but on gravel, or on a concrete foundation. It is also well placed around a pond or water-tank. In the centre of a square gravelled plot, a tall piece of rock-work is a very pleasing object.

It may be constructed by using the roots of old trees piled one upon another as a basis, which should be well covered with a good coating of fine loam. On this the stones may be built up, in any form that good taste may suggest, interstices, with more or less of surface, being left, which will in this way form beds for the different plants. The spring of the year is the best season for making rock-work, since the soil will have time to settle, and the stones to become fixed in their position before the next winter's frost. Almost every county in England has some material natural to it from which rock-work can be formed—even the larger stones of the gravel pits may be used for this purpose; and, in the absence of anything else, blistered clay from the brick-yards and clinkers from the smith's furnaces are not to be rejected. The seashore also, all along the coast, affords plenty of material, out of which a little taste and good judgment will soon arrange something both agreeable to the eye and useful as a bed for many different classes of plants. On the tall piece of rock-work which has just been described may be planted almost every variety of hardy or half-hardy creepers—lophospermums, *Maurandya, canariensis*, the different sorts of periwinkle, &c., &c.; while lower down, between the stones, cistuses, saxifrages, and sedums may be grown. The wild sedums of our different counties form most interesting collections when placed by themselves in a separate piece of rock-work; and so also do the wild ferns. The writer of these remarks has formed on a piece of rock-work, under a north wall in his garden, what to himself is a most interesting collection of seventeen or eighteen different varieties of ferns, gathered with his own hands in different places in Norfolk. Many other counties in England are much richer in these natural beauties, which, when arranged in rock-work as county collections, will well repay any one for the time and trouble spent in searching for them.

8.—PLANTING.

The season for planting may be from September to March. Many arguments may be brought forward in favour of the month of November, if the weather be open and free from frosts. Spring is always a busy season in the garden; digging, sowing, grafting, and pruning are then in full operation. "And why should planting be added to the number?" asks the Rev. Mr. Lawrence. "It makes part of the wise man's pleasure and diversion to have always something to do, and never too much. Amusements and recreations of all kinds should come to us in regular and orderly succession, and not in a crowd; besides, some intervals of time for meditation between different kinds of work in a garden are very desirable to a good and thoughtful man."

The Pear loves a silicious earth, of considerable depth; Plums flourish in calcareous soils, and the roots seek the surface; the Cherry prefers a light silicious soil; and all cease to be productive in moist, humid soils. The Apple accommodates itself more to clayey soils, but does best in a loamy soil of moderate quality, slightly gravelly. In preparing stations, therefore, suitable soils should be supplied to each. The station is prepared by digging out a pit about three feet square, and the same depth, in ground that has been well drained. In the bottom of this pit lay 10 or 12 inches of brick or lime rubbish, the roughest material at the bottom, and ram it pretty firmly, so as to be impervious to the tap-root: the remainder of the pit is filled in with earth suitable to the requirements of the tree. When the surrounding soil is a tenacious clay, the roots of the young tree should be spread out just under the surface, and rich light mould placed over them, forming a little mound round the roots; but in no case should the crown be more than covered: deep planting is the bane of fruit-trees.

The stations being prepared, the trees require attention; it is necessary to prune the roots, by taking off all the small fibres, and shortening the larger roots to about six inches from the stem; if there be any bruise, the root in which it occurs should be removed entirely, by a clean sharp cut. Two or three spurs are sufficient: but if there be more good ones they may remain, after careful pruning. The roots may be laid in milk-and-water or soap-suds, a few hours before the trees are planted. The process of planting will differ, according as the trees are intended to be dwarf, standard, pyramid, or wall-trees. With dwarf, standard, or espalier, place the tree upright in the centre of the station: spread the roots carefully in a horizontal direction, and cover them with prepared mould to the required height, supporting the young plant with a strong stake, driven firmly into the ground, and tying the stem to it with hay, or something that will not bruise; press the soil gently, but firmly, over the extended roots, having first cut away the tap-root. Then mulch the place. This process, called mulching, consists in spreading a layer of short, half-rotten dung five or six inches thick round the stem, in a radius six inches beyond the extremity of the roots; the mulch spread evenly with the fork, and gently pressed down by the back of the spade, or, if exposed to the wind, pegged down to prevent its being blown away. In the case of a wall-tree, let the root be as far from the wall as convenient, with the stem sloping to it, the roots being extended and covered in the same manner with the soil.

The nature of the soil is to be regarded, and the tree planted at a greater or smaller elevation above the level of the surrounding soil accordingly: where the subsoil is a stiff clay, the mound in which it is planted should rise from nine to twelve inches; in a warm dry soil, a very gentle elevation suffices. The roots should be planted in the richest mould; and various expedients may be used to keep them moist and cool, and free from canker. The mould requires to be pressed gently round the roots with the hand, so that the soil may be closely packed round them: with these precautions, no fear can be entertained of productive fruit-trees.

9.—PROPAGATING.

In a state of nature all plants are propagated from seed, and the multifarious form of the seeds and envelopes with which they are provided is one of the many interesting subjects of investigation to the lover of nature. For our purpose it is sufficient to state that most seeds are covered with a hard shell or envelope, which protects them from external injury; that within this envelope lies the embryo plant. All seeds in this latent state contain an organ, or Germ, which, under favourable circumstances, shoots upwards, and becomes the stem of the plant; another, called the Radicle, which seeks its place in the soil, and becomes the root; and the Seed-lobes, which yield nourishment to the young plant in its first stage of growth. Moisture, heat, and air are necessary conditions for the development of all seeds; and most of them require, in addition, concealment from the light.

It is found, however, that except in the case of annuals (as plants raised from seed, which grow, produce their seeds, and ripen their fruit in one year, are called), much time is lost by following this mode of propagation; it is also found that the seed does not always produce the same identical plant; above all, it is found that none of the double-flowering, and few of the herbaceous-flowering plants, with which our gardens are furnished, ripen their seeds in our climate. This has led to other methods of multiplying; for, besides the roots properly so called, which attach themselves to the soil, and draw from it the principal nourishment of the plant, it is found that each branch conceals under its outward covering a bundle of fibres or tissues, which, under favourable circumstances, develop roots, and become the basis of an independent plant, identical with that from which it sprung. Many plants have also a crown with buds or eyes, each capable of propagating its species. Every plant with roots of this description may be divided into as many portions as there are eyes, taking care that a few fibres are attached to the root, and each will become an independent plant. The potato, and all the bulbous and tuberous plants, are familiar examples of this principle of propagation; so are the Dahlia and Pæony, which grow better when the set is confined to a piece of the tuber with one eye attached, than when planted whole. So conspicuous is this in the potato, that, where it is planted *whole*, all the eyes except one, or at most two, should be scooped out with a sharp knife, because the young plant will thus be supplied with more of its natural pabulum while it is rooting, and will increase its vigour.

Other plants throw off short stems, like the daisy and house-leek, by means of which they are propagated. Others again, like the strawberry, throw off runners, each of which is furnished with its root-fibre already elaborated, only requiring soil in which to root itself. But there are others, where nature requires the aid of art, and this has given rise to the operation which will be found explained under the article *Layering*.

10.—PRUNING.

The pruning of fruit-trees is performed at two seasons,—winter and summer. Winter pruning should be performed while vegetation is entirely at rest,—the