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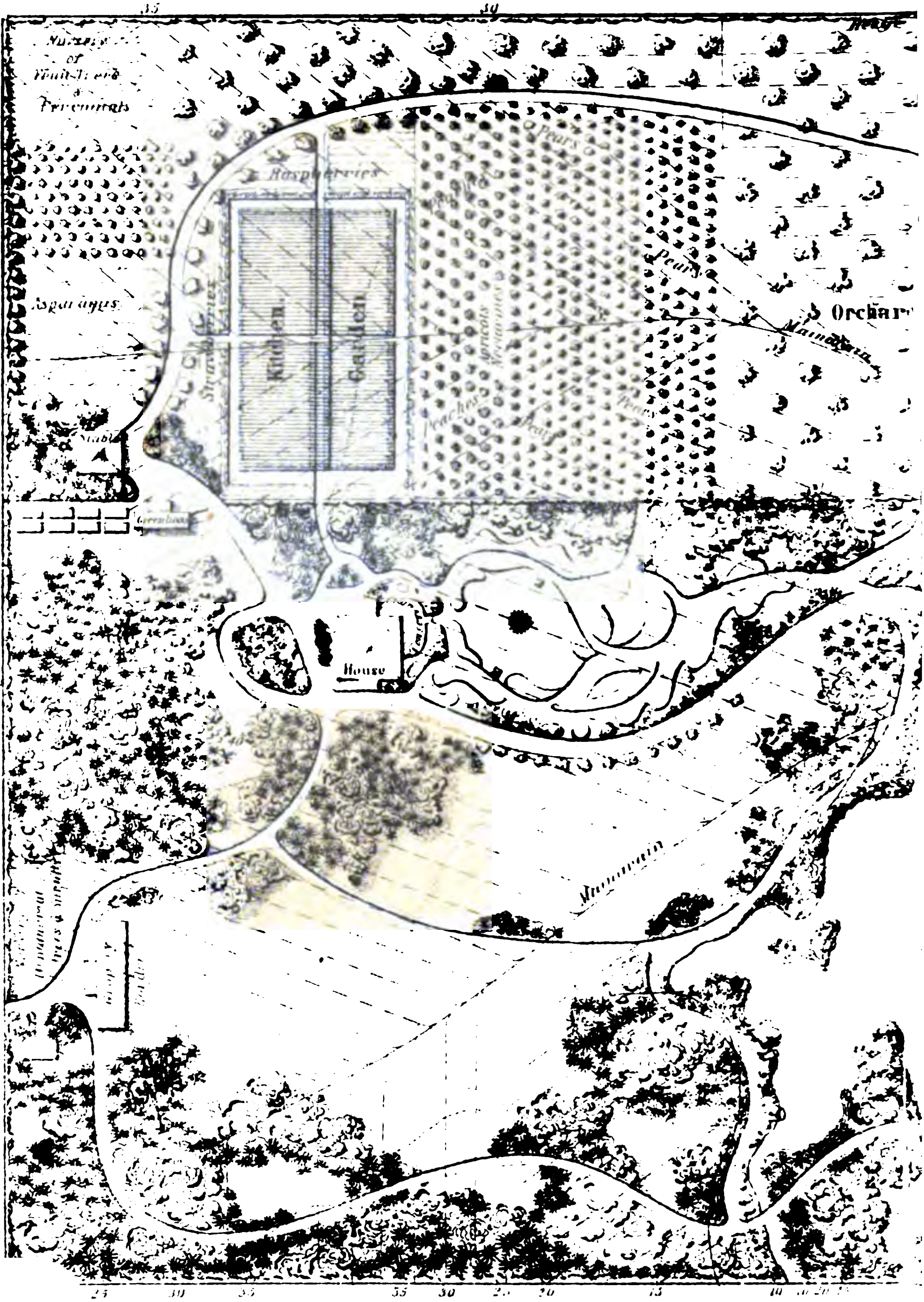

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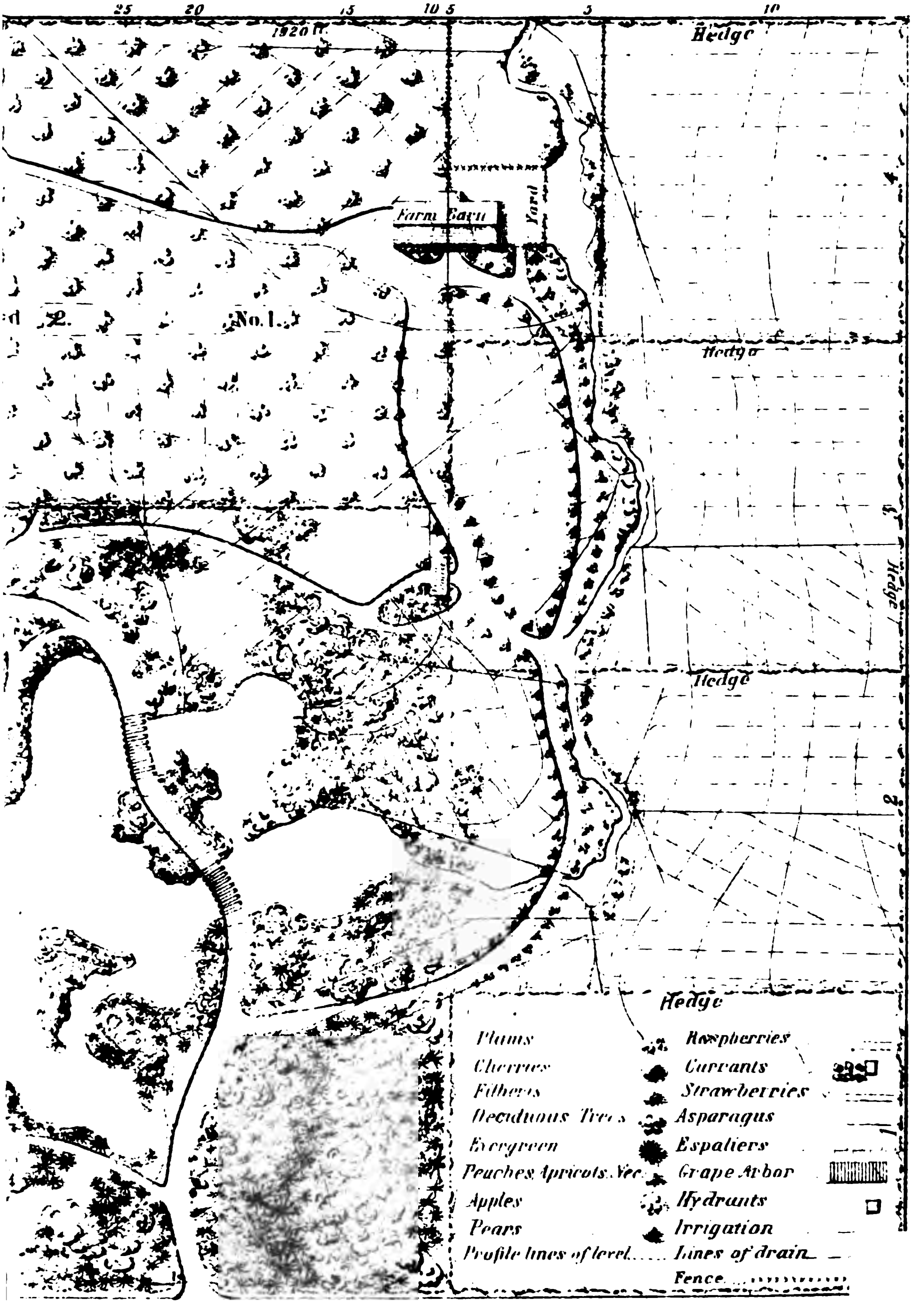


COUNTRY LIFE:

A HANDBOOK OF

Agriculture, Horticulture, & Landscape Gardening.

BY ROBERT MORRIS COPELAND.

VIEW AT BEAVER BROOK FALLS, THE AUTHOR'S RESIDENCE.

FIFTH EDITION, REVISED.

BOSTON:
DINSMOOR AND COMPANY.
1866.

PREFACE.

THE practice of the useful arts necessarily precedes their theory by a great interval, for it alone can furnish reliable material whence principles may be deduced, and rules determined; and there can never be a time when it shall cease to be the test to which all rules and theories must be subjected. This is pre-eminently true of agriculture, the oldest of the useful arts, through all its branches, and it is, therefore, in vain to look for a book on the culture of the earth which shall be altogether or mainly original; all such books, resting on the experience of the past, must, of necessity, refer to the past, must recapitulate its discoveries and practice, in greater or less degree. Unless they be monographs of peculiar speciality, they must partake somewhat of the nature of a compilation borrowing from many sources. I wish to acknowledge the ideas, the words, the illustrations which I have borrowed; and if I have failed to do this in any instance, the omission is not intentional. In some cases the views of others are so incorporated with and modified by my own, that it is out of the question to preserve the distinction between them.

Stevens (Book of the Farm), McIntosh (Book of the Garden), Loudon, Price, Liebig, Way, Gisbourne (Essays), Paul, Johnston, Boussingault, the journals of various English agricultural societies, are the European sources to which I am mainly indebted; whilst among American authorities I have principally referred to Dana, Browne's Muck Book, Text Book of Agriculture, McMahon, Hovey, Shedd, The Working Farmer, Field's Pear Culture, with some newspaper items. Of course there are many things within this wide range of which I have had small personal experience; in such cases I have relied entirely on the best authorities, applying them as my general experience dictates.

In the body of the work I have met some of the popular arguments against the course of adopting largely the English improved culture, but not so fully as to preclude a few general remarks in this preface. Without doubt our common practice is just where English agriculture was forty years ago. The descriptions of English farming, tools, buildings, crops, roads, etc., given by Young and other writers of that time, might be quoted word for word to-day, as descriptive of the mass of New England farms. And if English farmers followed this kind of farming forty years ago with profit, and have since improved their practice so much as to double and treble their profits, with no other change in the circumstances than an increased outlay of capital and intelligence, it seems to me that it logically follows that we can do the same.

The frequent discussions about high farming seldom lead to definite and satisfactory conclusions, for want of a precise and accepted definition of the term. High farming in this book is the name of that culture which provides for the thorough reclamation, drainage, and manuring of the land under treatment; so thorough a manuring that a single application will ensure ample food to all the crops of the sagaciously planned rotation; which so arranges the rotation for each field that each crop comes at a time when the soil is in the best state to feed it, finds an excess of its favorite food, and yet leaves an excess of the food most appropriate for the next crop; which looks on every weed as a thief, and on the labor expended in securing neatness, cleanliness, and order as certain to increase the final profit; and which leads, by intelligent steps, from improvement in the culture of earth to the yet more profitable and the far more noble culture of the man. These steps I have endeavored to point out in part. Sometimes I have invited the reader to trace them with me, hoping that he may find the result to which they lead eminently *practical.*

The calendar form, and the general divisions which recur in every month, have been adopted as facilitating reference.

The course announced in the opening pages, viz., to give but one method in cases where many are practised, and each has warm advocates, may expose me to the charge of ignorant conceit and dogmatism, but it has been deliberately chosen for the convenience and advantage of the general reader, who is not supposed to be an adept in any of the departments treated of. To him this book is offered as a manual for guidance; it would but confuse him if it presented many methods, and left him to choose between them. I have myself often suffered from the difficulty of ascertaining what was *the best* way of doing something I had in hand, when I had books enough which told in how many ways the thing was done, a matter to which one is perfectly indifferent when work presses upon him; and in my profession of Landscape Gardener, I have often remarked that much of the expense of obtaining answers to the innumerable questions put to me on all the subjects treated in these pages, might be saved to my employers by a simple printed statement of leading principles and rules. The adept likes to decide between different methods presented; the tyro is glad to learn what his teachers prefer.

I have tried to make all obscure operations and descriptions more clear by illustrations, where the eye often reads more at a glance than in many pages of print, and I here acknowledge my obligations to Mr. A. C. Warren, of Boston, the artist who drew the illustrations which form so important a part of the book. Also, I would again mention my indebtedness to J. H Shedd, both for the quotations I have made, and for the system of drainage shown upon the plan with which our book opens, which was arranged by him.

To my friend Frederick Winsor, M. D., of Salem, I owe much gratitude for assistance, which none but an intimate friend could have given, in revising and correcting my hastily written manuscript. But for his aid the short time which my engagement with the publishers allowed for the preparation of the book would scarcely have admitted of critical revision.

Bulky as the book is, it does no more than open many approaches to an exhaustless subject, and I lay down my pen with a feeling of deep regret that I have done so little justice to what is so near my heart.

One word on a point to which many words are given in this volume; the *spirit* in which one should deal with his farm, his flowers, his grounds. Surely it should be that of reverential friendship, not of cold and superficial business relation. This complex, and beautiful mystery, which we call Nature, surely offers us something more than food and clothing; and, believing as I do, that man's "life is more than meat," I cannot speak of the life of that class who seem to live nearest Nature as nothing more than a struggle for that miserable pittance known as a "*living*."

With these explanations I leave my book to the reader, asking him only to bear in mind the words of a Boston orator, who said, "that a book should be judged not merely by its contents, but by the intention of the author."

PREFACE TO FIFTH EDITION.

In the preface to the first edition of "Country Life," I maintained, that, in agriculture, experience must govern theories, and that any treatise on the subject must owe much of its value to the degree in which its rules and principles are based upon the results of experience.

Whilst this is true, we must not allow ourselves to become the slaves of experience, which, it may be said, is the constant tendency of farming life. To this day, many men sneer at book-farming as theoretical and unreliable, and resist, as an encroachment on their rights, those theories of cultivation which seem to disagree with the wisdom of the ancients.

Nothing would have broken down this feeling and resistance but necessity. When men have a certain result to obtain, and to obtain it must use the labor of men and animals, and supply tools and machines, they are compelled, if the labor is scanty, to try to devise, either methods for getting the result without the labor, or to perform the labor in some different way. If a man's tools and machinery are worse and less profitable than his neighbor's, the fact that the result in dollars and cents is against him will incline him to copy his neighbor.

The long war we have passed through has absorbed so much of the available labor of the country, and at the same time increased the value of the products of agricultural labor, that farmers have been compelled to invent either new machines or new crops, and methods of culture.

As a consequence, we have made vast improvements in agricultural machinery, particularly in harvesting tools. The mowers and reapers of 1866 are so much better than they were in 1859, that the work of haying and harvesting is reduced from severe to easy work, and a man and boy will now do the work on a farm which formerly required half a dozen men.

In Horticulture, new plants and fruits are introduced every year: some, upon trial, are proved to be of little value, and soon disappear, whilst a few become permanent friends and comforts to man. In the cultivation of grapes, there has been a great advance; and not only do we now have very greatly improved varieties, but a thousand cultivate grapes to-day in place of a hundred six years ago. With these new varieties and the widely spreading cultivation, new diseases have come, and some men have suffered so severely, that they have lost heart, and are inclined to abandon the vine; but, fortunately, man is a persevering animal, particularly when eating and drinking are the stimulants to his efforts, and we may rest assured that the grape or grapes will yet be found which will overcome all obstacles, and be equally good for the table and the vineyard. In the Supplement, the subject is extensively treated, and the reader will find there not only the best varieties for different parts of the country, but also the opinions of eminent cultivators as to the causes and cures of the most annoying diseases to which grapes are liable.

In the Flower-garden, I have introduced many new plants, as well as new lists of old friends, and have urged strongly the claims of some which I had hitherto neglected.

In the Agricultural division, I have brought together a large number of facts about Merino sheep, and have endeavored to urge farmers generally to do more to derive, by the aid of sheep, the full value from their farms. When we comprehend the real benefits which sheep confer on their owners, it is difficult to understand why so few persons, comparatively, have flocks. The Merino sheep is a proof of what may be done in New England to raise the value of agriculture and stock-raising.

I have presented in the Ornamental department, somewhat at length, the horticultural capabilities of cities. I do not seek to persuade the reader that the citizen can have the beauty, the wealth, or comfort of the country; but there is undoubtedly a great deal of space wasted in cities, which might be turned to good use, and give both amusement and real enjoyment to those who have only a brick house for a garden.

Doubtless the careful reader of "Country Life" has found methods of doing work with which he could not agree, or which seemed to him to be better done in some different manner. To all such let me say, that I never professed to give all the ways of conducting the operations incident to a life in the country,—only one way, which I was well assured would give a good result; and if, by disagreeing with me, I have stirred the active minds of men to investigate the subject, and produce newer and better methods than my own, I have certainly conferred a favor on them and all mankind, and may well feel satisfied with the labor and time I have expended.

Hoping that the Supplement to this edition may bring the book up to the present time, I leave it once more to make its way through the world, trusting that whoever reads it will find more to approve than condemn.

INDEX OF PLATES AND WOODCUTS.

COUNTRY LIFE.

CHAPTER I.

IN Agriculture, Nature repeats herself. Each year is a repetition of its predecessor, and each month but a further development of the plans and processes of the last.

The cultivator of the smallest piece of land performs, on his scale, the same operations with the farmer whose acres are numbered by scores, or with the gardener whose gardens and greenhouses have cost thousands of dollars.

In preparing a handbook for the instruction of one class of cultivators of the soil, we must touch upon the subjects which interest all; and therefore, to avoid redundancy, we will select as an example the estate of a person who must in the course of a year have occasion to practise every operation of agriculture and horticulture which comes within the means of men of moderate fortune.

I shall proceed to describe month by month a system of proceeding, based upon the most approved theories and practice of modern horticulture, agriculture, and landscape gardening, which will insure the largest return in pleasure and money to any one who will observe faithfully the directions given. I shall confine myself to the wants of men with small fortunes, as our country must always be principally inhabited by this class. Men of large fortunes need no such handbook, as they will seek their pleasure through agents whose especial business it is to understand all that I propose to discuss. Men with a bare competence need no special book, for although they may have a bit of land to cultivate, their operations will be identical with those I describe, only on a smaller scale, and they have but to reduce my advice and remarks to their own scale.

I do not propose to offer to the public advice and directions adapted to all parts of the continent. This would manifestly be impossible, owing to the great difference in climate. It might seem at first sight that differences in climate would only affect the time for commencing and concluding operations, and this idea has influenced all who have hitherto prepared such a work as this; but the view is incorrect. We must not assume that because the season in Philadelphia or Bangor is a week earlier or later than in Boston, directions prepared for either latitude will apply to the other. It is indeed so in a measure; but special directions are based upon special differences which are affected by slight variations in climate: as, what kind of plants will bear out-of-door culture; what precautions must be taken to secure satisfactory crops of various kinds; the length of season that will enable those plants and crops to mature. Again, in the tasteful department of culture there is a considerable difference in the plants that will bear exposure to the weather, and consequently in the combinations and effects that are possible; therefore, if we should take the plants or crops advised for places four or five hundred miles asunder, and cultivate them ourselves, allowing the proper difference in time, so that the season shall have advanced to that point that will warrant a commencement, we should ultimately find that there was the same allowance to be made at the end of the season; and thus a crop which would require three or four months for its perfection would be cut short a fortnight at each end, a month in the whole.

Of course the difficulty in preparing a book of this general character is only one of size, as by taking room enough the writer might consider the whole continent; but the resulting volume would be too unwieldy and cumbrous for general use. Nor shall I treat the various subjects introduced in a complete and finished manner, entering into a discussion of the whys and wherefores which have induced me to assume and maintain the views enunciated, as that course also would demand too much space and time; but shall content myself with stating the theories and practice which experience and common sense have proved to be the best for people who live in a climate like that which exists between the parallels of latitude two degrees north and two south of Boston.

The advice offered is certain, if followed, to give a satisfactory result. It is prepared for those who wish to learn; who, knowing but little, are ready to follow advice, not to discuss it. All such may feel assured that they may unhesitatingly follow these directions, and may confidently rely upon receiving their reward.

THE ESTATE.

As a necessary preliminary to the rest of the book, let me describe the character of the estate upon which we are to suppose ourselves living, and which we are to cultivate. It shall have an area of 60 acres, of which about 20 are farm; 1½, flower-garden; 3, kitchen-garden; 11, orcharding for Pears, Peaches, Cherries, Plums, Quinces, Apricots, Nectarines, Apples and Nuts; 6 acres are occupied by barns, stables, greenhouse, grapehouse, hotbeds, nurseries, and dwelling-house; the balance is lawn, woods, ponds, and roads. The pond, woodland, lawn, and shrubbery are contiguous; the greenhouses, hothouses, hotbeds, etc., are near the dwelling-house and near to both kitchen and flower-gardens. The surface is uneven. By purchase or otherwise the estate has come into our hands unstocked, and with its roads, paths, pond, flower-beds, and plantations in an unfinished condition. We find the roads, paths, orchards, and most of the plantations to our mind, but in all other respects the place must be renewed, remodelled, and replanted. The plan at the end of the book shows a ground plan of this place, and is so lettered and provided with an index that the various operations recommended may be followed easily and understandingly.

It is plain that the place just described may properly be termed a *Ferme orneè*. Some American writers have seen fit to ridicule the use of this term as being inapplicable to our country, and of no real significance anywhere. Why they should make such an attack it is hard to tell, for certainly no other term sufficiently describes a country place that may gratify all the tastes of a lover of country life. A mere pleasure place where there is nothing for use, and all for beauty, would satisfy but few, as most persons soon weary of merely enjoying. The man of earnest mind, who gladly unbends from serious work and wanders with the greatest satisfaction through lawns and flower-gardens, ultimately craves something more solid; a view of the practical part of life; a sight of the machinery by which all moves smoothly and profitably. Beside the mental gratification derived from a combination of pursuits, there is almost a duty laid upon every one who makes a country home, to provide occupation as well as recreation. Owners of country seats in America, are generally men who have retired from active business, and by having a farm connected with their homesteads, they secure something to do and to think about, and thus avoid the evil of mental inactivity.

Many who would agree with these ideas, may object to the term "orneè," as expressing a regard for beauty too great to be consistent with the profitable management of a farm. This is an error, and one to which Americans are especially prone,—the sacrifice of the beautiful to the practical, as though the two things were incompatible. Under this impression they would lay out their farm-roads straight, would strip hedge-rows and walls of nature's profusion of wild flowers and shrubs, as offending against neatness and order; they would plant their trees in straight rows; in a word, would make every thing as prosaic as the hoeing of corn or the milking of cows.

It is a mistake to wish thus to deprive agriculture of the pleasure which nature throws about it. Even if it is easier to plough up to a straight road or wall or row of trees, than to a curved line: what of that, if by planting trees in groups, and curving the roads, we can produce beautiful effects in form and color, and offer agreeable combinations of wood, grass, cultivated field, and distant landscape? The few dollars a year saved in the one case to the pocket, are no compensation for the loss of the pleasant lessons which the beauties of nature must teach every willing mind. It is natural that the present generation should imitate their fathers, whose success has been before their eyes from birth. They who have been taught that the value of the earth lies in the crops she brings, and that those methods are to be followed which will most surely give a large market value to those crops, will adopt unwillingly any course that seems to diminish the expected profits; but they who know how much more precious a worthy mental development is than any increase in the hoard of money, should advise all their pupils to cultivate the beautiful whenever it is possible, as the most powerful and delightful means of such development.

COMMENCEMENT OF THE YEAR.

Before entering on a description of the work before us in this new home during the next year, let us settle the time when the agricultural year begins: certainly not in January, when the harvest has long been garnered, and the preparations for the next year's planting are already in a forward state; not in March, when the frost fetters of the earth are unlocked, and the farmer goes out to consider what to do first, — but at the end of the harvest. Then the farmer begins his preparations for the succeeding year. What is true of agriculture, applies with yet more force to horticulture. January, the first month of the solar year, is not the first of the agricultural; that year extends from harvest to harvest, and we must begin to prepare for the next, in *its* succession, while we are yet reaping the fruits of the present year. In the latitude of Boston, the year really begins in November, when the harvests have been garnered, and nothing of the year's produce remains out of doors but a few root crops, which are to be gathered when we are preparing for the spring work. The same principle applies to the garden; only there the preparations must begin earlier than on the farm, as bulb-beds should be made, greenhouses stocked, and kitchen-gardens got in readiness before the frosts become severe. Some greenhouse plants should be lifted as early as the middle of August, and almost all by the last of September.

So, even at the risk of making our system badly proportioned, we must begin our description of the work to be done at the time when the gardener's year commences, and must take up the farmer's as we arrive at it. Therefore we shall date our year, not from the end of harvest, or November, but from September, as the month in which much of the next year's work is commenced.

CHAPTER II.

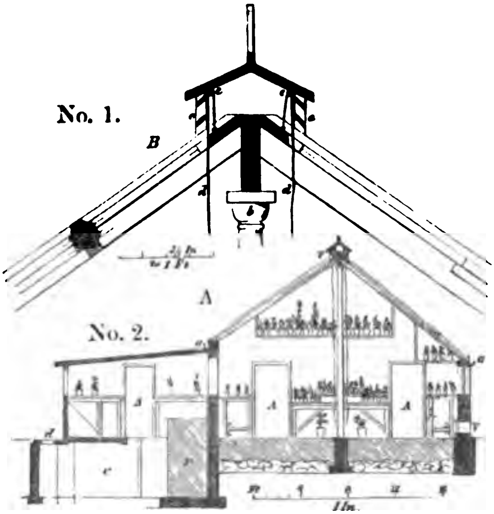
GREENHOUSE.

SEPTEMBER. In September our flower-gardens are generally in their greatest beauty — those beds at least which do not depend on perennial roots. The Verbenas, Salvias, Pelargoniums, Heliotropes and other bedding plants, have now attained their perfection, and although the annuals and perennials which have gladdened the earlier months are gone, they are not missed, their places being filled with the luxuriant growth of the plants we have just named. No month in the year gives such tender pleasure to the lover of the flower-garden. In it all the beauty of the spring and summer seem to concentrate, and to be intensified by apprehensions of early frosts, which shall turn color to blackness, and fragrance to the noisomeness of decay.

As the evenings grow cooler, the careful gardener is reminded that the next day he must get up the sashes on his hot, and clean out his cold houses; that piles of mould, broken crocks, and pots must be collected in the plant-sheds, and every thing put into the best condition to facilitate transplanting and repotting. Commencing our work with the greenhouse, we will give a description of the house, its size and arrangements.

Our greenhouse A, as shown by the plan, is a two-thirds span-roofed house, with a lean-to shed behind, in which potting may be done, and where cisterns and fires are situated. It is 60 × 20 feet and 15 feet high in the middle. The front wall is 10 inches thick and 4 feet high; every 5 feet in the front wall there is a ventilator, 1 foot square; this ventilator opens between the two hot-water pipes, so that the fresh air reaches the plants only when properly warmed; all these ventilators can be closed and opened at once,

No. 1.



No. 2.

No. 1.

B, Section of Roof.
b, Supporting Posts.
c, Ventilators.
d, Ropes for Ventilators.
e, Axles of Ventilators.

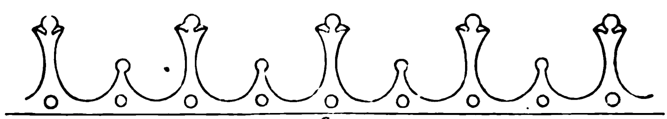
No. 2.

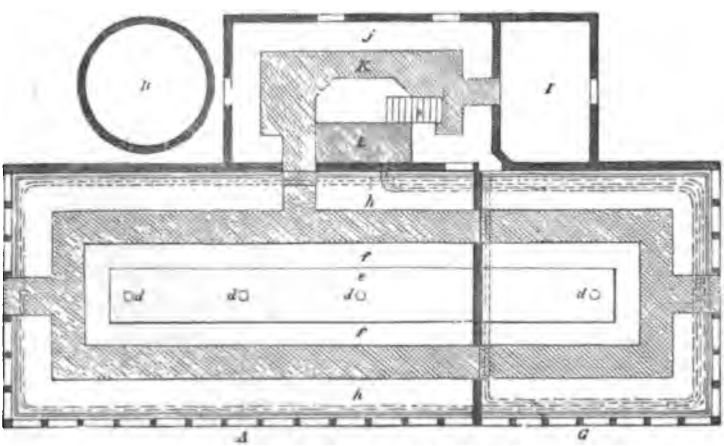
A, Section of Geeenhouse.
A, Doors.
C, Cellar.
F, Furnace.
G, Rafters.
V, Ventilators
d, Coal Hole.

No. 3.

A, Greenhouse.
B, Cistern
C, Ridge Board.
G, Hothouse.
I, Man's Room.
j, Potting Shelf.
K, Walk.
L, Boiler.
d, Supporting Posts.
e, Table.
f, Staging.
h, Shelf.

No. 3.





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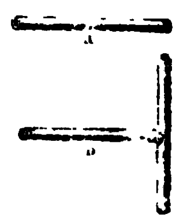
... are whole to ... [illegible]

... a sash ... 2 ... [illegible]

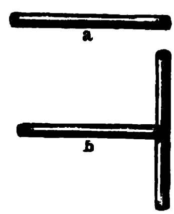
... with a rod ... which has at ... [illegible]

... going into a ratchet on the ... [illegible]

at one end, and all the windows opened ... [illegible] ... window may be disconnected by slipping ... [illegible] along, and then be opened or shut independently of its ... [illegible] the supporting post, of which there are ... [illegible] ... ridge and the two sides of ... [illegible] 2 ... from one end there is a glass partition, which ... [illegible] ... to be shut off from the rest, and heated and ... [illegible]. The back wall is $7\frac{1}{2}$ feet high, and is two bricks thick; it is solid, with the exception of the openings shown in the plan for ventilators, doors, windows, etc. Each wall and the centre posts rest on solid stone masonry, 2 feet deep. The house is heated by two pipes, which make the circuit of the inside under the side ... tables; each pipe comes from the boiler straight, *a*, and then sends off two branches at right angles, *b*, bending at the corners, and crossing each other at the front of the house opposite the boiler, where each is depressed so as to return to the boiler below the point of departure. Thus the house is uniformly warmed, each side receiving the water hot at starting, whilst in each the ... water is cooled equally before returning to the boiler. A branch pipe crosses the house each side the partition, to make circulation in case we wish to heat one part more than the other. The boiler ... the lean-to shed back of the greenhouse, and is supplied with fresh water from the rain-water cistern, B, and when there ... enough to keep the cistern full it is filled by the force pump in the well. The furnace is partly above and partly ... the



the shutters resting on a wheel which in its turn rolls on a rod of iron; the shutters are connected with another rod, which is pushed forward or drawn backward by a ratchet-wheel at one end. There is another glass window ventilator near the top of this wall, which slides by the inside of the wall in opening and shutting. The front side of the roof is pitched at 36°, the back side at 32°; the roof sashes are whole to within 3 feet of the ridge, where in each commences a sash 3×2 feet, which is hung in the middle, and connected with a rod, *e*, which has at each window a ratchet-wheel playing into a ratchet on the window; this rod may be turned at one end, and all the windows opened or shut at once, or each window may be disconnected by slipping its own ratchet-wheel along, and then be opened or shut independent of its fellows; *d* is the supporting post, of which there are five, of cast iron; these posts support and tie the ridge and the two sides of the roof. At 20 feet from one end there is a glass partition, which enables that portion to be shut off from the rest, and heated and cooled at will. The back wall is 7½ feet high, and is two bricks thick; it is solid, with the exception of the openings shown in the plan for ventilators, doors, windows, etc. Each wall and the centre posts rest on solid stone masonry, 2 feet deep. The house is heated by two pipes, which make the circuit of the inside under the side plant tables; each pipe comes from the boiler straight, *a*, and then sends off two branches at right angles, *b*, bending at the corners, and crossing each other at the front of the house opposite the boiler, where each is depressed so as to return to the boiler below the point of departure. Thus the house is uniformly warmed, each side receiving the water hot at starting, whilst in each the return water is cooled equally before returning to the boiler. A branch pipe crosses the house each side the partition, to make circulation in case we wish to heat one part more than the other. The boiler is in the lean-to shed back of the greenhouse, and is supplied with fresh water from the rain-water cistern, B, and when there is not rain enough to keep the cistern full it is filled by the force pump in the well. The furnace is partly above and partly below the



floor of the shed, and the firehole and the coal are approached by steps. The coal cellar extends outside the building, where there is a coal trap. I is a chamber for a man to sleep in; j, the shelves on which plants are to be potted, and under which pots, crocks, etc., are to be kept. The plants in the greenhouse are variously provided for according to their kinds and necessities. The table, *e*, in the centre, is for large plants, and those, like Camelias, which do not need the direct light. Under this table is room to lay away bulbs, and Fuchsias which, having blossomed in the summer, will be allowed to remain nearly dormant until growth recommences in spring, and all other dormant plants. On the other shelves other plants will be kept, just as they need more or less direct light and heat. Along the rafters and crossing the glass in various places may be trained Running Roses, Passion-Flowers, etc.

And now for the work! The first of this month thoroughly examine the house, — the glass, the paint, the shelves, — scrub all the wood-work clean, and thoroughly whitewash all portions exposed to mildew; fumigate with sulphur, to kill red spiders, etc., before the plants are taken in; paint the wood-work wherever water or wear has removed the paint, and make sure that no loose joints will admit rain and cold. Collect at once leaf mould, good loam, and white sand enough for the compost for all your plants; lay in your broken crocks and whole pots. Continue to pick off dead leaves; prune and repot all the stock plants not bedded in the ground; repot all that have outgrown their quarters, and remove the top mould from the others and add a fresh supply; begin to take up and pot all the cuttings and layers made during the summer. Pot carefully a large quantity of Dwarf and Giant Chrysanthemums, Salvias, Carnations, Gillyflowers, Ten-week Stocks, Tuberoses, Amaranths, and such other plants as may be just coming into bud, to be got ready to exhibit in the conservatory during October and November. Pot Neapolitan Violets, Cyclamen, Pansies, Chinese Primroses, Oxalis. Repot Heliotropes, Cinerarias, and Callas; separate and repot Mignonette and Sweet Alyssum; repot Verbenas for last time. When they are potted, keep them in the shade for a few days, till they are established in the pots, and then put them on the shelves in the greenhouse, from which they will be removed into the conservatory before the shelves will be wanted for the greenhouse plants proper.

It is very necessary to attend to the large plants not hitherto renewed and refreshed this month, in order that they may make new roots before winter. The cuttings, etc., should be kept in the shade for about a fortnight, being watered moderately. As soon as these plants are disposed of, plant your Ixias, La Perousias, and all tender bulbs in small pots, one or more together, as their size shall dictate; after potting, set them on the upper shelves near the glass; water them but little till they begin to show leaves, as much water will rot them; but after they begin to grow, give water as to other plants.

Get all your tender stock plants into the house before the 15th of the month, and most of the more hardy ones which you propose to show during the season by the 20th, as a single night of severe cold, even without frost, might seriously injure the vigorous color of their foliage.

The growth and success of pot plants depend very much on the compost used and the method of potting, which should be as follows: The earth with which the pots are filled must not be too rich, as this tends to over-stimulate the young plant and change flower-buds into leaves; besides, plants in a greenhouse may be fed like fires in a furnace; if we want an increased development we can easily get it by watering with dilutions of manure; or we can check the growth, if that be our wish, by withholding the usual supply of water. Plants, whether in the outside earth or in pots, derive but a small proportion of their nutriment from the earth in which they stand. Various experiments carefully tried, where all the modifying circumstances were controllable, have shown that however meagre the soil, even if it be pure-washed river sand, any plant selected could be made to thrive or dwindle just in proportion to the amount of simple or enriched water, or of pure or impregnated air, which should be supplied. Were there room in the present treatise to cite the experiments of Bousingault and others, we could prove that the judicious gardener, by studying the constituent parts of the plants he is growing and the constituent parts of the materials which seem most largely to contribute to their perfect development, can have them as much under his control as the engineer his engine. The experiments made in this matter have pertained to out-of-door culture, and were made with the hope of rendering the farmer more independent of varieties of soils and seasons in getting large crops, and they have shown most conclusively that agriculture need not be a matter of chance, but that farming operations can be conducted with almost the same certainty as manufacturing. If this be true on the large scale of farming, where the temperature, atmosphere, and rain are beyond control, how much more securely can the gardener guide the growth of his plants under a glass roof, where all the uncertain elements of growth can be supplied with graduated exactness.

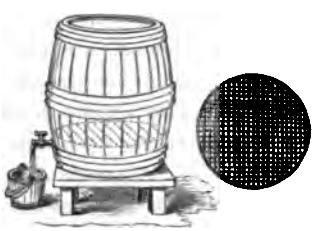
The earth in which we put plants may be considered in the light of a sponge which shall absorb, retain, and give out the food the plant needs to facilitate its perfect development. The essentials, therefore, are a carbonaceous character, as carbonaceous materials are sponges for the absorption of the nutritious gases; a loose and porous mechanical texture which will allow the water applied to percolate readily to the fibrous roots of the plants, and then to drain away quickly if it be in excess; and a due supply of those minerals usually called salts, such as lime, potash, soda, etc., which in small but distinct amounts are all important to the formation of healthy vegetable tissue.

COMPOST for potting.—Make your compost one-third leaf mould, one-third rich loam, one-third river sand; mix these materials well together, and to every bushel or thereabouts (for there is no need of special care), about a shovelful of lime, ashes, or gypsum. Having your material ready, set your pot before you upon the potting shelf; fill it about one-fifth with broken crocks * for drainage, as nothing injures plants more than to allow their roots to be supersaturated. Mildew, blight, a sickly growth, are all consequents of imperfect drainage, and with the single exception of too much

* Oyster shells are as good as, and in the opinion of some cultivators better than, crocks for drainage, as the roots of the plant find in them material for food.

and injudiciously applied heat, nothing oftener destroys plants than standing water. Were we oftener to think of the lesson which nature teaches us in the woods and fields, we should make fewer mistakes in this matter. No tree, shrub, or plant, that is a native of dry uplands, will thrive or even live when transplanted to a swamp; and the native of a swamp will thrive no better if subjected to a corresponding change; yet we must attribute the respective failures of the plants to too much or too little water. Having then the pot before us with the broken crocks in the bottom (which are the fragments of old and imperfect pots, hammered together till they are reduced to pieces varying from the size of a finger nail to an inch or more square), cover them about an inch deep (varying the depth a little to suit the plant in hand) with your compost; take the plant in the left hand and set it into the pot, being careful not to set it deeper than it stood before, and keeping the *crown* of the roots (the point where the roots and stem join), just below the top of the pot; with the right hand, pour in the prepared compost on either side, occasionally settling the earth into the roots with the finger or with a stick, and *gently* shaking the plant that the earth shall be well packed among the small roots. Go on in this way till the pot is full; then take it in both hands and slightly shake the pot, giving it a knock or jostle against the shelf, which will firmly settle all together and leave the plant standing steady and even in the middle of the pot. After this, shower it from the rose of the watering pot sufficiently to moisten the earth throughout. The plant must now be set in the shade and watered in the same way daily for ten days or a fortnight, after which it may take its proper place on the greenhouse shelves. If the plant has been newly taken from the ground, the top should be judiciously pruned so as to balance the mutilation of the roots, and give it a well-proportioned shape. Cut away all the broken roots, and be careful in selecting your pot to get one large enough to contain the main roots without much bending. Remember, however, that we do not depend upon the old roots for the main support of the plant; for that, we look to the multitude of new and fibrous roots, which the treatment just described will cause to spring out from all parts of the old roots, and which will rapidly increase till they quite fill the pot. So long as the roots are thus making and filling the pot, the leaves and woody parts of the plant will increase, and there will be no indication of flowering till the roots have occupied all the space allotted to them.

With the compost just described, there will be no need of manure-water for awhile, but when the flower-buds begin to form there will be too little nutriment in the earth to supply the new and increased demands of the plant, and to secure a satisfactory bloom, we must add occasionally a little guano or liquid manure to the water. The best way to prepare a liquid manure, is to set upon a shelf in some convenient place an old vinegar or other barrel that is tight, provided with a faucet. The shelf must be high enough to allow a watering pot or pail to stand under the faucet. In the bottom of this barrel, and just above the faucet, make a staging of two sets of parallel strips of wood, crossed at right angles, upon which the manure may rest, and through which the water may run as it percolates the manure.



In the cut, the dotted lines on the barrel show the situation of the staging, which is also shown by itself. This staging will prevent the manure from passing into the faucet and choking it. Fill the barrel thus prepared nearly full of stable-dung, and tread it down well. Pour in water slowly till the barrel is full; let it stand for two or three days before you begin to draw off. At first this water must be diluted to be safely used, — one part manure-water to at least three of pure water, — but as the plant becomes accustomed to it, stronger doses may be given. Such a barrel of manure will bear several saturations with water before all its strength is drawn out.

If guano is used, put one-quarter of a pound to two gallons of water; let it stand twenty-four hours, then use like the water from the barrel. If the guano-water is prepared in a barrel, the staging must be covered with a fine wire or a cloth-strainer, to retain the finer particles. This proportion of guano to water is advised on the supposition that the guano is of the best quality. Such guano is, however, scarcely to be obtained, and consequently the best way is to make what seems a solution of moderate strength, and then be guided by experience as to weakening or strengthening it.

This application of liquid manure is to be continued only while the buds are forming, as it will, if used after they begin to expand, often stimulate the plant enough to turn them into leaves. This is particularly the case with hard wooded plants like Daphnes, Camelias, etc., to which liquid manure should be applied only during the dormant or growing, not the blossoming, season. It seldom happens to Roses or Pelargoniums, as they are gross feeders.

Surprising as are the effects of liquid manure, they are no more than should be expected, for the food of plants must be diluted before it can be absorbed by the spongioles of the roots, and such dilution is the only chemical or mechanical means to which nature resorts for the development of the crops, flowers, etc., in the fields. The power which guano in solution exerts, is greater than that of any other manure, and indeed in its dry state it is likely to injure rather than benefit vegetation. In the greenhouse, whether applied as we have directed, or put on the surface in powder, no injury need be apprehended, as the daily watering will in the latter case soon carry it below the surface; but when used on a large scale in agriculture, whether as a top-dressing or ploughed in, its good effect depends entirely on the amount of rain that falls during the season.

STOCK PLANTS.—As yet we have made no mention of other classes of plants which are to be attended to in August.

First, — Stock pot plants. These will generally be Camelias, Daphnes, Cape Jessamines, Laurestinus, Lemon Verbenas, and other hard wooded plants which grow too rankly when planted in the ground, or which if planted out would be liable to injury from sun, wind, and transplantation. The way to treat such plants in the late spring or early summer will of course be described when we arrive at the proper time. What we have now to do is to take them as we find them. Such of them as have outgrown their pots and can be repotted, should, before they start afresh to grow, be removed into pots or tubs a size or two larger than the old. Make the drainage as before described; then examine the ball which you have taken out of the old pot, and if there are any signs of worms, hunt them out and kill them; remove all dead roots, score the sides of the ball a little, if it is much matted together, so that in healing the old wounds the plant will naturally throw out new fibrous roots from the calluses; remove the old earth from the top of the ball till you come to the roots. Now set it on the earth which covers the drainage in the new pot, and fill in between the ball and the sides of the pot with the fresh compost, and work this in well with a stick; then shake together; finally add fresh earth to the top of the bared roots till the pot is full. Water and treat as in other cases, although it will not be necessary to defer putting these plants at once into their final places in the greenhouse. Water Camelias abundantly as they start to grow. Give Azaleas less water and more sun. House Euphorbias. An excellent pot for such plants will be shown by and by.

Another class of plants includes those, which, owing to size or other peculiarities, cannot be repotted. In dealing with these, remove the upper earth in the pot down to the roots, and replace it with compost. They will need manure-water oftener than the others.

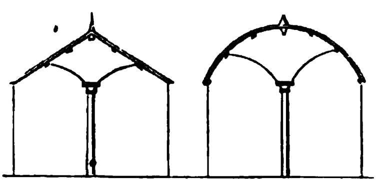
Pinch back roses in pots,—make cuttings of Verbenas etc., to blossom late in the spring; as the Fuchsias, etc., lose leaves give little water and keep in the shade till spring.

CONSTRUCTION.

The greenhouse on our estate, as shown by the plan, is a span-roofed house with straight sashes. The use to which any glass-roofed structure is to be put should decide its character. A building for the growth of grapes or fruit, where only one side is to be exposed to the light, may with some propriety be a lean-to house (*i.e.*, one of its sides may be a perpendicular, dark wall); but where plants which should be equally well grown on all sides are to be cultivated, the light should be admitted from as many points as possible. A distinguished English writer says: "Of all forms for a geeenhouse, that of a lean-to is decidedly the worst, and that of a span or curvilinear the best." When trained upon walls or trellises peaches and vines may be grown to the greatest advantage in lean-to houses, but greenhouse plants seldom can, as the merits of the latter greatly depend upon symmetry of form, and this cannot be attained unless every part of the plant be equally exposed to light, air, and sunshine.

"It seems now almost universally admitted that the span or curvilinear form of roof is best adapted for this purpose; and the ends of the house should front north and south, although under peculiar circumstances they may be usefully constructed to face the east and west; the more so if they are glass on all sides to within a foot or so of the ground."

It will be seen that this author uses the terms span and curvilinear as alike distinct from "lean-to," although they are far from being so. A span-roof, as we have shown, is ordinarily shaped with the sashes and the lines of the roof straight. But the lines of roof and sash in a span-roof may be curvilinear, and there may be the same differences in the lines of a lean-to roof, there being no more restriction to straight lines in this than in a span-roof.



To appreciate the respective advantages of these different forms, we must consider why glass is used for a roof. However much artificial heat fire will give, we must, to grow perfect plants, depend on the sun for light and heat; yet the position of the sun in the heavens differs greatly in different months. Out-of-door plants, in the growing season, have the sun's rays nearly vertical for a part of the day, and the vertical rays are the hottest. In greenhouses the order of the seasons is reversed, and the growing season is at the time when the sun's altitude is low, and his rays relative to the earth's surface never approximate to the vertical direction. Our aim must therefore be to arrange our glass roof so that the rays shall strike it nearly at a right angle. With a rectilinear roof,—whether "span" or "lean-to,"—some constant angle is selected; such, perhaps, as will secure the perpendicularity during the coldest months, and as the sun increases his altitude, this angle will become more or less desirable, and we must then depend upon the increase in the hours of sunshine, so that a decrease in quality may be made up by increase in quantity; or we can increase artificial heat. But with a curvilinear roof, this difficulty is lessened, as some part of its changing form will always be nearly perpendicular to the line of incidence of the rays.

There is, however, an objection to curved roofs. They are more expensive to build, because of the difficulty with which wood is bent to curves without injuring its strength. Curved roofs are therefore generally made of metal, which can be cast of any strength and shape required. This change increases the expense as well as the liability to damage from expansion and contraction in a climate of such extremes as ours.

Still, when a greenhouse is to be built by a person with money enough to allow of his considering the best of its kind to be an essential feature in economy, a curvilinear span-roof is beyond question the best for all plants which Nature intends to be symmetrical. Both these styles of houses may be rendered more effective still by the application of the ridge and furrow sash, which is described in another place.

This distinction between plants which branch in many directions and fruit trees and vines, whether grape or flowering, must be kept constantly in mind while discussing glass structures, as neglect of the peculiar wants of the different plants the gardener may wish to cultivate, has been the cause of the almost complete uselessness of many very elaborate and expensive glass houses.

A greenhouse is a building in which plants may be stored for the winter, and in which a moderate growth may be promoted; we may, if we please, divide the house so that some portions can be heated hotter than others, and the plants in it forced more rapidly for exhibition in the conservatory, when in bloom; but as a whole building it should be a cold rather than a hot house.

Some portions of the floors of greenhouses — around the supporting posts, and at the back walls and ends, may be filled in with loam, in which to plant vines of different species, Roses, Passion-

Flowers, etc., to be trained up against the glass; but this space should never be used for grapes or fruit unless necessity compels.

I shall treat this subject more freely, when we come to it in its proper order.

In all greenhouses where flowering vines are planted in the manner we describe, the ground must be forked over in the month of September, the old loam removed from the surface roots and new added. If this is done early, they will make new fibres and be ready for a rapid and healthy growth during the winter.

I shall give no space to the consideration of hothouses proper, as we have none on our place. They are chiefly used for growing Pineapples, exotic fruits, and orchidaceous plants. Pleasant as it is to grow these varieties, it is very expensive and troublesome, and not in accordance with a moderate income. Whoever wishes to indulge in this kind of culture must consult more elaborate treatises than this. The principles of management are very like those for the greenhouse, grapery, and conservatory, only carried to a higher point.

CHAPTER III.

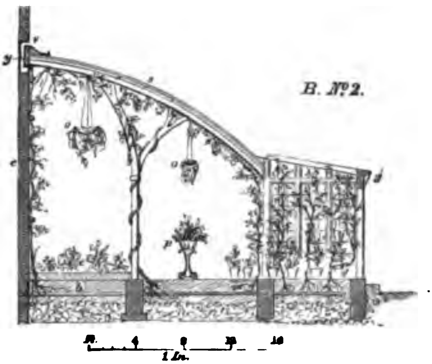
CONSERVATORY.

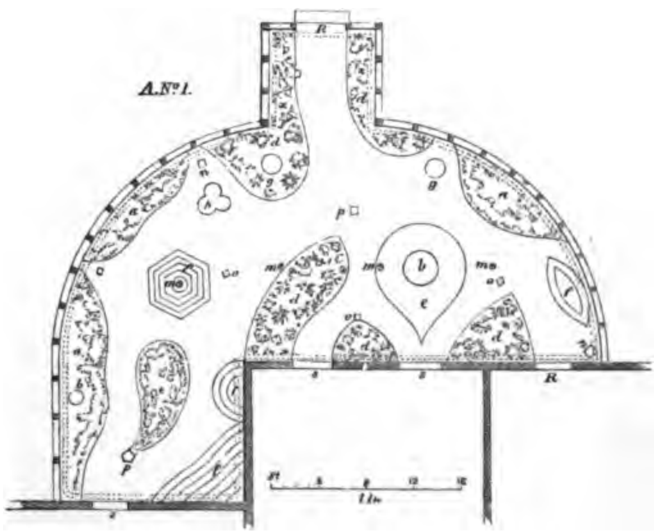
DURING September there is little to be done in the conservatory. This building differs from any of the glass structures already described, inasmuch as it is intended for the exhibition of specimen flowers, and for growing but few plants, such as flowering vines, which may be planted in the earth under the floor, Roses, etc., which grow in beds prepared like those of the out-of-door garden, or some very large plants, which need room and light rather than heat.

It should, if possible, be connected with the dwelling, and open out of those rooms most frequented by the family. In it may be a fountain basin for fish, aquariums, or birds, busts, statues. If there is room, a portion should be raised a little higher than the rest, and be furnished with seats and a table for the convenience of the ladies of the family, should they wish to sit there with work or books, and enjoy the pleasure which the fragrance and sight of beautiful plants must always give.

Of all things connected with gardening none is so misunderstood as the conservatory. We hear the greatest variety of buildings called by that name. Sometimes it is that hybrid which necessity alone can excuse, a greenhouse where plants grow on the shelves, and grapes on the rafters; and sometimes it is a pit, where a large bed of earth is boxed up, in which are planted flowering vines, to run over the back or walls of the building, while in the middle and front, Roses, Heliotropes, etc., grow; on a shelf directly in front — under the eaves as it were — is a collection of other plants, such as are most often subjected to winter culture.

Both these arrangements, for the culture of plants in winter, have their merits, and are very desirable, but neither of them is a conservatory. That building stands in relation to the other hothouses,





INDEX TO CONSERVATORY.

A, Ground Plan. **B, Elevation.**

No. 1.

d, **groups of plants in pots; E, beds of plants, as Roses, etc.; *f*, *j*, staging full of plants; *h*, *h*, small beds of Verbenas, etc.; *m*, *m*, posts of Conservatory, covered with vines; *n*, *n*, busts and statuary; *o*, *o*, large statues, *p*, *p*, standing baskets of flowers; R, R, doors; *s*, *s*, ground glass windows to house; *x*, *x*, hot-water pipes; *g*, *g*, basins for fish, etc.**

No. 2.

c, **Wall of house; *j*, gutter, *y*, ventilator; *b*, pipes for heating beds; *o*, *o*, hanging baskets; *v*, moulding to connect house and roof.**

[illegible] the drawing-room of a fine house [illegible] room. In other plant-houses plants may be [illegible] when in perfection, into the more light and airy house [illegible] admired, and after their beauty is passed, to be removed [illegible] being filled by a new set. The pit we have [illegible] in point of flowers and character, to the conservatory [illegible] hybrid between it and the greenhouse.

[illegible] confusion arises from our American passion for [illegible] names; from that false taste and mistaken [illegible] to palm off an inferior article for a better, by [illegible] sounding title. I would not be understood to depreciate [illegible] ing which holds the most humble collection of plants, [illegible] I continue, give directions for the construction of those [illegible] be more [illegible] and cheaply made and [illegible] cot; but I do [illegible] praise which is not connected with the approval of the [illegible] but resorts to the flimsy disguise of a misnomer [illegible] entrap the admiration of those, who, knowing nothing of the subject, gaping[illegible] wonder at the "learning," that familiarly calls common things by uncommon names.

The work in the conservatory for this month is (as in the other glass-houses) to paint, to clean, to renew the earth about the roots of all plants that stand in beds; wherever this last is difficult or impossible, owing to the presence of floor or pavement, give, when you water, strong manure-water. Prune the vines, remove all dead or superfluous wood, pick off decaying leaves, thoroughly syringe all the plants, and see that the heating apparatus is in order.

Plans for the conservatory should be conceived and settled on in May, in order that the foundation may be built, and the soil may be prepared, and such flowering vines planted as we propose to [illegible] they may have the summer to grow in, and may be [illegible] to blossom in the winter.

[illegible] finish our conservatory the last of August or middle of September, so as to have it covered in before frost comes. [illegible] a conservatory attached to the dwelling-house [illegible] designated by the letter C in the index. It is a [illegible] building, covering the windows of the dining-room and kitchen, [illegible] entered through a French window from the dining-room [illegible]

as the drawing-room of a fine house to the common parlor or sitting-room. In other plant-houses plants may be cultivated, to be carried, when in perfection, into the more light and airy conservatory, to be admired, and after their beauty is passed, to be removed, their places being filled by a new set. The pit we have described comes nearest, in point of flowers and character, to the conservatory, but is a hybrid between it and the greenhouse.

The confusion arises from our American passion for large, important names; from that false taste and mistaken judgment which thinks to palm off an inferior article for a better, by giving it a high-sounding title. I would not be understood to depreciate any building which holds the most humble collection of plants, and shall, as I continue, give directions for the construction of those which can be most easily and cheaply made and taken care of; but I do dislike that love of praise which is not contented with the approval of the discriminating, but resorts to the flimsy disguise of a misused name, to entrap the admiration of those, who, knowing nothing of the subject, gapingly wonder at the "learning" that familiarly calls common things by uncommon names.

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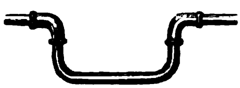
We should finish our conservatory the last of August or middle of September, so as to have it covered in before frost comes. The plan shows a conservatory attached to the dwelling-house on the east, and designated by the letter C in the index. It is a semicircular building, covering the windows of the dining-room and kitchen, and entered through a French window from the dining-room and parlor. The kitchen windows are of rough glass, so as to transmit light without looking into the conservatory. Its length on the front of the main house is 31 feet; on the kitchen, 15 feet; on the end of the main house, 19 feet; the depth in front is 19 feet; on the side, 15 feet; the porch is 10 × 10.

Plate No. 1 shows the ground plan. The whole front floor, not occupied by plants, is covered with alternate flags of purple and green slate; Malone sandstone, or strips of hard pine may be used. The outside foundation is a stone wall, 3 × 4 feet; above the base rises an ornamental brick wall, 3 feet, with ventilators, as in the greenhouse, opposite the hot-water pipes, and opening and shutting in sections — the curved form of the house making it impossible to move all at once; they are 4 feet apart, and 1 foot square. The hot-water pipes and boiler are similar to those in the greenhouse; the boiler is in a shed at the kitchen corner of the house, and not shown in the plan; the pipes surround the porch, or may cross it under the floor. Where they cross the pathway, and would be stumbled over if on its level, they sink on one side and rise again on the other, as in the greenhouse. No such rise and fall is necessary where they cross the entrance from the parlor, as the conservatory floor is there sufficiently above the level of the parlor floor to let the pipes pass under. The smoke flues traverse the walk along the front and return along the back of the conservatory into the kitchen chimney.



Above the brick wall rises a perpendicular glass front, 8 feet high, and from the top of this the glass roof springs back to the main wall of the house in a curvilinear manner. This gives an immense amount of light, and demands a great deal of heat to warm it properly. It is ventilated by a revolving sash in the middle of the top, and by ventilation through the wall of the house, similar to the greenhouse.

The ground floor is not covered to its utmost capacity, but is arranged so as to give as pleasant an effect as possible.

Internal Treatment.—*d* represents groups of plants standing in pots, such as Camelias, Daphnes, Cape Jessamines, Laurestinus, Pettosporums, Oranges, etc. They may be kept here constantly, or be brought in when about to flower. *e* marks beds of plants, Roses, Geraniums, Heliotropes, etc. These beds are 4 feet deep, well drained at bottom, then filled in 18 inches with stones, which are covered with strips of turf 3 inches thick, to prevent the fine loam being washed away; then comes a foot of oyster shells, charcoal, bones; then a foot of rich loam. The plants growing here are never moved, but are not watered during the summer more than enough to keep them alive, so that they are virtually dormant at that season, but grow and blossom most luxuriantly in winter. *ff* are stagings filled with plants from the greenhouse, ready to blossom; a succession may easily be kept up if a little care be taken; *hh* are beds similar to *e*, but smaller, and filled with bulbs, Verbenas, etc.; *mm* represent the posts of the conservatory, which, in No. 2, are shown covered with vines; *nn* are busts or any small statuary; *oo*, large statues of a character adapted to gardens, Flora, Pomona etc.; *pp*, standing baskets of flowers; RR, doors; *ss*, ground-glass windows leading into the house; *xx*, hot-water pipes; *gg*, basins for fish, aquariums, or fountains.

In No. 2, *c* shows the wall of house; *j*, gutter; *y*, ventilator; *b*, pipes for heating beds; *oo*, hanging baskets; *v*, moulding to connect house and roof.

Expense. — A conservatory of this kind would be a real winter garden, and would give more pleasure than any greenhouse. Water would be supplied from the house cistern, and could be made to serve many ornamental purposes. Such a building would, of course, be expensive, but nothing for which money is ordinarily expended would give a larger return in satisfaction. As the conservatory need not be stocked till next month, we reserve a list of plants for it till then.

CHAPTER IV.

GRAPERY.

By referring to the index of our plan, you will find the grapery marked by the letter B. It is quite a large building, eighty feet long; two-thirds is lean-to, one-third span; and it is filled with vines. It is divided by two glass partitions into three parts, so arranged that the heat may be increased or diminished in either at pleasure, thus enabling us to have a succession of fruits at those seasons of the year when it is most desirable. The space on the floor of the cold grapery, where in greenhouses would be a staging for the culture and exhibition of plants, is an espalier on which are Peaches, Nectarines, and Cherries.

The sections of this house have vines in them, respectively two, three, and four years old, and are, during this month, in very different conditions. The central portion is the cold grapery, where it is but rarely necessary to have any artificial heat, and which ripens its crop in August and September. The left section is to be a retarding-house, whose fruit is to be fit for use in December, January, or February. The right side is a forcing house, where the fruit will be ripe in June, July, or earlier, according to the age of the plant forced. For details of this building, a description of the border, etc., see the October work for the grapery.

Forcing-House. — In September, examine your forcing-house, clean the sashes, repair glass, paint or whitewash the wood-work, and get all things ready for work. As the evenings begin to cool, be careful to close the doors and sashes, and if any sudden frosts make it necessary, draw the shutters up over the sashes.

Our vines having been planted three years, we may this year begin forcing with vigor.

Much care should be taken in a forcing-house, lest being tempted by a desire for a large and early crop, which may remunerate us for previous outlay, we force the vines when young at too early a month in the year. A forcing-house reverses nature's order and converts winter into summer; and in managing it, we must be careful to be governed by the corresponding natural analogies. Out-of-door plants move slowly from frozen ground and cold air to thawed earth and genial temperatures. Therefore, our aim in the forcing-house must be to keep it as cool as possible in September, without subjecting the roots or vines to a chill. We may begin forcing this year at least fifteen days earlier than last. In this connection, I can do no better than to quote from J. F. Allen's treatise on the grape, as there is no more skilful or successful cultivator of the grape in this latitude.

"If it is intended to winter-force, you must *not* commence the process the first year before the first of March; the second year you may begin the middle of February; the third year, the first of February; and so on every year until you reach the first of December; beyond this you can hardly go, as this allows only time to prune and clean the vine after it has gone to rest." We shall in this, the third year of our forcing-house, begin to force about the first of February.

Retarding-House. — The vines in the retarding-house are ripening their second crop of fruit. Having thinned the grapes in August, there is but little to do in September, excepting to moderate the growth as much as possible by keeping the house cool when the sun shines. It is important to keep the house dry to avoid danger of mildew; shut the doors and sashes as the nights grow cool; if there is any appearance of mildew, dust the vines with flowers of sulphur, and shut up tight at night.

Cold Grapery.—In the cold grapery at the first of the month there will be a little fruit ripening and a little ripe. There should be but little, taking it altogether, as a vine two years old is too young to be allowed to bear any thing but specimen bunches. It is true, that vines of that age will often bear heavily if allowed, but the final effect of this is injurious, and only tends to weaken the plant and reduce its capability to bear large and steady crops hereafter.

Pinch back fruit and fig-trees in pots, to ripen and improve the wood. Having followed the directions for the earlier months (*calendar*) of this year, in August, or September —

"You may begin at the lower part of the cane, and with a sharp knife cut clean out all the laterals for eight or nine feet, leaving those on the upper part of the cane for the autumn pruning. Be careful in doing this not to injure the bud or leaf of the cane where you cut, for from this eye your fruit is to come the next summer."

If there are any bunches of fruit on the vines, keep your house as cool and dry as possible, as this is the only means of preserving the fruit; either extra heat or moisture will occasion mildew or decay.

CHAPTER V.

FLOWER-GARDEN.

We have already said that in September the flower-garden is in its most satisfactory condition; we should have limited our assertion to the first half of the month, after which time the work of disrobing begins. Many plants must be taken up, to be removed to the greenhouse, and some of the beds must be dug over for planting bulbs.

Bulbs may be planted in any of the autumn months, until the ground is frozen, the earlier the better, for many of them will make fibrous roots in the fall, and thus be ready to grow more rapidly and vigorously in the spring; and it will generally be found that the earliest bulbs to blossom, of a given variety, are those which were earliest planted.

In this month, as before, go over the beds repeatedly with knife and string, cutting out the old blossom stalks, and tying up the too drooping branches of the erect species of plants. Particularly watch the Dahlias, which by this time have grown large and top-heavy; a single high wind will prostrate every Dahlia that is not well secured, and thus destroy the hopes of a season. The Dahlia will blossom every month from July to October, if forced early enough, but will give its best blossoms only as the nights grow cool and long.

Bedding Plants.—Get up the tender greenhouse plants which are to be wintered before the 15th of this month; for although there is often fine weather till October, there will be an occasional frost, which will cut off every tender plant. As you begin to transplant, the beds will have a very seedy and dismantled appearance, and your judgment as a gardener will become apparent in the manner in which you conceal the losses made by transplanting.

The more hardy plants, like Carnations, Verbenas, Lantanas, and Pelargoniums may remain in the ground till October. In September we expect the last blossoms of the Perpetual Roses.

BULBS. — Overhaul the bulbs collected for the spring blossoms, ascertain the number you have of each variety, and how much surface they will cover; then decide what beds shall be devoted to bulbs; take out every thing in them, unless it be Roses or perennial roots, dig them over thoroughly, adding a good dressing of well-rotted manure. This work cannot be too thoroughly done, as upon it depends the satisfactory blossom we hope for in the spring. Having prepared your beds, towards the last of the month (25th, perhaps), begin to plant, although this may be deferred till the first of October. The amount of earth required over a bulb differs with the variety, but none need more than three or four inches. Where it is desirable to produce any given effect, say of color, with Hyacinths, Tulips, or Crocusses, lay them out around the bed on the surface in their proper places before beginning to plant, with a view to producing whatever effects you fancy, according to the variety; Tulips and Hyacinths from six to nine inches apart; Crocusses, two or three inches; the larger bulbs from three to four. By using bulbs of well-known colors and character, the most varied effects you wish may be produced with certainty.

Where we wish a succession of bloom, nothing is more easily procured; we have only to plant bulbs of the earlier and later varieties. A very pleasant effect is got by adding to the beds some Pansies, as they blossom as soon as the snow is fairly gone, and last till hot weather. Snowdrops come first, then Crocusses, then Pansies, then Hyacinths, Narcissuses, Tulips, Daffodils, Single and Double Jonquils, etc.

PLANTING. — Having laid out the bulbs as described, take a tin tube in the shape of a truncated cone, 6 inches long, about 3 inches in diameter at the large end, at the smaller, 1½ or 2 inches; take the bulb in your left hand, in your right, the tube; press the small end down into the earth as far as you wish to set the bulb — 4 inches for Tulips, etc., $1\frac{1}{2}$ for Crocusses, — drawing up the tube, you will find it filled with earth as high as it was pressed deep into the ground, its tapering shape preventing the earth in the upper and larger end from falling out at the smaller. Now set the bulb down at the bottom of the hole, its pointed end up. If it is a Hyacinth, shake a little sand over it; then invert the tin tube over it, and the earth removed to make the hole will be replaced. This will be found to be the most neat and rapid way of planting bulbs. Any tinman will make such a tube for ten cents.

TULIPS. — When choice Tulips are to be planted, a deal of care must be taken to arrange colors and sizes so that the tallest may be in the middle and the smaller towards the edge of the bed. Connoisseurs in tulips, who pride themselves on the splendor and variety of their bulbs, resort to very elaborate preparation in the way of soil, exposure, size of bed, number of rows, etc.; but this is troublesome, and undesirable to the general cultivator, who does not wish his whole satisfaction in his flowers to be destroyed by the trouble of taking care of them. The utmost that the Tulip demands is to have the bed in a rather high and airy situation, sheltered from the prevalent winds, and on a light rich soil. All other details may be arranged to suit the cultivator.

HYACINTHS, — too, have often been made the subject of elaborate memoirs. Were it necessary to resort to the care insisted on by the writers of these directions, Hyacinths would cause more trouble than they are worth. It is enough to observe the directions just given for Tulips.

With the other common bulbs we may be still less particular. When the amateur desires variety rather than whole beds of one kind, bulbs may be planted singly, or in groups, about the borders, among perennial roots, etc. When they are to be planted in this manner, it would be well to take with you a wheelbarrow of rich mould, and put a spadeful in the place where you are about to set the bulb, as all blossom well in proportion to the richness of the earth immediately surrounding them. Plant during this month

Pansies among your bulbs as just described, or in a bed by themselves, or in the borders. The Pansies to be set out are those of which the seeds were planted in June; by transplanting now, they will be enabled to get well rooted and make some growth before winter. They like a rich soil, and pay well for it. Old plants can be divided, and cuttings be made. The Polyanthus may appropriately be mixed with bulbs to vary effects; transplant this month. The ordinary Polyanthus needs no specially prepared soil. Plant White Lilies early this month.

Late in the month divide and transplant, or reset the perennial roots. Make beds for them by themselves, or in common with other plants, but endeavor to get, as you easily may, such a succession of perennials as will give some flowers during all the growing months, from May to October. Having a greenhouse to supply an unlimited amount of bedding plants, it will be well to leave gaps among the perennials, in which to set Verbenas, Heliotropes, Geraniums, Salvias, so that their successive and late blossoms may come in to fill the spaces left by dying perennials.

Florists' Flowers. — Some writers have indulged in lengthy directions for the growth of Auriculas, Ranunculuses, and other plants, which I can consider in this latitude only as denizens of the greenhouse and hotbed, and as such I shall treat them. Be careful now to watch the Chrysanthemums, both Giant and Dwarf, for the gaiety of the garden in October and November must depend upon them. Tie them well up to sticks, and keep out the weeds, and do not allow any perennials or bedding plants to crowd them, and thus impair their vigor. Make beds of Picotees and Carnations agreeably to directions in July.

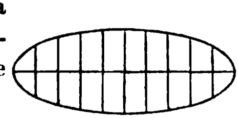
As there are in our flower-garden no beds for the bulbs or the perennials of which we have been speaking, we will now proceed to make them.

Refer to the enlarged plan of the flower-garden, where we can have better opportunity to describe the work intelligibly than in the narrow limits of the general plan. We will give the method of staking out two of the beds and let that suffice for all.

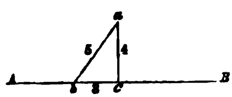
First, carefully measure the garden and its walks, and lay it down on paper. Then draw on the plan such beds as you know will produce a good effect when judiciously planted. *Remember particularly*, that the prettiness of the shape of flower-beds is not of the least consequence, but that all beds should be of such shapes as will give a good effect individually or collectively, when planted. Make the indentations as large as possible, as they will then be more easily kept free from weeds and grass; avoid sharp points for the same reason; give as much variety to the outline as you can, making your curves easy and graceful.

To STAKE OUT A ROUND BED.—Select a point for the centre, where drive a round stake; take a rope with a loop at the end, put the loop over the stake; hold the rope in the left hand as far from the stake as one-half the diameter of the proposed bed; take a handful of stakes in the other hand; walk forward at the full length thus taken, and put in a stake every three paces. When you return to the point of departure, the stakes set will make a circle on the ground.

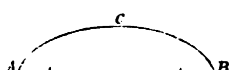
To STAKE OUT AN OVAL is more difficult. Decide upon the length of the largest diameter,—say 20 feet; draw this line at some scale on paper; draw another line cutting the first in the middle and at right angles. This second line is the short diameter of the proposed oval, 8 feet,—4 feet on each side the long diameter. Draw around these lines such an oval as will suit you; at every two feet draw a line from one side to the other, at right angles with the long diameter: the first line parallel with the short diameter.



Measure these lines and note on each its length (by the scale of the first line). Go to the garden, and select the spot for the oval; stake out a long diameter, A B, 20 feet long, parallel to the path or border on which you wish to make the bed; or, if that be curved, connect two points in it by a straight line, and make A B parallel to this, and the proper number of feet distant from it. Find the middle of the line, 10 feet from each end, and here set a stake C; take a tape line and pin its ring or end to this centre stake; measure back on the diameter 3 feet to *b*, where set another stake; draw the tape firmly round this last stake; follow the tape till you come to the 12 feet mark, and fasten the tape at this mark to the centre stake again C. The tape will now be fast to the middle stake by both its ends. Find on the tape the 8 feet mark, and holding there, draw the tape out tight either side the 20 feet diameter; at this point set another stake *a*; your three stakes will now mark on the ground the angles of a triangle *a b c*, and the last-placed stake will mark the centre of one of the sides of the oval. Find the other side in the same manner. Measure the line A B, as in the figure, into two feet lengths; at each end of these points measure out a line parallel to the short diameter *c a* (just obtained on the ground), proportionate to the corresponding line on your plan. When all are staked out, draw up the middle line of stakes, and the oval is complete.

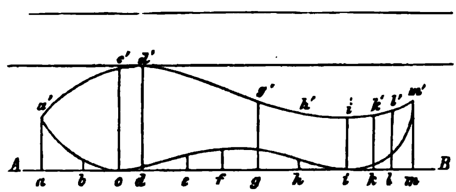


Another method of doing the same thing is described in common mathematical treatises, but it applies only to the regular ellipse drawn on a smooth surface; among bushes or tall herbaceous plants it would be impracticable. It is as follows: stake out the line A B for the long diameter of the ellipse; find two points *a*, *b*, which shall be as far from A and B respectively, as one-quarter the short diameter of the ellipse; fasten to the points *a*, *b*, a cord as long as the line A B; press a sharp-pointed stake against the cord, so that it may loop about it, and draw it back on the line A B to either extremity; then carry it toward the other extremity in such curve as will keep the cord constantly taut, marking out your course meanwhile with the point dragged on the ground, and you will describe the curve A C B as in the diagram. Having changed the stake to the other side of the cord, repeat the operation and complete the ellipse.



To stake out an irregular figure for a bed, a different method is followed.

Suppose it to be the bed A on the plan. Draw as before, on paper, a line A B to a scale; make it as long as the proposed bed, and let it touch the beds at the points *c i*. Now on the plan measure the distance, the outline of the bed and the path at various points on the line A B; these points are *a b c d*, etc., and may be any distance apart, but whatever that distance is, note it carefully on the plan. At these points erect perpendiculars, till they touch either the outline of the bed, the path, or the border; measure the length of these perpendiculars, and put these lengths down, each on its proper line. With this preparation go out and stake out the line A B as far from the path or border as the length of the lines *cc'* and *dd'*. Now divide A B into *a b c d e*, etc., measure out on the ground the lines *aa' cc' dd'* etc. (full size), perpendicular to A B, and stake as you measure. When this is done, remove the stakes that merely mark the line A B, and you have your figure; and however irregular this figure, this is the best way to stake it out. There need never be any trouble in getting one line perpendicular to another on the ground, if you remember the process followed in staking out the oval. That method of getting a right angle is embodied in the mathematical proposition that the square of the hypothenuse of a right-angled triangle is equal to the sum of the squares of the other two sides.



To proceed with the work. After staking out all the beds, select those which are to be devoted entirely to bulbs, as *a b c f*, marked on the index by a star.* Prepare them as we have directed, and plant to suit your taste. The index shows how they are planted on our plan. The other beds may be planted at will; the bulbs in bunches and groups (see index), the other space filled with perennials and bedding-out plants.

* See p. 726.

CHAPTER VI.

KITCHEN-GARDEN.

THE kitchen-garden must be closely watched from February to December, although September needs as little attention as any month. Seed-beds are now to be prepared for the growth of various salads for winter and spring use, and to start some early spring vegetables. It is not generally known that much spring labor with hotbeds could be saved, if attention were given during this and the next month to growing young plants of those vegetables most in demand in the spring. Being once well started, they may be pricked out in cold frames during October and November, and being covered with boards, or leaves, will be found ready to transplant and grow as soon as the frost leaves the ground fit for culture.

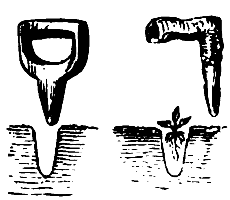
To plant seeds, select a warm, moist place; fork the land over, mixing in well-rotted manure; rake the surface thoroughly to reduce it to the finest possible condition; then sow the seeds in drills six inches apart, if they are to be covered with hotbed frames for the winter; a foot apart if they are to remain in the open ground. Spinach should be sowed in long beds, rows a foot apart; cover the seeds about half an inch deep, and roll in well. All plants intended for early spring culture must be sown before the middle of this month, care being taken that they do not get too forward. If they grow large they are very apt to run to flowers in the spring, before they are in condition for the table. They may be retarded at pleasure by several transplantings in the course of the autumn.

Lettuce and Cabbage, the latter for greens and early heads, may be started, and kept in frames as we have just mentioned. Salads for winter and spring are not as much cultivated in Massachusetts as in the neighborhood of New York and Philadelphia.

Earth up advancing crops of Celery once a fortnight, being very careful never to do it when wet with rain or dew, as it causes rust, and also never to cover the heart; treat Cardoon and Artichoke Chard in the same way; transplant and trench Endive and Sea Kale; hoe beds and clear the plants of Sea Kale, Chiccory, and similar vegetables. Watch early Cauliflowers, and gather their heads, as also Broccoli, before too much advanced. The earliest kinds of Celery may be dug towards the end of the month. Peru and Lima Beans will be getting fit for use. Sow seeds of small salads, as hitherto; likewise beds of Prickly-seeded Spinach. Radishes sowed now will be ready for the table by winter. Okra must be used frequently, as it will be cut off by early frosts. Any herbs not yet gathered, save immediately. As Onions ripen, gather and dry them. When the neck of the Onion shrinks, gather them; lay them in heaps to dry for ten days or a fortnight, according to the weather, and then house. If the fruit on the trees is troubled with wasps and bees, hang some wide-mouth bottles half full of molasses, or sugar and water, about them. Many will be caught and destroyed; they go in but are unable to return.

Fruits in Kitchen-Garden. — It will be seen by reference to the plan that we include many kinds of fruit in this garden, such as Strawberries, Currants, Raspberries, Gooseberries, Blackberries, and Thimbleberries, Quinces, Filberts, and espaliered fruit. These fruits belong to the kitchen-garden only, as they are not grown in quantities for the market, but as a table supply, and require an amount of attention not demanded by other orcharding.

Strawberries. — Early in this month it is a common practice to reset Strawberry beds; and when the land is moist, or there is a prospect of a wet season, no month is better for this purpose; work is now less pressing than in the spring, and plants well started get several months to grow, and will bear some fruit in the spring. Avoid, if possible, resetting the bed in the place of the old, as all plants are benefited by the rotation of crops; and where Strawberries have been cultivated several years in succession, they are never so good as on fresh land. In preparing the bed, dig it deep, and give a liberal dressing of manure, as it is difficult to manure the strawberry crop after it has begun to grow, though no crop pays better for large supplies of liquid manure during the time of setting and ripening fruit. Select good, healthy, year-old plants; cut off all but two, or at the most three, leaves, and shorten runners. Hold the plant in your left hand, taking your dibble in the right (the dibble may be the handle of an old spade or shovel cut off eight or ten inches below the cross-bar, and roughly pointed, or a stout bit of hard wood eight or ten inches long, bent on itself



at a right angle, and pointed); press the dibble into the ground about three inches, which will make a smooth hole; as you withdraw the dibble, set the plant into the hole. Now re-insert the dibble, first on one, then on the other side of the plant, at a re-entering angle of about 45° to the perpendicular hole first made, and press the earth closely up to the roots of the plant. This is the most rapid and effective way of transplanting all plants of which large numbers are required. The rows of Strawberries should be six inches apart and three rows to the bed. Some cultivators are now more in favor of a single row and no beds; each row being two to three feet from its neighbor. This method allows the fruit to be picked more easily than any other, but occupies more room and requires more labor in cultivation.

When it is desirable to transplant Strawberries or any other fruit with extra care, so as not to interfere with their growth, it is

well to use some one of the English or French transplanters, of which a specimen is shown in the cut. The arm *a*, is ratchetted and swings on a point *b*, and fastens on a tooth *c*. Lower the arm *a*, and it drops off the tooth *c*, and opens the cylinder at the bottom of the instrument, as shown in the cut; now drive the open bottom firmly down on each side the plant to be removed until its upper edge is level with the ground; take one of the stilts in each hand and press them apart. This brings the two parts of the cylinder together and compresses the earth firmly about the roots of the plant within; now fasten it in this position by letting the arm *a*, bite on the tooth *c*. Here the whole is in a compact box, and a little lifting strength being applied to the arm *a*, will take the plant, roots, earth, and all out of the ground. We may now carry it as far as we please, and having dug a hole the size of the cylinder, set it into it, fill in the earth closely about it, unlatch *a*, and drawing the stilts together slightly raise the instrument by an easy and slow movement, leaving the plant in the ground. Transplanting accomplished in this way never checks growth for a moment, but is obviously too slow a process to be used on a large scale.

In selecting Strawberry plants, bear in mind that some varieties are staminate, or male, and have but few pistillate or female flowers, and consequently are small bearers, whilst other varieties are the opposite. If we get a large proportion of the staminate, our trouble is useless; if too large a proportion of the pistillate, a failure of fruit often follows from deficient impregnation. The Old Virginia or Scarlet Strawberry is largely staminate, and is an early though small bearer, rather inferior in flavor, whilst most of the seedlings more choice in flavor and size are pistillate. It will be well to set about one of the Virginia to five or six of the others in order to insure a good crop.

Where it is easy to get a quantity of young plants for resetting beds, we may largely increase the number and size of the berries, by never allowing the plant to make runners; if these are carefully cut off, the parent plant will spread over a large surface, the Old Virginia even covering a space as large as a peck measure and bearing in proportion. This kind of culture gives many more Strawberries to the acre than any other.

As to varieties, those that seem to stand competition best are Hovey's and Walker's Seedling, the Brighton Pine, and the Jenny Lind. New varieties are offered every year and have their advocates. Without specially advocating any variety, I am sure that these have proved themselves good on a large scale.

RASPBERRIES. — Raspberries should now be well hoed and tied up to their sticks. If you have any leisure you may cut out the old wood which has borne this year, as it is now useless.

ESPALIERS. — The espaliered fruit will now mature rapidly. Gather the ripening Peaches and Nectarines, and do not leave them on the trees till they are perfectly ripe, or they will not keep so well. They should be picked when their color shows the practised eye that a few days will make them mellow. Take them into the house and lay them in the coolest and driest place you have, and be particularly careful not to handle or press them, as the one removes the bloom, the other hastens decay.

The same holds good of Pears. No Pear should be allowed to fall to the ground, — whether worm-ripe or not, — as it can hardly do so without bruising other fruit in its passage, at the same time spoiling itself. Pears, even more than Peaches, should be gathered *three or four days* before they become mellow. Take them into the fruit-room and lay them out on the shelves. The varieties of Pears on the espaliers should give a regular succession of fruit from the middle of August to November, by which time the fruit of the orchard trees will be ready for use. Of the espaliers there are four Nectarine trees, five Apricots, ten Peaches, and twenty-four Pears. The Nectarines are Early Violet, Hunt's Tawney, Boston, New-white. The Apricots are Large Early, Brede, Peach, Roman, Moorpark; the Peaches, Early York, White Imperial, two George IV., Grosse Mignonne, two Crawford's Early, two Late Red Rare-ripes, Oldmixon; the Pears, two Bloodgood's, Madeline, two Dearborne's Seedlings, four Bartlett, three Andrews, two White Doyennè, four Seckel, two Fondante d' Automne, two Louise Bonne, two Beurre Capiaumont, two Duchess, two Glout Morceau. The Filberts are Gifford's and Frizzled.

MELONS. — Melons are now in their perfection, and should be used every day, as an early frost will very probably cut them off. When not done last month, put under each fine melon a shingle, to keep it from the ground, or its flavor will be injured by the earth. The Cantalopes, Musk, Nutmeg, and Green-fleshed, should all be ripe now if ever. The ripeness of all yellow melons is shown by color; but those which have a green rind show ripeness by a gradual detaching of the footstalk, so that when raised by the hand the vine drops from the melon without resistance. Watermelons must be made much of now as they are in their prime. Various ways of ascertaining their ripeness are given: when rapped with the knuckles they give a hollow sound if ripe, because of a hollow interval left by the separation of the inner lobes, which have hitherto been all joined, but separate as they ripen. Another test is, pressing the melon between the hands; if ripe there will be a slight crackling (as the lobes crack), the same cavity in the centre offering no opposition to the pressure. Another test is, the decay of the tendril, which will be found on the side of the stem of the vine, opposite the footstalk of the fruit, until the latter is ripe, when it withers away.

PICKLES. — Hoe carefully the pickle crops of Cucumbers, Mangoes, Peppers, and Martynias; gather all ripe Tomatoes, and lay the best and earliest ripe in the sun to get seed; the others, not needed for cooking, should be allowed to accumulate a day or two, being kept dark and cool, to stew for winter use, or for the market. Be very attentive to the ripening seeds; gather and dry all you wish for the next season, never selecting for seed those similar varieties which have grown near together, as they will have mixed.

Pinch off the ends of the Lima Bean runners early in the month, as this is the only way to force the vine to mature its seeds.

ROOT CROPS. — Look over the root crops, Beets, Parsnips, Turnips, Ruta Bagas, etc.; if any stray weeds are to be seen, get them out. Hoe the Cabbages wherever the earth seems to have fallen away from the stem. Dig your early Potatoes, and lay them in heaps, out of the sun and dew, in a dry place for a day or two, to dry thoroughly before putting them into the cellar. Gather seed ears of the early Corn as it ripens; dry well, strip back and tie together the husks, hang them up where they will be secure from rats and mice. Early Peas and Beans are now to be pulled up, the vines dried, and the seed threshed and cleaned; the vines or haulm will be greedily eaten by cattle if well dried, or they may be used for bedding. Gather seed of Summer Squashes and throw the vines and remaining Squash to the pigs. Dig over the portions of the kitchen-garden which have grown these early crops, to be ready for new planting.

Pull up and store away any early Turnips not used, as they will now be apt to run up to blossom stalks, or become hollow-hearted and corky. Cut, dry, and tie in bundles, and hang up pot-herbs, Sage, Rue, Sweet Marjoram, Summer Savory, etc., the last of the month.

Gather the Squashes, and pile them in some warm and dry place, or shelter the heaps with boards till they are well dried; then sell or store them. A light frost will injure them very much, and every bruise is followed by decay.

As soon as the tops of the Asparagus are fairly yellow, and the berries red, cut them, lay in piles in the alleys between the beds, and cover with manure; then dig all in, cover the beds with a dressing of well-rotted manure and salt, but do not dig in for fear of injuring the crowns of the roots, unless very lightly; if the manure is fine it will not impede the Asparagus shoots in the spring.

CHAPTER VII.

ORCHARD.

The orchard now needs constant attention. The earliest Apples are mostly gone, and the autumn Apples are ripening. Send out every day a man with a barrow or a cart to collect all the decayed and "windfall" fruit for the pigs. Such as is good enough should be pared, sliced, and hung up for drying. Our Apples which will ripen this month, are Porter's, Gravenstein, Jersey Sweeting, Pumpkin Sweet, Maiden's Blush, Nonesuch, Seek-no-further, Scarlet Pearmain. They should all be carefully hand-picked before ripening, and laid out on shelves; — not barreled unless they are to go to market at once. The sale of autumn Apples requires much judgment, as they do not generally keep well, and are therefore hurried into the market until it is often overstocked. When carefully gathered and well barreled, they are in demand for export to the most Northern States and to Canada. For carelessly gathered fall Apples there is no such demand. A careful picker, barreller, and marketer, will sell his Apples for nearly double the price commanded by ordinary Apples.

Pears must also be well attended to. Go over the dwarfs, and pinch back the new growth that was not thus checked in August, to secure thorough ripening of the wood and save labor in the spring. In gathering and storing use the same care directed for the espalier fruit. The Pears that ripen this month are Andrews, Buffum, Beurré de Capiaumont, Beurré Bosc, Beurré Diel, Bergamot, Bon Chretien Fondante d'Automne, White Doyenné, Manning's Elizabeth, Flemish Beauty, Napoleon, Rostiezer, Seckle. These Pears should all be gathered at least a week before they are fully ripe, and be placed on the shelves of the fruit room, or in baskets and buckets, as will be hereafter described (for drawings of which see the October work), and kept cool and dark till quite ripe. If ripened thus, they will be highly colored, firm and juicy, and when well assorted will sell for very high prices. When they are carried to market, the wisdom of thinning out the Pears on the trees in June and July will be evident.

All the Peaches ripen this month as they are planted for market. Our only orchard varieties are Coolidge's Favorite, George IV., Crawford's Early (gone early in the month), Royal George, Late Red Rare-ripe, Large White Cling-stone, Oldmixon, and Heath. Treat them as directed for the espalier fruit in kitchen-garden.

Our Nectarines are the same as in the kitchen-garden.

The out-door Grapes will begin to ripen this month; first Diana, then Concord, then Isabella; late in the month Sweet-water and Catawba. Leave the fruit on the vines as long as possible, cutting only for use or sale. We have no vineyard for wine-making, and those who wish to try what is hardly a profitable business in this latitude, east of Albany, must consult special treatises on this subject. As the month closes, if there is any threat of freezing weather, gather the grapes, and winter-pack them in kegs with pretty dry sawdust, or lay them in drawers between layers of cotton batting, taking care to keep them cool and dark.

We have only a dozen Plum-trees, as the curculio, black-rot, and mildew make their cultivation a discouraging task. They will all ripen this month; Greengage, Coe's Golden-drop, Jefferson, Bolmar's Washington, Magnum Bonum, Damson. Gather this crop as it ripens, and place on shelves in the fruit room. It does not keep well; so eat, preserve, and sell as fast as possible.

Be sure to bud any stocks or branches of Plums, Cherries, Peaches, Nectarines, Apricots, and Pears, not budded in August.

CHAPTER VIII.

NURSERY.

HERE there is little to do if budding was finished last month; if it was not, do it now. Pull out all stocks that seem diseased; run the horse-hoe through the rows that are weedy; look over the tallies at the ends of the rows and refresh any that are dim.

The best tally is zinc, on which write with some preparation that will not fade, or with a stylus, or wooden tallies, first rubbed over with white lead, and written on with black lead pencil before the paint is dry.

In the nursery of ornamental plants, be sure to bud all the Roses as soon as possible; for varieties consult the flower-garden lists. Toward the last of the month, divide the tufts of perennial roots, so that whatever you wish to transplant may be ready, and the rest be making new roots.

Ornamental trees which you propose to plant this fall may be pruned now, if there is time, as it will save delay when transplanting. Go through the rows of trees and shrubs which are not to be transplanted this fall, and prune off all side branches, suckers, etc., which would interfere with a satisfactory development of the plant. Every unoccupied part of the nursery should be trenched and thoroughly manured, to be ready for planting next month.

EVERGREENS. — If there are any evergreens that must be transplanted before spring, or become worthless, move them now. Arbor Vitæs and Norway Spruces seem often not to suffer by fall transplanting; but as a rule, no evergreen should be disturbed in the fall, *except as a forlorn hope*, for it is of the greatest importance that a tree freshly transplanted should have time to repair the damage which its roots have suffered in the removal before it is taxed for any other purpose. Transplanting tears away more than we can estimate of minute fibres and spongioles, the vital parts of the plant, and its first physiological act in its new position is to heal these wounds and make good the place of the lost organs. The healing process is to form a callus similar to the callus on a "cutting" and analagous to the granulations thrown out in wounded flesh, where no tissue like skin or flesh is found at first, but a new substance that serves to protect the wound against the external air and shocks, to shield the new tissues that form beneath; so the broken root makes a shield of cellular tissue, which is in time absorbed or cast off, to give place to woody fibre and cellular tissue, from which roots are emitted in due season.

To insure the growth of cuttings, gardeners know that they must remove most of their leaves and set them in a shady place where there will be but little evaporation. So deciduous trees being without leaves in the autumn and winter evaporate but little moisture even in the sun; not enough to overtask their roots and prevent the formation of calluses after transplanting. They may therefore be removed even in the late fall with great advantage; and if this be well done, and the trees properly secured against the wind, the formation of calluses and new roots is certain in nearly all hardy varieties; and when spring comes there is an immediate resumption of growth; whilst a tree transplanted in the spring has all this reparative process to perform before it can grow. But in evergreens, the process of growth begins later in the spring, and the demand on the roots for sap continues till spring again; and when they are moved in the fall their vital processes are in full activity. The new growth of leaves, young and tender, is just formed, and demands the largest possible amount of moisture; whilst, if newly transplanted, the supply from the roots is diminished, and a demand made (for the formation of calluses) by the roots for a part of this diminished supply. Even if the evergreen could be moved into the most favorable position, where evaporation should be at a minimum and moisture at a maximum, the process of healing its wounds and putting forth new rootlets must go on very slowly, so great must be the demand of its foliage, under any circumstances, in the fall.

Suppose, however, the healing process goes on in the roots sufficiently to keep the tree alive. If it is to withstand the winter winds, the roots must have every opportunity to spread and seize firm hold of the earth. Even deciduous trees, with their skeleton top, are often winter-killed after being transplanted in the fall, by being so shaken in the wind that the slight hold of the new roots on the earth is broken. How much greater is the danger to the evergreen with its thick and leafy top, that opposes a large surface to the wind! But in the spring it needs less moisture, for its leaves are then old, and having supplied the tree for half a year or more, they have performed half their function, are thickened and hardened by the deposit of mineral matter in their tissue, and therefore work more slowly, elaborate less sap, and of course are less exposed to evaporation.

PRUNING. — If, however, you are compelled to move evergreens in the fall, prune them before setting them in their new place. It is little that can be done to restore the balance between roots and leaves; but you must aim at this; so cut away as far as possible the same proportion of top that you have torn away of roots. Evergreens may not be cut back like deciduous trees; their branches are to be thinned out.

CHAPTER IX.

THE FARM.

In September the farmer looks for some little leisure from the driving work of the year; not idleness, but an opportunity to begin upon those repairs and improvements which are not indispensable, but which will pay well in future.

Field No. 4 is in grass for the first time. It will depend upon the set the grass got last year, and on the kind of spring and summer, whether there will be a crop of Aftermath or Rowen succeeding the hay. The field was laid down to Grass and Clover with Rye last year, and should have cut a heavy crop of Clover. Early in the month, if there seems to be grass enough to warrant it, cut the Rowen. If, as is possible, the Clover has come up clean and free from any stray Rye, summer weeds, or grass, you may cut it for its seed, in which case it should be left to stand longer than if to be cut for hay.

Clover. — If cut for Rowen, treat as in summer; put in the mowing machine as soon as the dew is off in the morning. The whole of it may be cut before the mid-forenoon, there being about two acres in the field. After dinner turn it thoroughly; at four rake it; put the hay into cocks that will contain about fifty pounds dry hay. Cover with hay covers every night and during damp weather. Leave unopened until an examination shall show whether it is cured and fit for the mow; if it is, the covers should be removed during the heat of the morning, and the cock be turned over, to allow the bottom to get thoroughly dry. Then haul to the barn; salt slightly. This Rowen will prove the most agreeable food to your milch cows during late winter and early spring, and will cause a larger flow of milk than any other kind of hay.

Clover-Seed. — But if you wish to have clover-seed, the crop must be treated differently. Let the grass stand till nearly ripe seeds show at the bottom of the head; it will not do to wait longer than this, as the head continues to grow long after, and the lower seeds, which are the best, would ripen and fall before any others would mature. You may now mow this like Barley, or *cradle* it and tie in bundles. In either case, cure it like a grain crop; carry to the barn, and either thresh immediately or put it on the mow to be threshed hereafter. Another method of saving seed is to use a machine which can be carried through the field and will take off the heads, which must then be collected, dried, and threshed. The stubble may be pastured, or be cut for inferior hay or for bedding.

The ornamental grounds now need their last cutting for the season. That part of the lawn which was cut but once for hay will now yield its crop of Rowen, which must be treated in all respects like the Clover, excepting that it need not be left in cocks to make. The Clover leaves being very fragile when dry, break readily and are lost if the hay is turned frequently in making; and it is to avoid this that we cure it in cocks. Some farmers are of the opinion that all hay is better made in this way.

ROWEN. — The Rowen from the lawn is to be made like any other hay, and stored in the barn for the cows in spring. The grass on the rest of the lawn, and about the borders, flower-gardens, and house, is, as it has been at each previous cutting, similar to Rowen, although somewhat less nutritious, owing to the repeated cuttings, and is cured in the same way.

Field No. 2 is in Roots. Its area of 3 acres is divided into $1\frac{1}{2}$ acres Carrots, 1 Ruta Bagas, $\frac{1}{4}$ Parsnips, $\frac{1}{4}$ Flat Turnips. Nothing need be done here but to go over the field occasionally and pull out any weeds that have come up since the last hoeing. If the weather is very dry and the roots seem to suffer, let the brook into the catch-water drains, and allow it to stand long enough to saturate the ground thoroughly. Before the water is turned in, run the horse or wheel hoe through the rows to loosen the soil. If there is no water for irrigation, hoeing will be of service.

The lawn south of the hall door was planted with early Potatoes, water has injured them, repair thoroughly. Make the drains now in Field No. 1 for next year's crop.

It is very strange that our farmers should be so remiss in the matter of irrigation, when no natural aid is as powerful if applied with judgment. In a climate where frequent rains remove all fear of drought, a supply of water by irrigation would seem superfluous; and yet it is in England, where such a climate exists, that irrigation has been carried to the greatest perfection. How much more then should we gain in this often scorched region!

The necessity of drainage has forced itself upon our agriculturalists, and although it is exceedingly rare to find a farm thoroughly drained, it is no less rare to see a farm where something of the sort has not been done.

The theory is very simple and obvious. It is important to hasten the approach and prolong the stay of warm weather as much as possible. We know that a wet board becomes wholly heated much more slowly than a dry one, as the water must first evaporate. So earth saturated with moisture will not become warm enough to germinate seeds readily, till the surplus water is removed; sufficiently at least to leave the surface freely exposed to the heat of the sun's rays. Evaporation is a rapid process, if we consider the vast amount of water daily converted into rain-clouds; a slow process when we wait for the drying of a submerged or saturated field to an extent that will allow the plough and seed to be applied in spring. This delay is most seriously felt in late seasons, when under the most favorable circumstances farmers find barely time enough to prepare for the crop. The surplus water may in this way shorten the season a fortnight or even a month. Again, in the fall, the early rains — colder than the soil — will collect in the very places whence the sun could hardly remove the water in the spring, and will inevitably chill or decay the roots of the yet immature crops; thus cutting the season short at this end another fortnight or month. This time lost from the season will be enough to destroy those crops which can mature in this latitude only by having the full amount of heat which our late springs and early winters afford. Besides this shortening of the growing season, there is the utter impossibility of ploughing such lands in the autumn to expose them to the beneficial action of the winter frosts.

All this difficulty may be removed by judicious drainage; and no month is more favorable to the making drains than September, when we usually have some weeks of steady, dry weather, which evaporates the surface water, and enables us to judge where drains are most needed.

"To determine the actual degree of cold produced by the evaporation of one pound of water from the soil, is rather a complicated, and not a very certain, operation; but scientific reasons are given for an approximation to this result — that the evaporation of 1 pound of water lowers the temperature of 100 pounds of soil 10°. That is to say, that if to 100 pounds of soil holding all the water which it can by attraction, but containing no water of drainage, is added 1 pound of water which it has no means of discharging except by evaporation, it will, by the time that it has so discharged it, be 10° colder than it would have been if it had the power of discharging this 1 pound by filtration; or more practically, if rain, entering in the proportion of 1 pound to 100 pounds, into a retentive soil which is saturated with water of attraction, is discharged by evaporation, it lowers the temperature of that soil 10°. If the soil has the means of discharging that 1 pound of water by filtration, no effect is produced beyond what is due to the relative temperatures of the rain and of the soil. Mr. Dickenson, the eminent paper-maker, who has several mills and a landed estate in Hertfordshire, has deduced from a series of observations which are, we believe, entitled to great confidence, that of an annual fall of 26 inches of rain, about 11 are filtered through a porous soil. The whole of this 11 inches (and probably more), must be got rid of by a retentive soil, either by evaporation or by superficial discharge. The proportions in which each of these will operate will vary in every case, but this will be a universal feature — that these 11 inches will retain in undrained, retentive soils, except during some accidental periods of excessive drought, a permanent supply of water of drainage, which will be in constant course of evaporation, and will constantly produce the cold consequent thereon. Retentive soils never can be so warm as porous, for a simple reason. Every one knows, or may know, that if into two flower pots, with holes in the bottom, are put respectively equal portions of gravel and clay, equally heated to any point short of torrefaction, and if equal quantities of water are administered to the surface of each, water (water of drainage) will run from the gravel long before it begins to run from the clay. Gravel can hold by attraction much less water than clay can. At the time when each is saturated by water of attraction, and neither holds any water of drainage, evaporation will begin to act upon the water in each, and will act most strongly in the vegetative period of the year. The cold produced will be in proportion to the quantities of water evaporated respectively, and will, of course, be greatest in the retentive soil. We will reserve a farther cause of coolness in retentive soils, which is also connected with evaporation, till we have spoken of the depths of drains."

"The temperature of retentive soils is very much raised during that period of the year in which vegetation is active, by the removal of water by drainage."

"Many experiments have shown that in retentive soils the temperature at 2 or 3 feet below the surface of the water-table is at no period of the year higher than from 46° to 48°, that is, in agricultural Britain. This temperature is little affected by summer heats, for the following short reasons. Water, in a quiescent state, is one of the worst conductors of heat with which we are acquainted. Water warmed at the surface transmits little or no heat downwards. The small portion warmed expands, becomes lighter than that below, consequently retains its position on the surface, and carries no heat downwards. To ascertain the mean heat of the air at the surface of the earth, over any extended space, and for a period of eight or nine months, is no simple operation. More elements enter into such a calculation than we have space or ability to enumerate; but we know certainly that for seven months in the year, air, at the surface of the ground, is seldom lower than 48°, never much lower, and only for short periods; whereas at 4 feet from the surface, in the shade, from 70° to 80° is not an unusual temperature, and in a southern exposure, in hot sunshine, double that temperature is not unfrequently obtained on the surface."

"Now let us consider the effect of drains placed from 2 to 3 feet below the water-table, and acting during the seven months of which we have spoken. They draw out water of the temperature of 48°. Every particle of water which they withdraw at this temperature is replaced by an equal bulk of air, at a higher, and frequently at a much higher temperature. The warmth of the air is carried down into the earth. The temperature of the soil, to the depth to which the water is removed, is in a course of constant assimilation to the temperature of the air at the surface."

"From this it follows, necessarily, that during that period of the year when the temperature of air at the surface of the earth is generally below 48°, retentive soils, which have been drained, are colder than those which have not."

"There are no satisfactory British experiments with reference to the surface-heat of the earth. Professor Leslie's only commence at 1 foot below the surface. Schubler's experiments, made near Genoa, in the year 1796, are strictly superficial. His thermometers were sunk in the soil only to the depth of 1-12th of an inch. In that sunny clime he found the *mean* heat of soil, at that depth, to be at noon for six successive months, 131°. If that were his *mean* heat for six months, we cannot doubt that it is frequently obtained as an extreme heat in the hottest portion of our year, in England."

"Mr. Parkes gives temperatures on a Lancashire Peat Moss, but they only commence at 7 inches below the surface, and do not extend to midsummer. At that period of the year the temperature at 7 inches never exceeded 66°, and was generally from 10° to 15° below the temperature of air in the shade, at 4 feet above the earth. At the depth of 13 inches, the soil was generally from 5° to 8° cooler than at 7 inches."

"Mr. Parkes' experiments were made simultaneously on a drained and on an undrained portion of the Moss; and the result was, that on a mean of 35 observations the drained soil at 7 inches in depth was 10° warmer than the undrained at the same depth. The undrained soil never exceeded 47°, whereas after a thunder-storm the drained reached 66°, at 7 inches, and 48° at 31 inches.

Such were the effects at an early period of the year on a black bog. They suggest some idea of what they are, when in July or August thunder-rain at 60° or 70° falls on a surface heated to 130°, and carries down with it into the greedy fissures of the earth its augmented temperature. These advantages porous soils possess by nature, and retentive soils only acquire them by drainage."

How then shall we best get these advantages by the aid of drains? how deep shall the drain be in the soil? and how wide apart on the surface? That some absolute depth is right for average soils is self-evident, whilst different qualities of soil will vary this depth and distance.

We should not forget, in considering that the reasoning in the foregoing and following quotations is applied to England and Scotland, that the facts and deductions from them are equally applicable to America. The depth of the drains below the surface in all ordinary cases depends upon these two considerations: from what depth does water prefer to arise to the surface by evaporation, or to descend into subsoil drainage, and how much does the escape of water by natural evaporation affect the temperature of the soil.

Careful experiments have shown that the heat necessary to convert 1 pound of water into vapor by sun evaporation is just as great as to convert it into steam over a fire, and that the fire heat contained in 2 or 3 ounces of coal is that amount.

By consequence, then, were all the water which falls upon an acre of land in a year, 40 inches or 4,040 tons, to be so removed, there would be for each day 11 tons, which would consume the heat of 32 cwt. of coal per hour. We know that all this water is not so removed, but all that is removed by evaporation consumes heat *pro rata;* and the amount we know, under all circumstances, is large, whilst in saturated land it is enormous.

Bring before your imagination an acre of close clay land, nearly impermeable by water; in its natural condition, this land, in early spring, is unapproachable for its saturation; by degrees it dries, and is meagrely tilled, the crops feebly budding into life are not only grievously choked and poisoned by the standing water, but also the heat, so vitally necessary to their rapid growth, is taken away at the rate of 24 cwt. of burning coal per hour, whilst the plants are half frozen."

"It has been proved that the heat of a pound of water in a state of steam would raise the temperature of 1,000 pounds of water one degree, and consequently the heat abstracted to convert one pound of water in the soil into steam, reduces 1,000 pounds of earth one degree, or 500 lbs. two degrees, and so on."

Besides this abstraction of heat by evaporating water, another solid objection should be considered: that water is the best of non-conductors of heat. If a kettle of water is heated below, it soon boils by the rising of the lighter hot water to the top, and the falling of the heavy drops at the top. But if a fire were made on top of the kettle, it would never warm, as the hot and light particles are at the top, and cannot ascend and allow new cold particles to have access to the fire.

"Apply this to poor land lying exposed to the heat of the sun, the warmth of whose rays may penetrate into the ground only so fast as the water evaporates and reduces its level. But although, so poor a conductor, it is a very rapid radiator, as we have seen. Were the soil warmed, we will say to 60°, and the water at any depth, not over two feet, to 40°, the water would rapidly abstract the heat and rise into the air, carrying away with it as is above seen the warmth of thousands of pounds of soil."

But let the land be readily permeable by water and it becomes a carrier of heat, not a remover. Supposing the water to be that of a warm thunder-storm, say warmed to 70°, it will run down into the soil to the drains, carrying that warmth and imparting it on its way; or, supposing the upper stratum to be warmed to 70° or 120°, the water which falls upon it instead of standing there, awaiting to absorb heat enough to evaporate, and so cooling the soil to its dead loss, now runs through it, abstracting much of its heat, and carrying it down to the subsoil, and, of course, as it gradually cools, imparting its heat to the soil.

We are thus brought to the edge of the question of how deep drains are to be. Set a pot containing a plant into a saucer full of water; at first the water will rise as high in the pot, or owing to capillary attraction a little higher than, the water in the saucer. The top of this water is the water table; from this point it rises by evaporation through the soil till it appears at the top, and is thence discharged into the air.

Observe how largely heat must be abstracted to make the water thus escape; and it is for this reason, though perhaps not knowing how to explain it, that gardeners object to plants standing in water.

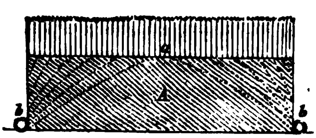
So, too, whenever water stands in soils it assumes a level which we call the water table and from its top it will rise to the surface by evaporation. How low ought this water table to be, to reduce its injurious action to a minimum? Experiments have shown that the water in the soil, from its surface to a depth of not less than 30 inches, is colder by several degrees than below that depth; or in other words, the evaporation acts upon the water to that depth, and consequently cools the water and the earth holding it; below that depth it does not affect it materially; only water enough rises to supply the roots of plants, which will descend if the strata is open to the water level, if it be even 4 feet below the surface. Not less than 30 inches should be the depth to the top of the water table, and as much lower as circumstances will admit, until we arrive at 4 feet, where the temperature seems to be about the same with water at much greater depths. At first, we might suppose that deep drains would not remove the water with rapidity after a rain, but, on the contrary, in lands drained at different depths, the drains 4 feet deep begin to run the soonest and stop the earliest, showing that the flood about the roots, immediately after a shower, is the water of evaporation, condensed and checked, together with the water of saturation, not the rain. For instance, Mr. Parkes relates, p. 153, Royal Ag. Soc. for 1844, "that on the 7th and 8th November, rain fell by guage to the depth of $\frac{48}{100}$ of an inch. On the 9th, he inspected some drains on Mr. Hammond's farm, and found that after a rain of 12 hours' duration on the 7th, in a nine-acre piece, the drains 3 feet deep were just dribbling, whilst in a four-acre hop ground adjoining, the four-feet drains were already exhausted."

Mr. Hammond states that after the late rains Feb. 17, 1844, a drain 4 feet deep ran 8 pints of water, whilst another, 3 feet deep, ran 5 pints, although placed at equal distances.

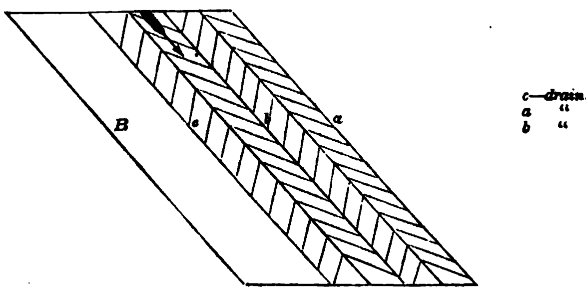
There are cases, undoubtedly, where shallow drains should be joined with, if not substituted for, deep drains. On very plastic clays, dig a hole into the soil, and permeate its bottom with small holes, and arrange so that water shall gradually weep through its sides. At first it will rapidly disappear through the bottom, but slowly small particles of clay will wash down, and form a film or puddle over the bottom, after which no water will escape. In all clays which will so puddle, you will observe that much of the water must be removed by surface drains and shallow drains, as the deeper the drain the more chance there would *seem* to be for puddling. This is not, however, true, in its full application, because another feature in clays may be improved in connection with deep drains, namely, cracking, We know that a clay field will contract under the sun's heat, so as, in many cases, to make during summer really fearful fissures.

As the rains return in the autumn, the clay absorbs the water, swells, and refills the cracks. But if the field was thoroughly and deeply drained, this rain water will be conveyed into the drains all the more rapidly for the fissures, and that which was its curse, becomes its blessing; the clay will close more slowly and perhaps not at all, giving the desired opportunity for ploughing, subsoiling, and sanding, by which the clay may be made exceedingly fertile. When shallow drains shall be used for deep is a very nice question, and can only be settled by a professional and experienced man. The depth of drains seems to be settled, at any rate approximately. Let us now consider their distance apart.

Water can only get into drains by gravity; and just as certainly as it seeks its own level it also seeks the lowest point to which it has access and for which it may run. Let A be a section of a field to be drained. Imagine the drains, *b b*, to be made at no matter what distance apart, but 4½ feet deep. The water will at once escape into the drain, being pressed into it by the weight of the mass overhead. This will be followed by the drops overhead up to the top of its water table, which directly over it or adjacent may be



reduced to 4 feet; but at the same time the water will tend to these two drains from both sides, as is shown by dotted lines. Experiment has shown that in ordinary soils the water needs a slope of about one inch to the linear yard to overcome friction; in very porous soils less will do; in very retentive, more will be necessary. To lower the water table in the centre of our land at *a* to the desired depth of 4 feet, we must have our drains distant from the centre 18 feet, or the drains 36 feet apart. I have said very light soils will allow the drains to be farther apart. The distance will be affected also by the slope of the land, which may so slope that the water will move rather in the line of steepest descent through the earth, gradually approaching the surface, than laterally into the drain. B is a hillside; the arrow shows the line of steepest de-



scent, and the inclination is 1 foot in 20 feet, or 1 inch in 20 inches. Now to overcome friction, we must allow 1 inch to the yard, or 3 inches in 20 feet, for the drains. But the natural slope here is 12 inches in 20 feet, or four times as much, and the inclination is therefore four times stronger to run to the surface at a lower part of the hill than to the drain. If the drains are made diagonally to the hill this is somewhat counteracted. I only mention these cases to show the need there is for judgment and caution. But some one may object that land thus drained at every 40 feet with drains 4 to 5 feet deep will be too dry, and plants will perish. The following cut shows some Wheat plants whose roots were carefully traced when growing freely in open mould; they penetrated 5 feet. Indian Corn has been traced 7 feet; Parsnips 5 and 6 feet. Thus will be seen the enormous advantage of that treatment of soil which gives the plant 5 feet to feed in, rather than 6 inches, and also that where the plant has room it will push down through the warm soil to the water table, and there get water much warmer than were it standing one foot above.

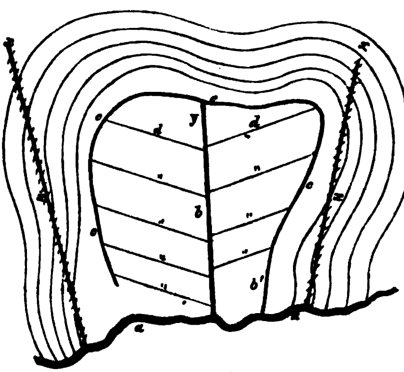
No one ever saw crops dry up in deep-drained and well-tilled land, whilst all of us have seen it in land where hard pan is within six inches or a foot of the surface, — as is shown by the wood cuts, pp. 575, 576. These roots must find all their food and moisture within this shallow soil, which is soon warmed by the sun and dried out.

Experiments have shown that all land not decidedly sandy is benefited by underground drains; some have found that even sandy and dry land was improved by them, as they seemed to serve as conduits to admit moist air to the roots of the plants, and allow the moisture of the subsoil to rise more freely to the surface. It is therefore claimed that the principle is of universal application. I will not press it to that extent now, but simply assert that all springy, rocky, deep, wet, and low lands should be drained. The rule laid down by English farmers is, a drain every 40 or 60 feet; but this distance is to be varied according to the judgment of the cultivator.

The surfaces to be drained will be either side-hills, undulating, high and level surfaces, or low and level surfaces. In the first and last cases, the adjoining land being higher, experience teaches that the surplus water, to some extent, runs into the place we wish to drain from this higher land near by. We must therefore find an outlet for our drains. The best outlet is a natural brook whose high-water level is lower than the bottom of the drains we are to make. If the high-water level is higher than this, we must still be content, for brooks fall rapidly from their high-water mark; and if at the highest flood our drains do not work well, we may rest assured that as the flood lowers they will draw the water from the land more rapidly than it could flow off if we had no drains and were compelled to rely on the natural drainage. If no such brook can be found, look for the nearest pond which is ordinarily lower than the bottom of our drains; and if no pond can be found, ascertain the lowest point which is under our control on the farm, and there make a pond, first digging out all the loam, etc., and then, if the bottom is hard pan, cutting through it to some open gravel or sand stratum below. The water discharged into this will soak away; or if we do not open upon a sand stratum we may make an artificial pond.

Having found a point of discharge, dig a main drain as wide as is requisite for the rapid removal of the water, and as deep as the surface will allow at the end most remote from the outlet; if the distance is considerable, the drain will be very much deeper at the outlet, as there should be about 3 inches fall in 100 feet of drain to insure the water's overcoming any slight obstacles to its flow. If the distance to be traversed by the main drain is very long, so that by starting at 3 feet depth and dropping 3 inches to the 100 feet it would sink lower than the outlet, the upper end must be made more shallow, or there must be less drop in 100 feet.

To render this description more intelligible, consult the accompanying diagrams.

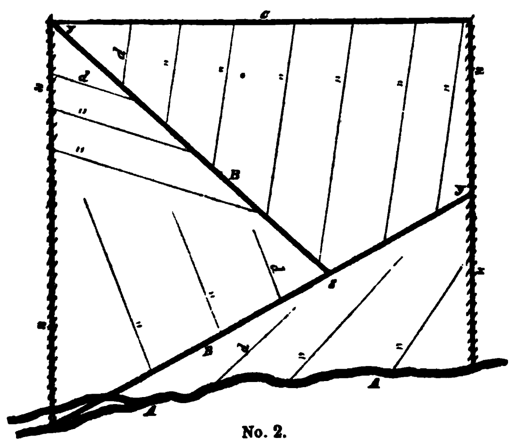


No. 1.

No. 1 represents a piece of land bounding on a brook and surrounded by high land. The farm does not include the whole of the high land, as shown by the boundary fences *x x*; *a* is the brook. Now dig the main drain *b*, 500 feet long; start it at the upper end *y*, 39 inches deep; sink 3 inches to the 100 feet, which gives at the lower end 54 inches in depth. Dig the other main, b′ from the brook back, 150 feet; at the commencement, 49 inches deep; at the outlet, 54 inches. Now dig at the foot of the hill, and following its curve as shown by the diagram, a drain *c c c c*, nowhere as deep as the main drain by at least 2 inches for every 100 feet that the main drain is distant from it. This drain should be as a general rule not more than 30 feet from the base of the hill. At various intervals cut cross-drains *d*, from *c c c* to the main, B, which, starting from the bottom level of *c c c*, shall sink gradually so as to enter the main above its bottom level. The distance between these cross-drains will vary according to the character of the surface, its unevenness, wetness, and level. As has been said, 20 to 60 feet is common practice, and they may be farther or nearer as necessity directs.

When you can conveniently, enter the side into the main drains at an acute angle, for the flow of the water should be facilitated as much as possible, and every rectangular turn obstructs it more than an acute angle. Also, enter them above the bottom if possible, that the water may reach the bottom of the main after a slight fall.

But if our surface were a side-hill it should be treated as in diagram No. 2. Here it is necessary to retard the flow of water, rather



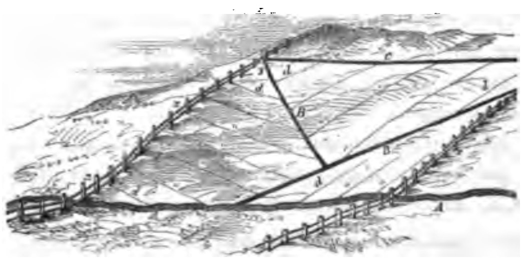
No. 2.

than increase it, as the rapid running may destroy the sides of the drains.

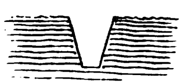
Under these circumstances the best plan is to carry the drains diagonally to the slope of the hill, taking care, however, that they follow the slope sufficiently to prevent the waters settling into the earth on the lower side of the drain, making the land below each drain more "soggy" than if not under-drained.

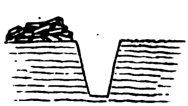
As before, A is the brook; B, the main; *c*, the side-hill drain; *d*, the cross-drains; *x x* fences; *y* the heads of the mains. Where one main empties into another, as at S, much care must be used to protect the receiving main, that it may not be destroyed by the friction of the running water, which may undermine its side and cause it to fall in.

The third case of drainage is a nearly level field with no hill-



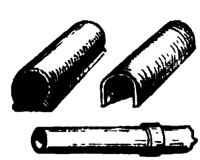
sides near. Treat this like No..1, only carry the drain *c* across the upper end,—and perhaps down the sides of the field,—to receive any water that may be in the adjacent land. In most cases, however, this can be dispensed with, as the main and cross-drains draw the water thoroughly enough.





Having fixed upon the lines of drain, decide upon the materials with which to make your drains. These are as various as the means and inclination of proprietors. The best way is always the most economical; we will describe it, and then mention other methods.

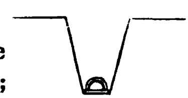
Dig the drain the requisite depth, narrow-ing from top to bottom, like a truncated wedge. The earth is to be thrown all to one side. Now take the pipe and collar, or horseshoe sole tile, or plain horseshoe tile, which comes in pieces 1 foot to 14 inches long, and may be bought at Albany, N. Y., Worcester, Manchester, and Boston, Mass., or Exeter, N. H. These tile vary in diameter from 1 to 6 inches, and proportionately in price.



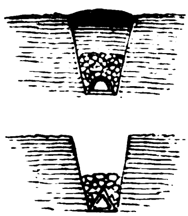
If you use the sole tile, which has, as shown in the cut, a solid bottom, having made the bottom of the drain smooth, lay down the pieces of tile end to end, bringing the ends together. It is obvious that the bottom of the drain must be made level, smooth, and hard, and below frost, so that neither heaving of frost nor unequal hardness of bottom, may ever disturb the tile after it is laid; for if it is disarranged, the ends of the pieces will not come opposite each other, and will interrupt the flow of water, so that the drain will ultimately be choked and rendered useless.

If the tile without the sole is used, it must be laid on a board or plank to prevent the running water from wearing the bottom of the drain, which would cause the tile to sink and the mud to rise into the cavity of the drain and choke it.

The tile being laid as directed, a section of the drain will be thus.



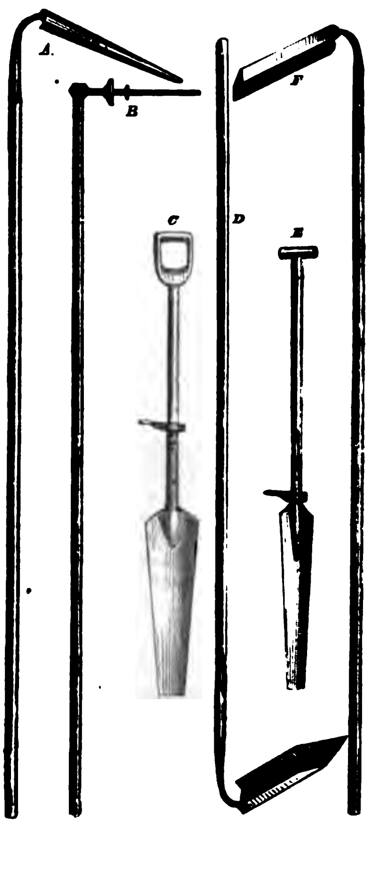
Pile over the top of the tile stones about the size of a man's fist,— if they can be procured,—to the depth of 4 inches; they must be laid by hand; shoveling them in would break the tiles. To expedite the work the stones should be piled at the side of the drain opposite the earth removed in digging; and if they are placed close to the edge, the man who lays the tile can fill in the 4 inches of stone as he goes along, a boy standing at the side of the drain to hand the joints of tile and any stones that may have rolled beyond reach of the man. When 4 inches of stone have been thus carefully laid in and wedged about the tile, 8 inches more of larger stones may be thrown in with a shovel. Then return the earth dug out until the



drain is full and heaped a few inches higher than the adjacent surface, to allow for settling.

The cut shows a section of the drain when completed. Brush, straw, tan or sods may be laid over the tile, or even coarse gravel, or loam; or you may use broken stones to insure the most perfect drainage.

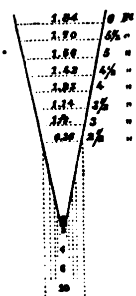
Similar drains may be made without any tile, using different sizes of stone, beginning small and gradually increasing till within 18 inches of the surface. These are called blind drains and answer very well for many years, but are apt to choke. The "V drain" is an improvement on absolutely blind drains; the wood cut shows its structure; having cut as if for tile, select rather flat stones and lay them together at the bottom, edge to edge, their lower ends resting on a board or plank; on them fill in with stones. Drains may be made with brush, laying in bushes and branches of trees, their buts up stream; these sooner or later decay or choke. Lastly we come to the instruments to be used in making the drain. The accompanying instruments are the English instruments for cutting drains; the workman's feet never approach within 8 or 10

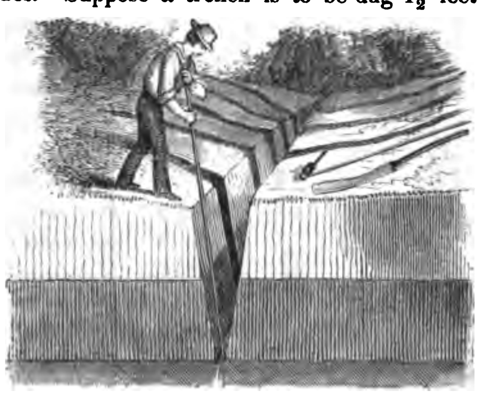


inches of the bottom of the drain, which does not need to be more than 10 inches wide for the largest size drain pipe, and not more than 2 inches for the usual inch pipe, which is competent to drain off all the water in the soil, and conduct it into the mains. A 2 inch pipe with a fall of 3 inches in 100 feet, and a velocity of .895 foot per second will discharge 11,400 gallons a day."

The following is quoted from J. H. Shedd, Civil Engineer, of Boston: —

"The accompanying diagram shows the lines that may be followed in forming the cross section of a trench from 2½ to 6 feet deep, and to admit a pipe from 1 to 8 inches inside bore. The full lines represent the sides of the trench; the horizontal dotted lines are at certain distances from the bottom, as represented by the figures opposite each, at the side. The figures above each represent the width of opening at the surface for a trench of that depth; the widths are given in feet and hundredths; to reduce the decimal to inches, divide by 8; the result will be inches, nearly. The vertical dotted lines show what earth must be removed in order to increase the width at bottom to receive the larger sizes. Suppose a trench is to be dug 4½ feet deep; the number opposite 4½ is 1.42, or 1 foot 5 inches, which is the width of opening at surface.

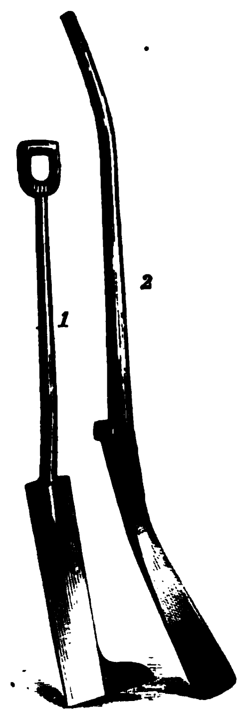




"If the trench is to be 3 feet deep it need be opened only 1 foot wide at the top, and with proper tools it can be carried down to a width of about 2 inches at the bottom, though, of course, the foot of a man cannot come within 6 or 8 inches of the bottom; in which case the pipes are laid by a man, walking on the surface, at the edge of the trench, who lifts the pipe, piece by piece, with a kind of hook made for the purpose, and lays them carefully in the trench, as shown by this engraving."

An Irish spade, No. 2, shown in the following cut, is thought, by some, the best instrument: —

"As it is not necessary to the convenience of the workmen that the sides of the trench be carried down any nearer vertical than is represented in the engraving, they may be opened and carried down in the same manner, for each size of the pipe, until the sides have approached so near, that a pipe of the size required can be just passed between them; the cut may then be carried down vertically to the depth required. This allows much earth to remain which would be thrown out if the sides were cut straight down from the width opened at the top to the width at the bottom. A skilful workman will dig the trenches with ease in this way, after some practice, though it may be a little troublesome at first. I am now having trenches dug, in which the opening at the surface is even less in width, for the required depth, than is here given."



"The labor of one man, in a day of 10 hours, varies very much under different circumstances."

"1. In hard, gravelly, and clay soils, where picking is constantly necessary, a man will throw out only from 3 to 5 cubic yards in a day."

"2. In ordinary clay and gravel, with an occasional use of the pick, he will throw out about 10 cubic yards in a day."

"3. In loose earth, without picking, or in shoveling after the picking of another, as in railroad excavations, a man throws out 15 to 18 cubic yards a day."

"In the first case, a yard, or 27 cubic feet, will be removed for 25 cents, by a man who works a day, of 10 hours, for $1."

"In the second case the removal of a yard will cost 10 cents. This will be the basis of our estimate of the cost of cutting trenches, from the fact that most soils which need draining may be classed under this head."

"In the third case, 1 yard will be removed for about 6½ cents. The solid contents of earth removed from a trench 100 feet long, of sufficient width at bottom to admit the smallest sized pipe, and of the depth as shown, is as follows:—

Depth.	Cubic Feet.	Cubic Yards.	Cost.
2 1-2 feet	127.5	4.72	$0.47
3 "	174.	6.46	0.65
3 1-2 "	227.5	8.43	0.84
4 "	288.	10.67	1.07
4 1-2 "	355.5	13.17	1.32
5 "	430.	15.93	1.59
5 1-2 "	511.5	18.94	1.90
6 "	600.	22.22	2.22

To this must be added the cost of tools, trimming, and superintendence."

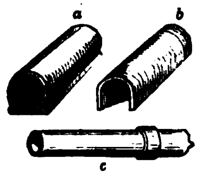
"The quantity removed by increasing the width at the bottom of the trench, so that it may admit pipes of the larger sizes, is very slight, being only 1⅛ cubic feet in 100 feet length, on increasing the width to 3 inches at the bottom. Quantity removed by increasing the width to 4 inches is 4⅞ cubic feet; to 5 inches, 10⅞ feet; to 6 inches, 20⅞ feet; to 8 inches, 45 feet; and to 10 inches, 79⅛ feet.

The increased cost being, for the 3 inch width, ½ cent; for 4 inch, 2 cents; for 5 inch, 4 cents; for 6 inch, 8 cents; for 8 inch, 17 cents; and for 10 inch, 29 cents.

The amount of earth removed by widening the trench for a larger pipe, is the same in every case, without regard to depth."

Drains have been dug by Mr. Shedd the past season, in stiff, hard pan, 4 feet deep, for 27 cents a rod — which you see will reduce the cost materially below the estimate hitherto given. A large number of very valuable tables of cubical contents and costs, are given by Mr. Shedd, in the Report of the Maine Board of Agriculture, pp. 251–2.

For such drains as I have just described to you the best conduit is drain tiles or pipes. There are three kinds: the horse shoe, *a*, the sole tile, *b*, the pipe and collar, *c*; *a* needs a board or something under it to keep the soft under-soil from squelching into and filling it; *b* is the next best, but *c* is by far the best of all. *a* and *b* are both liable to be disarranged; they are laid end to end, and for ordinary drainage 2 inch pipes are amply large; should one end of any pipe, from any cause — extra pressure or softness — get tilted or shoved one side, the flow is interrupted, and soon the whole drain would choke and become worthless. This is obviated by the pipe and collar. These are round, and the joint covered with an earthern collar large enough to admit the two ends of the pipe and leave ¼ of an inch all round for the free entrance of water; the pipes rest in them, and are supported at the two ends and unsupported in the middle; the middle is, however, immediately filled under and compacted with silt and mud. Perhaps some one will doubt that enough water can get into these joints to do the work. They are a foot apart, and offer openings which, making a reasonable allowance for rough ends, are not less than ½ inch square. But listen to experience: —



Gisborne says, "This scepticism is natural, but on each point we are able to offer them abundant consolation and conviction. We have seen hundreds of drains wrought in the manner we have described, and in no instance where the land contained water of drainage have they failed to run freely. We never heard any one say they did not."

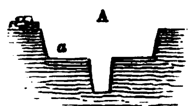
The rationale of this escape of water through small pipes is apparent at once if you refer to the wood cut, which shows the distance apart at which drains are to be laid. The pipe laid 4 feet deep — in a soil whose natural water table is 1 foot below the surface, has the pressure, of course, of all the water which may be over it. If water over the pipe is near the outlet into the pipe, it receives a proportional pressure, and the water in the land to be drained is forced into the drains with a pressure proportioned to its distance from the drains. The pressure of water, to the foot perpendicular, is $6\frac{4}{10}$ ounces to the square inch, and the water is forced into the pipe with three times that pressure, and having once entered into it, escapes with the greatest rapidity. Mr. Parkes mentions a pipe, $1\frac{1}{2}$ inch bore, laid down over 350 yards, an experiment, through an unctious, plastic clay, which discharged one gallon per minute during 76 days, when all the water seemed removed from the soil. Mr. Shedd calculates that, in a drain 200 feet long, laid with tiles 13 inches long and 2 inches diameter, the amount of aperture at the ends of all the pipes will be 184 joints, or 110 square inches, for the entry of water, whilst the outlet of the pipe is 3 inches; thus the opportunity for the entrance of water is 37 times greater than for its discharge. The discharge will be rapid enough, however, as has been seen.

In laying the pipes at convenient points, such as junctions of side with main pipes, it is well to sink a cesspool, rising to the surface of the ground, and covered with a movable cover. These cesspools can be occasionally opened and examined, and the condition of the drain tested.

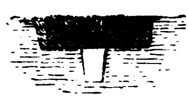
Tile drains are sometimes choked by the roots of trees and branches, and by deposits of iron in very ferruginous soils; the use of the pipe and collar reduces the danger. Pipes and collar are more expensive than horseshoe or sole tiles, but more than enough better to pay. The cost of tiles in England, allowing a fair price to the maker, is $4 a thousand feet or pieces, or $\frac{1}{4}$ of a cent a foot; and it is a discredit to our makers that we have to pay so much more. Tiles are made in various parts of the country, and in time will be supplied at reasonable rates.

In peat lands where drains are to be made, another plan is sometimes followed. Peat turfs cut and dried in the sun become as hard as coal, and may be used under water much like bricks without softening or losing shape for a long time. A drain may be cut in peat land as in A: take out all the turfs to *a* with a peat-cutter, and lay them by the side of the drain to dry as if for burning.

A

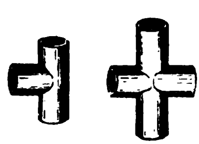


The work is begun by cutting the top sod, which should be removed by an ordinary spade; then the peat-cutter is used, cutting across the end of the drain working backwards, and taking the turf out smooth, like pieces of cheese. The top-drain (down to *a*) may be wide enough to allow a man to stand in it, and must then be about 4 cuts of turf wide. The drain being dug as far as *a* through its whole length, leave it till the peats cut out are dry enough for fuel. Then send in the cutter; let him, standing in the drain, dig out one turf, the width of the cutter, exactly in the middle of the drain, down its entire length. As the material is very soft and oozy, and will probably settle in if not prevented, let another man follow, and taking the dried peats from the side of the drain lay them across the top of this new cut as in B. Then cover with the top sods first cut, then with sand, gravel, or peat, to the full height.



Across drains thus made, bridges should be made at intervals for teams to cross; otherwise the drain may be crushed in.

Open Drains.—No drain is so poor as the common open one, dug like the others, but not filled. It is constantly collapsing, sliding in, being undermined by muskrats, etc. Indeed, covered drains should have wire nettings at the discharge hole, to prevent vermin from getting in and choking them.



For all ordinary tile drains, a diameter of 2 inches for side and cross drains, and 3 to 4 inches for the mains, is enough.

Where drains cross each other, the junction should be in T or elbow joints, which are supplied to order from the tile works.

Irrigation.—Whilst standing water is very injurious to undrained land, the benefits of water, when properly applied in the process of cultivation, are wonderful. In America, capital has so rarely been applied to farming, that the good it can do is but little known. If our farmers have a few spare dollars, they are much more ready to devote them to building unprofitable railroads, to buying wild lands, or to shaving notes, than to improving their farms;

though this last is the best speculation they could enter into, inasmuch as their farms are entirely under their control, and will, if judiciously improved, pay a rate of interest that increases every year.

As I have said, water when it stands in land, delays the maturing of a variety of crops, and yet the farmer can have no greater advantage than water — so under his control that he can apply or withdraw it at pleasure.

The staple crops of that latitude in New England to which these pages apply, are Grass and Roots, and upon the amount of that crop depends the value of our farms, the net profits of our cultivation, and the general prosperity of the country. These crops are subject to serious fluctuations. When cut short it is generally by drought, sometimes by too much wet. For the latter, we have seen the remedy; now for the former!

If any farmer with large fields of Grass and Roots could turn on water when he pleased, he could in times of drought secure his Grass from danger. In the late autumn he could so apply it as to stimulate and keep green the late Grass fields; and by allowing it to flow freely over the surface during the spring, or by entirely submerging the surface, he could remove frost and start the Grass early. The same is true of all other crops; Grain, Corn, Roots, all suffer from uncertain moisture and changing temperature, whilst they might by the aid of well-controlled water be cultivated with the certainty of manufacturing.

In treating of the culture of plants in greenhouses, I spoke of the value of special manures in a liquid form. In Agriculture their value is no less, yet from our liability to protracted droughts that value is often unattainable. Peruvian Guano, for instance, has a power to stimulate and support vegetation without injuring (as some falsely suppose) the soil, which is second to no manure; and yet, being a dry and highly concentrated powder, its benefit — when added to the surface as a top-dressing, a compost, or to be ploughed in — is often imperceptible. It must be diluted to be absorbed by the roots of plants. Were water under our control, we could effect this dilution at will; we might top-dress with guano, and then let in water, which would immediately soak the manure into the roots. The benefit to any one crop — whether it were Grass, Rye, or Wheat in the month of June, Corn in August, or Roots in September — would more than pay the cost of simple irrigative works. We might by such an application to grass-lands in July after haying, when the hot sun burns up the roots and prevents the growth of Rowen, or to the young Grass and Clover which follow a grain crop, secure a second crop equal to or larger than the first, and count our profit by tons of Hay and bushels of Grain or Corn.

In England, this has been done; and in the neighborhood of some large cities, Edinburgh, Glasgow, and others in Great Britain and on the continent, where sewage is attainable and can be used for irrigation, Grass crops have been cut 4, 6, and 8 times in the year, and to the amount of 20, 40, and 80 tons to the acre. A report made to Parliament states that by the application of sewage water the annual rental of land near Edinburgh has been increased from $8 and $50 per acre to $150 and $200 per acre; and that poor, sandy, sea-shore land has been raised in value by this means alone from an annual rental of 50 cents to $75 and $100 per acre. It is stated, that by the application of sewage water, the rent of land near Milan has been raised from a merely nominal value to $40 and taxes per acre.

"In 1826 the *Grass* of the Craigintinny meadows near Edinburgh was let for $120 to $150 per acre, whilst portions belonging to the Earl of Moray brought $285 per acre rent. Remember that this is because the frequent application of sewage during the season, gives such crops of Grass that it may be cut three or four times in the season."

"Some lands at Willesden in the county of Middlesex were cut four times in one year. The first cut gave four tons to the acre, the second 8 tons, and the fourth 12 tons of Italian Rye Grass."

"At Ashburton where liquid manure has been used for the last fifty years, land thus treated produces Grass a month earlier, and is valued at $40 to $60 per acre a year, whilst the same land not thus treated is considered worth only $6 to $8." (Essay by G. Drysdall Dempsey, published in Weales' Series.)

In applying pure water the largest benefit is got where it is allowed to run over the surface in a slow current; the next, where it stands but a few hours at a time, and where the under drainage is complete enough to remove all soakage at once; the least, but still a marked benefit, is got from water meadows, where the water is allowed to stand for many days, or even weeks, before being drawn off. In low meadows, which are flowed all winter, this application of water is very beneficial, as it keeps out the frost, prevents the early growth of coarse grasses, and fertilizes the earth by dissolving valuable materials in the soil, and carrying them directly to the roots. But if such meadows are kept under water after vegetation fairly begins, the injury exceeds the benefit, as the coarse and sour grasses start which will choke out the better qualities after the stagnant water is removed. A distinguished English writer on Agriculture has the following on the effects of irrigation:—

"It is a commonly received opinion that the elementary food of plants is contained in a state of solution in water, and that no plant can exist without a supply of it in a greater or less degree, in a dense or rarified state."

"Without some degree of moisture the roots of Grass become withered and perish, and too great a depth over them (*i.e.*, the roots of grass, except aquatics) is equally fatal to their existence. Stagnant water on Grass lands encourages the worst and kills or discourages the best kinds. Water in motion, whatever the depth may be, is less injurious than if quite at rest, and the shallower the current and the quicker the motion over the turf, the more the latter is excited into luxurious growth."

"Many different opinions are held to account for this result: that is, the luxurious growth of Grass under a thin flow of water in motion. One supposes that a nutritious food is deposited by the water in its course, and the greater the quantity in transition, the greater the deposit. This idea rests on the presumption that mineral or decayed vegetable substances float in the water, and that they are intercepted by, or lodged among, the leaves of plants. This may be partly true; but when it is observable that where there is the greatest *quantity of sediment*, the Grass grows least, and where there is no visible sediment whatever, the growth then is strongest, we must attribute the luxuriance to some other cause than the deposition of substances from the water."

"As early and as heavy crops are obtained by using the purest water, as by that which is full of all manner of impurities; not but land is enriched by deposits of decomposed animal and vegetable matter, and which would be strongly evident in the *future growth* of crops of Grass or Corn. Yet for the temporary purpose of irrigation, perhaps the most transparent water is the most efficient. It must be borne in mind that heat, light, and air are indispensable agents in the development as well as maturation of plants. If they be kept in a low temperature, secluded from fresh air, or kept in darkness, they are inactive, or languish and die. Applying these facts, while considering the effects of irrigation, we may safely conclude that the energies of the plant are excited by being protected from the chilling night air, while they enjoy a higher degree of heat, generated by the motion of the current; and at the same time, are not excluded from the direct action of solar light."

"Nor can a thin covering of water be said to deprive the plants of the necessary portion of air. The agitated portion of the former mingle with the latter air, so that there is an intimate connection, which enhances by mutual influence the effects of both."

"From these observations it would appear that irrigation promotes the development of grass by its instrumentality in affording protection from cold air; by its generation of heat, and by its free admission of every ray of light. It moreover thickens the sward by increasing the number and inducing the simultaneous production of leaves, rather than by exciting the premature production of stems. By such effects, irrigation is said to be a *sweetener of the turf*, because there is a thick and equal growth of leaves at the bottom. The deposit of warp or mud contained in most river water, possesses fertilizing properties, proportioned to the soil and other substances from which it has been obtained, and it must be valuable in the same proportion for the permanent improvement of the land; but where the object is a quick succession of grass, much deposit injures the herbage, and sharper streams have been found better adapted to the surface."

I shall not now proceed with the subject of liquid manures as fit for the growth of plants, but leave that for another month, to which it more properly belongs, while I proceed to describe the preparation necessary for the diffusion of water over the surface.

Irrigation may be effected in several ways: 1st, when the farm is bounded by a brook, river, or pond which is sufficiently above the fields to be irrigated to have a flow over and through them to their lowest part, whence the water may be conveyed away into another field, or into some outlet for drainage.

2d, where water can be dammed up at the mouth of a brook which passes through any fields, and by flooding back, may make a water-meadow which may be drawn down at will.

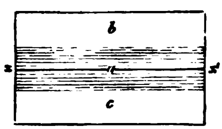
3d, where damming will flood back a stream till it swells high enough to be conveyed by drains to the land to be irrigated.

4th, where water is forced by hydraulic rams, or by windmills, to an elevated point, whence it may be distributed over the surface.

The first of these methods of getting water is evidently the most economical and simple, the works needed being merely gates and sluices, which will enable us to check the current, so that by opening the sluice gate the water will run in the desired direction. Even under these circumstances it is desirable that the field should slope gently from the watery side to its farthest boundary. In such a field, as soon as the water is admitted into one end of the leading drains it will flow without delay to the other, unless its path is obstructed; and by resorting to simple devices we may spread it as widely as we please. I shall quote again from the author last cited a description of one method of constructing works for irrigation.

"Let us suppose there is a field of moderate size, say six or eight acres, which is intended to be irrigated; from the upper to the lower end there is a fall of five or six feet; across the upper end an open ditch is made, banked on both sides so that it will hold water to stand one foot higher than the surface of the meadow adjoining. Into this ditch the water is admitted from the river, either by a weir or dam across, or by an open duct cut from a point higher up the stream, which saves the expense of making a dam, which might be otherwise inconvenient. A supply of, or inlet for, the water being thus secured, the next operation is laying out the leaders, inclined tables, and catch-drains. We cannot convey a clearer idea of the manner in which the surface of the water meadows should be laid out, than by supposing that the whole was ploughed lengthway and laid into twice-gathered lands or ridges of eight yards each."

The wood cut shows a field twenty-four yards wide. A land or ridge twice-gathered is shown by laying this out in three lands, each eight yards wide. Now run the first furrow down through the centre from x to x', and return on the other side of the furrow thus made from x' to x; and so continue till the whole land is ploughed; this will leave the middle higher than the sides of the land. Repeat the process with b and c, and the field upon completion of ploughing will be thrown into three ridges and four hollows.

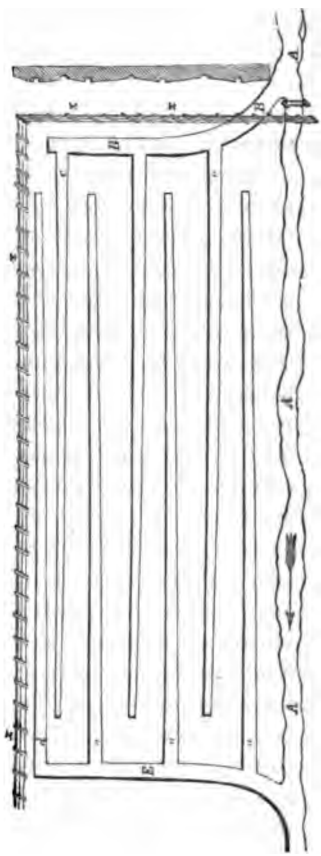


"Along the crowns of the ridges (x to x'), water-leaders (c, on plan, p. 75) are made, diminishing in width from the main at the top to where they terminate near the receiving ditch at the bottom; the catch-drains are shallow and narrow at top, but are made gradually wider and deeper at the lower end. It will be easily conceived that when the water is admitted into the leaders from the main at top, either by withdrawing sluice-gates previously fixed, or by removing thick heavy turfs, used as stoppers, the water will flow along till the leaders are brim full and running over on both sides along their whole length. It comes down the slopes, falls into the catch-drains, and is carried off into the bottom ditch, and from thence again on to the river."

"An attendant, shod in water-tight boots, keeps an eye on the action of the leaders, to see to the equal distribution of the water, and by raising or depressing the edges over which it flows, or by introducing a stopper of thick turf into the leader, regulates the flow of water in every part. If there be a full supply of water, the whole meadow may be irrigated at once; if not, one part may be done before another. It should be well understood that the more copious the supply of water, the quicker it flows over the surface, and the sooner it is let off the more effectual is the process, and the more rapid will be the growth of the Grass."

"When the surface of the meadow is undulating, the first object to be attended to is, whether the hollows can be dried by catch-drains; if so, the leaders must be made straight, or winding along the highest part of the knolls, whence the water will flow down the slopes to the catch-drains in the hollows."

"Where there are different levels, or where the leaders, from being too long, act imperfectly, the irrigator throws his catch-drains into divisions, by which the whole becomes more effectually watered, in consequence of an accelerated motion being given to the water. Where, however, the plane of the surface of the field presents a considerable descent, the leaders and catch-drains, instead of being carried straight across it, are cut in an angular direction across the line of descent with such an inclination as will best favor the gradual though certain discharge of the water; for in some situations the declivity of the ground is so great as to render it necessary to make leaders at certain distances below each other, to catch the water at different points of the fall and thus prevent its too rapid passage."



A, river; B, head ditch to receive the water; *c*, leaders to conduct water; *d*, catch-drains; E, ditch to conduct water back to river; *x*, fences.

The drains may be made permanent, or may be shovelled out anew each time we plough the field. When once it is laid down to grass, the drains may be grassed like the rest of the field.

When level land is irrigated according to the methods just described, it must be very much ridged in ploughing to insure a flow for the water from the leaders into the catch-drains. But level land should never be irrigated unless the under drainage is very good.

Flow meadows or water meadows are made by damming any brook that crosses a meadow, — perhaps even a ditch, — making the dam high enough to flow the water back not less than a foot, — better two feet, in cold regions, — over the whole field. The water should be deep enough not to freeze to the bottom; for should it freeze to the sward, a rain or flush of water might raise the ice suddenly and tear up the grass with it.

The method of irrigation by catch-drains just described would be very expensive on steep hillsides, or on very undulating surfaces, and is said by some who have tried it not to convey the water to all parts of the field with sufficient rapidity.

Another system better adapted to such surfaces, and recommended by its very simplicity, shall be presently described.

My readers may object that expensive works for irrigation and draining are well enough adapted to the rich lands and men of England, but would be less profitable or possible in the more sterile and cheap lands and on the small farms of New England. The objection would have weight to superficial thinkers only; for irrigation has been most effective on the steep and seemingly sterile hill-sides of the West of England and Scotland.

In such places, comparatively little reliance has been placed on the water in summer, when all brooks and springs are liable to be dried up; but in late autumn and early spring it furnishes grass for pasture. It is turned on, as the season grows cold, and running slowly in a thin sheet over the surface from one catch-drain to the next, by its motion, as has been observed on a preceding page, it keeps the ground over which it runs warmer than the uncovered soil, and thus keeps the grass growing until the cold becomes sufficiently severe to freeze running water to the sod; then the water is shut off, and the icy covering partially protects the grass till a thaw, when the water is at once turned on, be it a spring or a winter thaw, till again frozen, or till cut off by drought.

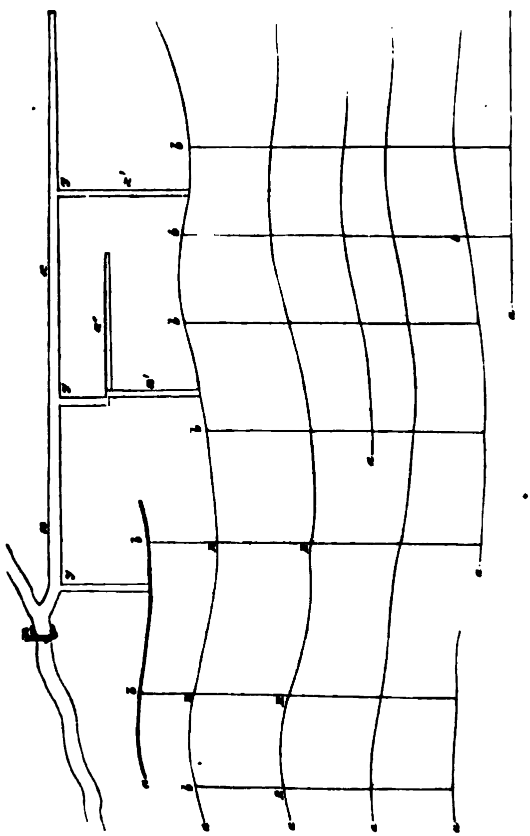
Thus in the early month of January (corresponding to our March) the running water warms and protects the Grass roots, and the young and tender herbage grows rapidly, furnishing early feed.

Travellers have been astonished in visiting the farms where the practice prevails, to see verdant hill-sides at a season when all else is brown and bare. It will be seen that it is a reasonable practice, and after Nature's example. Call to mind any bleak, unsheltered hill, where a brook runs during fall, winter, and spring, and you will remember the green line of grass that marks the course of the water, long after winter has seized all other green places, and long before spring has proclaimed itself even in the most sheltered spots. And this early coming and later stay of vegetation is not the only gain; for where pastures and hill-sides are naturally sterile, or covered with moss and sour vegetation from having been too long pastured, a stream of pure water turned so as to trickle over the surface, is found to sweeten the soil, banish moss and rubbish, and produce short, sweet herbage with the same certainty that a top-dressing of wood ashes brings out Clover on every soil.

England is not the only country where this practice has been followed with great advantage. There are many farmers among the Swiss Alps who have irrigated for years without knowing of any similar practice in other countries. These farmers, finding their supply of water in the streams that come from the glaciers, on the very edge of which they live, have converted land that was not worth fencing, into land that cuts *six and eight tons of hay to the acre.* Their system of irrigation is as follows: —

Having decided upon the size of your "catch-meadow," lay off the hill by the level into lines *a*, marking them as you go by stones, stakes, or sods raised with the spade; the lines may be at such distance apart as you please, and however near together they may start, the varying inequalities in the field as the lines of level are followed across its face will make any close parallelism between them impossible. Next dig the leaders *x;* these will be tapped at *y*, to draw the water into the catch-drains. Beyond the last *y* the leaders *x* become catch or watering-drains themselves. Now from points equally distant, or at such distances apart as you please, on the line of the first catch-drain, draw straight lines crossing all the lines of level, *a*, previously laid out at R, to the farthest extremity of the field.

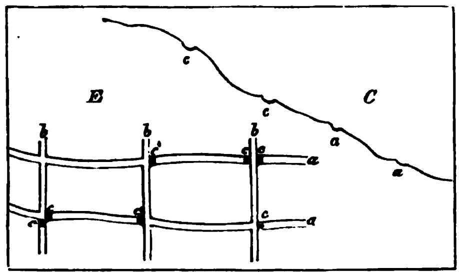
Then take a spade, four to six inches wide at the *point*, or a plough invented for the purpose, which cuts and throws out a strip of turf four inches wide, and dig or plough along the lines of level, *a*, until they are all thus dug out. Your field is now divided by a series of small ditches. To ensure the water's running



a, catch-drains; *b*, cross-drains; *m*, dam; *o*, brook; *z*, main leader, *x*; branch-drains; *y*, branch-leaders.

through these with sufficient rapidity, their inclination may be varied as seems best. Now with spade or plough, cut the transverse lines of drains *b*, thus dividing the field into irregular quadrilaterals. The *b* set of lines are the leaders through which water may be supplied to the top, bottom, or any part of the field at will by inserting into the mouths of the catch-drains pieces of sod cut to fit them exactly, thus blocking out the water when and where we please.

A section of such a field would appear as shown in cut C, where *a a* and *c c* are the catch-drains shown before. Cut E shows the intersection of catch and cross-drains.



a, catch-drains ; *b*, cross-drains ; *c*, stops of turf.

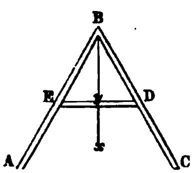
The peculiar advantage of this system — apart from the ease and rapidity with which it can be carried out is the certainty with which the water is conveyed off the surface or to distant points of the field irrigated. The levels once established, there need be no expense in clearing drains every year or two, for at such intervals the spade or the ditch-plough should run along at the side of the old drain to cut a new one, the sod or earth turned out of this being used to stop up the old drain.

I have urged these two matters of drainage and irrigation at this length, because they are the two surest methods of raising the rental of all our farms, and because there is no land too poor to be benefited by one or the other; and neither is so expensive that any farmer should be terrified. Remember that the English farmers, few of whom are fortunate enough to own the farms on which they live, are obliged to get the profits of their investments in permanent improvements during the continuance of their leases; and yet most of these improvements are made by tenants who hire their whole farms, either at their own expense or by paying interest on money advanced to them to make such improvements, by their landlords or government. These farms are often hundreds of acres in extent, and are leased at rentals, varying from one to fifty dollars per acre, and averaging $12 to $15 per acre, with rates and taxes in addition.

How much more reasonably, then, may such improvements be made by our farmers, who are not obliged to get the returns from their investments in a few years, but may enjoy them for life with a right to transmit them to posterity.

September is the month in which to undertake these improvements; there is generally more leisure then than at any other period of the farming year; and the work once begun should be prosecuted as long as the weather allows. Drains may be dug even in winter, although if they are to be covered, it is well to guard the bottom from being affected and softened by frost.

It will be observed by referring to the plan that the whole estate is underdrained, and the farm irrigated whereyer low enough to command water, different methods of irrigation being tried in different fields.



The simplest way of locating the drains, is to use a level much in vogue among masons. Three strips of wood, two of which are about 12 feet long, the other of any length, are jointed together to make a huge A, thus. Cut and joint them so that when the instrument rests on the points A and C on a level floor, the bar E D will be perfectly horizontal which may be tested as follows: insert a pivot at B; and find the middle of E D; suspend from the pivot a plumb line B x; y, marks the middle of E D, and if the instrument stands level on its legs A C, the line B x will cut y. If this is not the case, adjust A and C till it is. Now going out into the field set the leg C on the point from which you wish to start your level for the first catch-drain and move the leg A, till it rests in such a position as to make the line B x cut y, when the points A and C must be on the same level. Drive a stake or raise a sod to mark these points; remove the leg C to the point where A rested, and repeat the process. With such an instrument, an intelligent man can lay out the catch-drains for a field of many acres in a day.

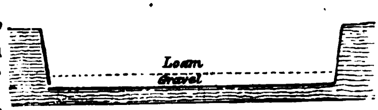
CHAPTER X.

ORNAMENTAL.

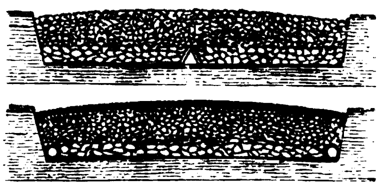
It is but little work to keep in order ornamental grounds on which the work has once been thoroughly done; but we have a deal of such work to do for the coming year, and must be at it as soon as possible.

The avenue has been but roughly made; so with the roads to the barn. The farm-roads, the paths in the flower-garden and those to the grapery, farm-house, and kitchen-garden are finished. All other paths exist only on the plan. The pond extends no farther than is shown by the dotted lines; the side-slopes of the main avenue are unfinished; the bridges only temporary; and beyond the woods there is no ornamental plantation.

Our attention should first be given to the avenue, as being both the means of access to the estate, and as the object which gives the first impression to visitors or occupants. It passes through a gravelly soil with a top stratum of gravelly loam to the depth of 18 inches. It enters, as shown by the topographical lines of the plan on the crown of a ridge, which has sufficient slope in either direction to carry off water rapidly either by the



surface of the road, or through drains below, and was made as follows: the road was excavated 2 feet deep and 15 feet wide; the loam, the first 18 inches, was carted off to fill up inequalities in the surface of the lawn wherever it was needed, and to bank the avenue at those points along the hill where there were cuttings. The gravel was dug out 6 inches deep and laid up in piles at the road-side. When the men who were digging had advanced some few rods, another set began to make the avenue. They first laid in by hand stones about the size of a double fist to the depth of 6 inches. In the middle, a V drain, as to be described, was made as the stones were laid. On top of these stones and thoroughly covering the drain was laid 15 inches of smaller stones, as shown in the cut, always keeping the stones at least 3 inches higher in the crown or middle of the road than at the sides; over these stones enough of the gravel already piled beside the road was laid to make a covering to the road-bed 24 inches deep, and this should bring the centre of the road on a level with the surface of the surrounding soil. This gravel was thrown upon the road by the shovel, and one man in the road, with a long-toothed iron rake, distributed the gravel equally over the surface, always drawing toward him the loose stones out of the gravel, and repeating the operation with the next gravel thrown on, thus spreading it out, layer over layer, and leaving the surface of the road covered with fine gravel clear of stones.



If this work is carefully done, travel and the action of wheels passing over it will force the fine gravel down among the stones beneath, pressing the small stones of the upper layer in their turn more compactly into those below them, and so on to the bottom. A few months' wear will suffice to make this avenue firm and compact, and will insure dry, good driving at all seasons of the year. It can freeze only 4 inches deep, and will of course thaw and dry rapidly.

Roads freeze just in proportion to the amount of water that stands suspended in their material. If this is all loam it holds water like a sponge, and freezes and thaws accordingly; if all gravel, it holds less water and freezes less; if but 4 inches of it is gravel, it holds scarcely any water unless frozen during a rain. This is so, because,—1st, there can be no standing water on a crowned surface; all that falls and is not at once absorbed runs off immediately into the gutters, and so is carried into the natural or artificial drainage of the surrounding surface. 2d, a surface thus made and crowned is hard and compact, like a house roof, and absorbs hardly more water than a roof; 3d, the little that may be absorbed will trickle rapidly into the more open stones below, and will thence find the drain in the middle of the road, which is quite out of the reach of frost, and will convey the water into the pond or other receptacle where it discharges.

After this road has been used some six or nine months, put on about two inches in depth of screened gravel. That first put on will have been lowered by pressure about that distance and can be forced no farther, so that this dressing will be final.

Where roads cross low places, as ours crosses the island, it is well — if the road-bed is higher than the ordinary level of the neighboring water — to crown the bed a little, but less than the surface of the drive-way, say two inches, and lay on each side a tile drain, or stone drain, of 1 to 3 inches discharge, instead of the single V drain, and then fill in as directed above.

Roads made in this manner consume considerable time and money, but are, nevertheless, the cheapest roads in the end.

The manner in which roadmaking is practised, even in the neighborhood of Boston, where roads are better than in any other part of the United States, is very unscientific. The men whose office it is to first make the road (County Commissioners, etc.), fearing to startle the tax-payers and voters by presenting a high estimate for the cost of making roads, allow the work to be done in the most indifferent way. They content themselves with skimming the soil down to the gravel, and then shovelling from the sides of the road a few inches of gravel to crown it a little in the middle, and finally covering the whole with a very thin dressing of gravel. This method does tolerably well where the road-bed is hard pan and the surface drainage is good, although even then, frosts and thaws, and the oozing of water from springs in adjoining high lands, make mud of disgusting depth in winter and spring; but where the road-bed is not hard pan, but soft or loamy gravel, or where it traverses boggy land, this method produces roads vile beyond description, except in midsummer or early autumn, although better than most roads in the Western and Southern States.

Even now, some of the towns and cities in the vicinity of Boston,—Cambridge for instance,—pursue this or a worse system, and thus subject tax-payers both to the first cost of the road, and to a large yearly bill for repairs.

The important and vital requisite to the possession of good roads, is close attention to good drainage. It is to the standing and soakage of water that all our bad roads are due.

Footpaths.—Our footpaths, like those in the flower-garden, to the greenhouse and grapery, should be made like the avenue, only narrower, for it is important that they should be dry at all seasons. But the paths that traverse lawn and woods, like those on the south of the house, may be made much more simply. It will be enough to dig off six inches or a foot of the top soil, and replace it with gravel, crowned about 1½ inches in 6 feet. Even less than this is sufficient for paths that go through woodland or other places little visited. For them, either dig out 3 inches and fill in with gravel, or merely dig out and invert the sod, and cover with loam to kill the grass and weeds.

Indeed, the rural beauty of all decidedly retired places, is sadly marred by the appearance of trim gravel walks. Where wild flowers and blossoming shrubs, free songs of birds, the murmur of the brook, or the plash of water on the bank of pond or river, fill us with a feeling of solitude, we dislike any appearance of man's labor or artificial improvement. At the bottom of all our hearts is an appreciation of the exquisite character of simple, natural beauty, and an admission that nature far excels man in producing beautiful effects with earth, grass, trees, and water. If we are strolling through secluded meadows, and beside unfrequented waters, in natural woodlands or forests, however much we may enjoy the beauty or the delight of discovery, there is an additional interest to most of us, in the fact that others have enjoyed the same pleasures, as we know by the herbage bent beneath the tread of man or beasts, by a rough seat, or by any similar evidence not out of keeping with the surrounding natural objects. But if our way lies through a thickly settled country, where artificial life is constantly forced upon us, where all walks are formal and gravelled, all gardens trim and hedged, fences straight, and trees in formal lines, it is an additional pleasure to come upon a spot where nature seems hardly to have been disturbed, where the path we follow seems to have been made by loose cattle, or is a wood road, too little used to be regularly made, and so left to wind in and out to avoid a standing tree or projecting rock. Such roads, with their three tracks, two wheel ruts, and between them the path for the feet of men or animals, overgrown with grass and spangled with White Clover and Butter-cup, or gay with Asters or Golden-rod, are an unfailing source of delight to all true lovers of nature.

Let us practise on the lesson they teach when we make paths through ornamental grounds; paths are merely for convenience, and should never attract attention in any other way than as being well adapted to bring out the irregularities of the surface, and the views of the landscape.

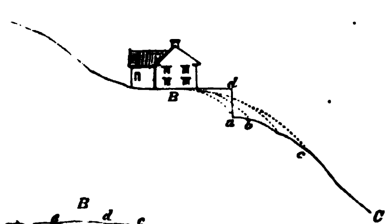
CHAPTER XI.

BANKS.

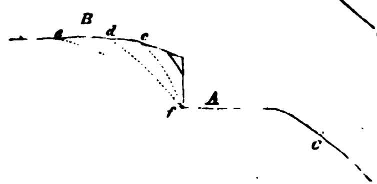
It was directed that a portion of the loam dug from the road-bed should be carried to points where banks are to be formed. In the construction of banks more mistakes are made than in almost any other branch of ornamental improvement. The rule for our guidance is, to make all banks such as shall conform to nature's practice under similar circumstances. Nature never makes terraces except on an immense scale, as shown in the banks of rivers where the stream has worked from one level to another; and man should never make them except from necessity. The banks about a house should not be disguised by artifice, *to conceal the fact* that it has been raised above the surrounding surface, but should be made to assume natural slopes, because such slopes are more pleasing to the eye, more easily made, and can be preserved at less expense.

Whenever circumstances compel us to set a building on a hill-side so steep that the observer fears lest a jostle should slide the building from its place, we ought to throw out such a bank as will broaden the base on which it seems to rest, and thus remove the feeling of insecurity. If it be necessary to break the bank into two or more to economize material, or for some other imperative reason, the necessity justifies the act; but under no circumstances is such an arrangement beautiful. It is always hard and formal, and should be avoided.

When a bank is to be made, consider the natural surface of the adjacent land. If it is to be laid up about a house, observe the slope of the surface on which the house stands, and try to give your bank the same slope or one in harmony with it. Thus, B is a house on a hill-side. If the bank slope to *a*, as shown by the dotted line B *a*, it is harsh; if to *b*, it is more harmonious; if to *c*, it is perfectly so, and is confluent with the natural slope of



the hill, as shown by the unbroken line ending at C. The eye then rises along the slope to the top of the bank, and then easily takes in the whole house. Moreover, such a bank and slope give grace and dignity to the house.



Or again, suppose a road to be cut across the face of a hill, thus. A, road; B, top of hill; C, bottom. The bank, *f c*, is harsh; *f d* is better; but *f e* is harmonious, and confluent with the general slope of the hill.

If banks or slopes must be, they cannot be made too well, as they are to be grassed, and perhaps planted with shrubbery; the following is the method in which they should be made, without exception.

Decide upon the slope; if you are to make a bank fill up within 2 feet of the line of slope, and parallel to it; add 2 inches of oyster shells, old bones, or similar manure; then fill up 2 inches above the top line of slope with rich or well-manured loam, to allow for general shrinking; tread freely to prevent subsequent shrinking. When it is perfectly firm, rake the surface thoroughly with a long-toothed iron rake, and then sow seed and beat or roll in. If it is to be sodded, fill up with well-packed loam to the line of slope, then cut thin sods, not over 2 inches thick, and cover the bank; beat them thoroughly, to press their roots well down into the earth. Water occasionally if the weather is not dry; if it is, water every day, till the sod has begun to grow; then give it a few doses of manure-water, and gradually cease to attend to it.

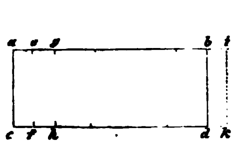
If a slope is to be made on a hill-side, cut down to the line of slope you propose to maintain. If in so doing you come to the hard gravel, dig it off at least 18 inches, and replace it with such material as was directed for the bank. If, however, you do not come upon gravel, trench and thoroughly manure, then sod and grass as above.

CHAPTER XII.

LAWN.

THE lawn is divided into three parts: one west of the house and drive; one south of the house and north of the path; and one south of the path to the woods. The last is to be treated like ordinary grass-land, and has already been laid down to grass; viz., Red-top, Timothy, and White and Red Clover. The portion west of the house is already in lawn, but that south of the avenue is to be laid down this fall. It has been cultivated this year in early Potatoes, which were dug late in August. For some years it was in grass, and had been pretty well exhausted. Last year it was ploughed and subsoiled, with a Michigan plough, to the depth of 18 inches, and the rocks and large stones were removed. In April it was dressed with compost, — 8 cords to the acre, — which was well though lightly ploughed in, care being taken not to disturb the sod inverted last fall. It was then planted with the Potatoes as mentioned.

Remembering that we are undertaking to make a permanent lawn in a climate naturally dry, we must spare no pains in doing the work thoroughly. First, make the drains shown on the plan by red lines, laying them with tiles 3 to 4 feet deep. Now cart on not less than 4 cords to the acre, of the best manure we have. Spread the manure no faster than it can be dug in; at the same time and rate spread common plaster, not less than 600 pounds to the acre. Having made these preparations, trench the whole field 18 inches deep, or otherwise thoroughly subsoil.



The process of trenching is as follows: The parallelogram, *a, b, c, d*, is a field; open a ditch at one end 18 inches deep, and 2 feet wide (*a e, f c*), and carry the earth dug from it to the edge of the other end of the field, and there pile it up in the space within the dotted lines. Then open another trench or ditch (*e, g, h, f*), and throw the earth into the first trench (*a, e, f, c*), mixing well the manure and plaster, and thus continue till the whole field has been dug over. The earth piled at *b, i, k, d*, will fill the last trench, and complete the work.

Spread over the surface, as a top-dressing, 200 pounds Peruvian Guano to the acre; then rake with a short-toothed iron rake. Sow and roll in the seed, using double the quantity usually recommended to the acre for laying down grass-lands, of Red-top (2 bushels), Timothy (20 quarts), White Clover (8 pounds), and Yellow Clover (8 pounds). White Clover is very liable to be winter-killed the first winter; so, to save seed, you may defer sowing it till late winter or early spring, when it may be sowed on the sward. Add to this Vernal grass (1 bushel to the acre), which will give a peculiar fragrance at every mowing. Roll thoroughly. Other combinations of grass seeds are given hereafter.

This work *should* be done in August, and must not be left later than the first fortnight in September, otherwise the grass will not set well before winter.

CHAPTER XIII.

TREES AND SHRUBS.

STAKE out the places for ornamental trees and shrubs which are to be planted this fall, and have the holes dug, well prepared, and filled in to the top, for this will save much time when you come to plant.

For trees, dig holes 2 feet deep, 4 feet in diameter. At the bottom you may put well-rotted manure 6 inches deep; but by no means let it come within 6 inches of the roots when planted. It is for food to the tree in the second year, when we want rapid growth.

The holes for most shrubs need not be more than 3 feet in diameter, and when well dug, should be from 12 to 18 inches wider at bottom than at top: and the bottom should be well loosened with spade, pick-axe, or bar.

As selecting the places where we are to plant trees must be preliminary to digging the holes, let us give a little thought to the principles which should guide that selection.

Mr. Downing, referring to the difficulty of grouping trees, and in advising persons who were not well skilled in making plantations, and yet wished to produce the charm of variety and irregularity while they shunned stiffness and formality, mentions approvingly the practice of a man who went out with a basket of Potatoes, and threw them up into the air with various degrees of force, and then planted a tree where each Potato had fallen. This he asserted would produce better irregularity than is likely to occur to unpracticed planters.

I think this scheme most injudicious, and that it would be productive of barbarous results when followed.

Nature seems never to fail in producing beautiful groups, whether they be looked at in winter, summer, or autumn. In spray, in full foliage, or in autumnal coloring, her trees are always beautiful, always seem just fit for their place. It very rarely happens that any of her groups, with which man has not meddled, seem badly arranged.

Why it is that so very few of man's plantations escape criticism, and so very few of nature's are open to it, I know not, unless it be that the Divinity of nature is so powerful in its control over the mind that we tacitly admit it to be irreverent to criticise her.

Selecting the most beautiful group of trees that we are acquainted with, let us study it, and seek the causes of its power over us. They are many — irregularity of outline but one among them; variety of species gives variety of form, of spray, of leaf, of top, of color. Whether in spring or fall, all are there, and each contributes so largely to the beauty of the whole, that we could not remove one without the risk of destroying the beauty of all.

The most attractive groups are not those in which but one or two varieties are found, but those where there are several kinds of trees with shrubs intermingled. For there is to every tree a character, and an individuality which is most clearly brought out by contrast.

The form of the Elm is very graceful; it is very much and very finely divided; and its spray and smaller branches are almost always somewhat pendant. The grace of the tree is proverbial. The Hickory is also graceful; not a branch or a twig of it is straight, its whole spray is full of irregularity, and yet its expression is contest and resistance rather than grace and pliancy. It is one of the hardest and toughest of woods, and this character is shown in every branch.

The Oak is very different from these. When it is relieved against a clear evening sky, where every branch, however small, is sharply defined, we see but few absolutely straight lines, and yet the character of the tree is angular, rigid, unyielding, though never stiff, — from that quality it is redeemed by its dignity and reserved force, — still it is never in any sense pliant or graceful.

The Ash is made up of straight lines, is stiff, and is rarely possessed of any pretensions to grace; at the same time a perfect Ash is a most beautiful tree.

The Horse-chestnut has its own peculiar, stubby branches, its uniform shape, its dense shade; is, in a word, a cabbage on a stick.

We might, were this the proper place, easily set forth the varieties in form of all our common trees, and trace them to their causes; but it is needless to enlarge upon facts that are patent to every lover of nature. And the varieties of form are not more marked than those of color and character of foliage. From Evergreens to Oaks and Maples, there is every shape and shade of leaf, and the satisfactory character of an artificial plantation will depend, mainly, on the judgment with which varieties are combined. An old writer (Gilpin) on Landscape Gardening, laid it down as a rule, that satisfactory planting could only be attained by masses of trees of the same kind, because many of a kind were necessary to give the character of the individual to a group. This is true where trees are to be planted over many acres; but where a man's arboretum is confined to a few specimens or groups of trees, he would lose all the pleasure derived from variety and from agreeable contrasts of light and shade, the graceful with the stiff, the spiry-topped with the horizontally branched, by following such a course. Besides, nature, as has been said, rarely makes a group of a single species. There may be a prevalence of one kind, as in some of our meadows of the Red Maple, but the stem of the White Birch will gleam through the green leaves; in some part of the group will be the dark color of the Pine, Hemlock, or Cedar, — a single tree it may be, but enough to tone the whole; — at another point will project the rough, contorted, but horizontal branches of the Swamp White Oak; the edge will be thick with shrubs of every form and color, — Viburnum, Cornel, Clethra, Black Alder; while running through and over all, will be the feathery festoon of the Virgin's Bower, the glistening leaves of the Horse Brier, the crimson stem of the changing Woodbine, and the gold of the Ivy.

Study every natural group you see, and make yourself master of its beauty and the causes of it, and you will not only find that its variety and irregularity are wonderful, but that the system by which it was all developed can be followed as well as analyzed. It is the result of careful study and well-planned planting; and although the greatest carelessness seems to prevail, we see that nothing could be removed without injuring the whole. Every tree-stem has its own peculiar beauty of lichens and mosses. The rocks are green, golden, or brown, as the rain is frequent or rare; the flowers are light or dark colored, as shade or sunlight needs contrast. Every part is perfectly balanced. This may be the work of chance, but it is a chance which is perfectly uniform in its action, which may be reasoned on and predicted, and reduced to tabular views; a chance — if a chance — that has proceeded by rule and regulation from the earliest period of man's observation till now.

It is not my intention to inquire why God makes beauty; he does make it, and that most lavishly, and without regard to the possibility of man's ever being benefited by it. The depths of unexplored forests, unopened mines, and unfathomed seas are all aglow with beauty, grace, and variety; and no appreciative mind but must always be full of delight at the manifestations of love shown in this peculiar regard for the beauty which may be given to the most common objects, to recommend them to man's attention when discovered; and one must be awed too by the certainty of the careful and deliberate design and plan which influenced the conception and development of every object in nature.

Shall we then who wish to reproduce such beauty, to imitate the Master's workmanship, to make plantations that may communicate to us and to our neighbors the same pleasure and instruction we derive from God's planting, resort to the blindest of chances, worse than dice or lottery?

I do not mean to say that Mr. Downing advised the Potato exercise as a general or the best practice, but he mentions it with such commendation that men of ordinary judgment, and a slight acquaintance with the art of planting, will be very much inclined to adopt the plan. That some A or B might by chance have been successful in this way is true; but it would be mere chance; and it is to be regretted that Mr. D. should have mentioned it with any hint at favoring it, for several persons have quoted such a plan to me, and it may be often found in print, as an infallible guide in making an effective plantation, whilst in reality it is the merest nonsense.

Our rules, therefore, for planting are: study well your material; then study the outlines of all the best natural groups you know; make careful notes of the way in which the varieties are combined, how near the trees are to each other, how often nature has planted them close together, how often within a few feet of each other, how often at the distance of 20 or 30 feet. See where she has introduced a mossy rock; how she has drawn attention to some points by a mass of Woodbine hung on a projecting branch or twined round the nodding top of a Cedar, or swinging from the pendant branches of an Elm. See how she has given a rounded form or great angularity and prominence to a group by relieving against a Willow or Maple a picturesque Hemlock or Hackmatack. Make yourself master of all this; draw it out on paper; and then, so far as you can, reproduce the effects you like best by transferring them by eye or measurement to the ground to be planted. Do not expect to satisfy yourself or to escape the sage criticism of those who, very like, cannot distinguish a Cat Brier from a Gilly-flower, cannot name one in a hundred of the trees, shrubs, and flowers which surround their homesteads; or of those who do every thing by rule and line, and see beauty in graceful Hemlocks clipped into hideous resemblances to lions and cocks; who admire the straight line only, and would regularly curve, or straighten and enclose with a stone wall, the wild and indented margins of our ponds and streams; who worship Lilacs, Snow-balls, and Carnations, but are quite indifferent to Viburnums, Cornels, Fringed Gentians, Wild Roses, Clethras, and Cardinal flowers. If they condemn your efforts to reproduce Nature and to imitate her profuse, graceful, and irregular variety, they are simply to be pitied, and their comments are to be despised. What you have done will become more beautiful, more and more like nature, every year; and will, as soon as it has had time to grow, give delight to every one who can appreciate Nature herself, and can see in the work of a man the spirit and intention which guided him, though imperfectly expressed.

CHAPTER XIV.

GREENHOUSE.

OCTOBER. There will be but little new work in the greenhouse in October. The plants potted from the ground last month may now be taken from the shade and arranged on the shelves and platforms which they are to occupy during the winter. When you arrange them on the tables, set the largest in the middle, and graduate the others according to size, so that the mass of foliage may slope regularly down to the edges of the tables: place on the shady side those plants which thrive best out of the direct sunlight. In front and on the hanging shelves those small plants are to be placed which need direct light, and which, not being rapid growers, will not interfere much with each other.

If any Monthly Roses, Verbenas, Pelargoniums, Lantanas, Chrysanthemums, or Carnations, still remain in the garden, they must be removed at once, otherwise there will be no time for them to make new roots before the beginning of winter. Cut down Achimenes and gradually dry them up.

Prepare thumb-pots or pans, and sow in them seeds of Lobelia, Nemophila, Nierembergia, etc., which will be wanted in the spring to hang from the roofs of the greenhouse, conservatory, etc.; set these pots and pans on the sills of the windows, or anywhere near the light Do not neglect the bulbs mentioned last month, but plant at once those that were not then planted; and if any planted have fairly begun to grow, give them water, though very sparingly at first. Pot Ixias and Sparaxis if not already done; set Cinerarias, Neapolitan Violets, and Daisies into frames.

Keep most of your plants cool and rather dry, as they will then make more hardy roots and growth than if over-stimulated; all the Camelias need abundant water, and Chrysanthemums liquid manure. During all warm and dry weather keep the sashes and ventilators open, and allow the air free access during the night as well as the day, but avoid any thing like chilling the plants. It is not necessary to resort to artificial heat at present.

Use water rather sparingly, though frequent syringings will be very beneficial, for water thus applied comes in the most natural form in which plants can receive it. Rain is important to out-of-door plants, not only as a supply of water, but because it sets leaves and twigs in motion as it runs over them, and washes away dust, and insects and their eggs.

Aeration. — The system of ventilation in our greenhouse furnishes air both in sufficient quantities and in the most natural way.

One would naturally suppose that plants are benefited by the motion of their leaves and branches, and numerous experiments have shown this to be true; for where currents of air have been used to ventilate greenhouses, the plants have been more thrifty than where air has been admitted without regard to its course within the house.

In a dwelling-house the whole object of ventilation is gained by securing a constant supply of fresh air without any annoying draughts. But "ventilation" does not properly describe the true system of admitting air to plants in greenhouses, where the current or draught is essential to the welfare of the vegetation.

A distinguished vegetable physiologist explains this matter as follows: "Ventilation is the process of letting the external air at once into the forcing-house; and aeration is the art of keeping the air of the forcing-house in constant motion by currents of warmed fresh air. The importance of aeration cannot be over-estimated; it is the one thing which now requires to be secured in order to render our artificial climates natural. Man's reason must tell him that a plant condemned to pass its life in a still atmosphere, is like nothing so much as a criminal condemned to pass his life in an everlasting pillory. In order to secure motion in the vegetable kingdom, currents of air are made to do the work of the muscle, limbs, and volition, of animals.

"It is not at all improbable that in addition to the mechanical effects of motion in assisting the propulsion of the sap, it may be important that the stratum of air in contact with the leaves of plants should be incessantly shifted, in order to enable them to procure an adequate supply of food, for we find that water in motion, when used for irrigation, feeds them better than when stagnant.

"Leaves are constantly abstracting from the air the very minute quantities of carbonic acid (and other gases) which it contains. When the air moves quickly over their surface, fresh supplies of that food are incessantly presented to it, and the operation of abstraction may be much facilitated; while on the contrary, if the air is stagnant, the absorption of carbonic acid (and other gases) may be much slower.

"Perspiration is another vegetable function which must be maintained in healthy action. The quantity of water that flies off from the surface of a plant will, other things being equal, be determined by the rapidity of the motion of air passing over its surface.

"In an absolutely still air, perspiration will be reduced to its minimum, and it will increase, within certain limits, in proportion to the quickness with which air sweeps over it. If the motion of the air is thus favorable to the two great operations of feeding and perspiration, we shall find that it is equally needed, day and night, for inspiration and feeding go on principally by daylight, whilst perspiration or exhalation continue during the hours of darkness.

"A good system of aeration *must be constantly in action.*"

To make this more clear, it may be well to mention here one of the great vital principles of agriculture.

It is generally supposed that, given a good soil, plenty of water, and sunshine, all plants derive the materials for their organic growth directly from the earth. This view is well enough for general purposes, but it is by no means strictly true. The vegetable portion of plants — in which is not included the water of their tissues or the mineral matter conveyed by water into the tissues and held there in suspension only to be detected by the ashes resulting from the complete combustion of any plant — is derived principally from the air. The earth is needed as a place from which to grow, and in and upon which the plant, by means of its roots, may perform its vital functions; but the larger part of the structure of the plant is supplied in a mysterious manner by the air.

Without delaying for a scientific explanation of the causes and reasons of this wonderful fact, we will consider a few familiar instances, which will prove conclusively the truth of the statement. In any of our country towns it is easy to find lands covered with woods, which within the memory of the present generation, have been cultivated till they were worn out; *i.e.*, so drained of those constituents which plants derive from the earth, that no crop could be got from them that would pay the cost of cultivation. These lands upon being abandoned by man, soon began to grow up in wood, — here and there little Pines or Birches or Cedars started, — and in ten or twenty years the fields were quite covered, and in forty a fair yield of wood could be cut from them. The wood being cut and the land ploughed and cultivated, good crops can be again got for some years. These lands were not manured by any thing but air and water, and yet not only have the trees grown, but their leaves, shed from year to year, have fertilized the soil far beyond the fertility any soil acquires by the slow disintregation of its mineral constituents during a term of years, — an operation analogous to the increase of moneyed capital, which yields an annual interest, till ultimately it is doubled and more by the accumulation.

It may be said that this proves nothing more than that land, which without manure will not yield crops for food, does yet contain the elements of vegetable growth necessary to develope the forest. But it will not be said truly.

It was stated at the beginning of this treatise, that agricultural operations are not changed in kind but merely in degree, by being conducted on different scales; so that we may fairly reason from a single plant to whole crops. Now experiments have been carefully tried by men distinguished in agricultural science, which have proved conclusively that, be the crop what it may, about three-fourths its vegetable bulk is derived from the air. Pure sand has been confined under glass receivers, and in it seeds have been planted, which have been watered with pure distilled water, no manure being applied, and yet these seeds have germinated and made a very considerable growth of vegetable matter; showing that apart from the stock contained in the seed, the nourishment of the plant was derived from the air.

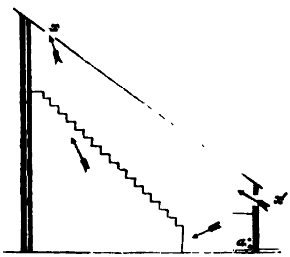
It is not claimed that a healthy vegetation *capable of maturing food for animals* has been produced under such circumstances, as there are certain chemical elements, not to be found in common air, with which a plant must be supplied, in order to yield food for man; but simply that such experiments prove both that plants derive a large portion of their substance from the air and water, and should therefore have enough of both, and that the growth of woodland under the circumstances mentioned above, is mainly attributable to the food supplied by the air.

Another striking illustration of the truth of this position is found in a common agricultural operation: fertilizing land by green crops. Given a piece of land too poor to be worth cultivating; weigh out the manure you apply, and sow Clover seed; the Clover will grow for a year or two and cover the land more or less generously; at the end of the second year plough in the tops and roots, and leave them a short time to decay. You will find that the land is permanently enriched, so as to yield a remunerative crop if cultivated. If the crop of Clover ploughed in added nothing more than the weight of manure first applied, plus the material it abstracted from the soil, the subsequent crops would be no greater than if the manure alone had been ploughed in and left, and the farmer would be poorer by the cost of cultivating his Clover; but the reverse is the result whenever the experiment is tried.

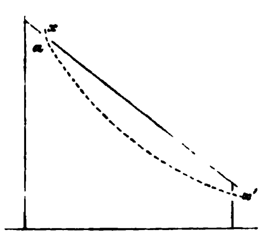
Thus it is clear, first, that air is necessary to plants, and full of the elements of organic life; second, that it must be constantly renewed and shifted by winds and currents, or else stationary plants would soon exhaust the supply and cease to thrive; third, that a leading principle of success in plant culture is aeration.

Currents of air judiciously admitted, give additional efficiency to the use of the syringe. Syringing washes violently away insects and their eggs; but instinct teaches insects to avoid those parts of the plant in the line of usual currents of water, and thus escape. If, however, currents of air strike the plant on various sides, instinct again leads the insects to shun these new currents, and the two fluids, air and water, being applied sometimes together, sometimes apart, both cannot well be avoided.

The old method of admitting air by sliding sashes in the top and front of the house, is unfavorable to this general diffusion of air, as the accompanying diagram shows. In this section of a greenhouse the sashes slide at x and x'; the current admitted at x' naturally warms a little as it enters, rises and goes out at x, affecting the plants but very little; as it is cold and rapid, and blows above the warm pipes a, it does not mingle with the warm air or sink much, but rather blows across and out at the top. The hot air is blown in the line of the two lower arrows, and goes through and under the staging for plants; whilst those standing on the table in front, or trained up against the glass feel but little warmth. Whenever air is admitted, it comes in nearly as cold as the outside atmosphere, strikes the overheated foliage, which it chills rather than cools. Now if our system is followed this can never happen. Again, where air comes as in the preceding diagram, no current really affects the leaves so as to give them the motion described as so beneficial. The truth of this will be seen when we consider the condition of the house before the admission of the outer air. The whole house is warmed so that a thermometer at

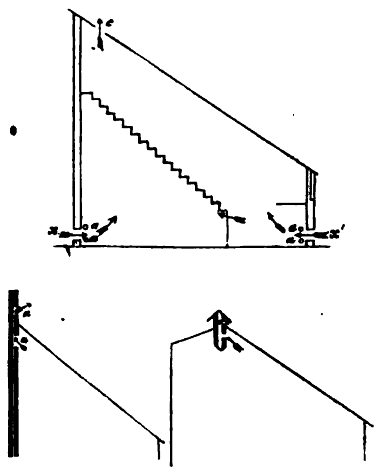


the level of the eye, shows enough heat to need air. If the temperature is thus high at the level of the eye, what must it be at a, whither all the hot air is tending by natural laws? to remedy this we admit air at x'; this serves to cool down the front of the house too much, and only makes the upper part hotter. Open the sash



x, and the hot air will rush out for a few minutes until the air at x,' begins to fill the current, when it will no longer sink, the temperature in its neighborhood having been lowered too much to feel any difference between its own weight and that of the entering air. The current however is strong; it is a draught, and the air comes in at x' and goes out at x, making a curve (x' x) through the house, giving no aeration, but cooling one part very much without relieving the rest.

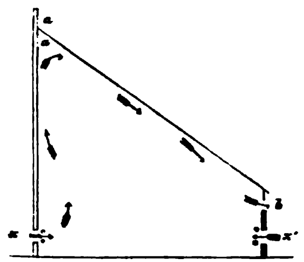
Now observe our plan. In a lean-to or span-roof house, we carry up a brick wall for 3 feet at least: every 5 feet we open a ventilator between the hot pipes *a a;* now if the house is too hot, by opening the ventilators x and x', we let a stream of cold air, — not upon the tender foliage, but on the hot pipes, where it is at once warmed, and rises in four directions; perpendicularly by the natural laws of equilibrium in fluids, and diagonally by the power of the draught.



When the upper sash is opened at *c*, these different currents converge toward that opening, making currents throughout the house, which from their various directions, must thoroughly search every part of every leaf, and, although gently and almost imperceptibly, yet surely, set all the leaves in motion.

The diagram, however, only shows how air may escape by openings above, made by sliding or revolving sashes. Revolving sashes are for some reasons the best, for others the worst; standing at an angle with the roof when open, they are very liable to be broken by the wind; and yet must often be opened in windy weather. To obviate the need of either sliding or revolving sashes when but a slight current is wanted, or during high winds, the back wall of a lean-to, or the ridge of a span-roofed house should be carried up from 2 to 4 feet above the sashes; then there should be ventilators, *a a*, in this wall, above and below the sash, closed by sliding doors; these may be more or less opened, and will admit air slowly and without danger from high winds.

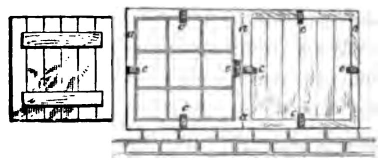
With ventilators thus arranged and of sufficient size, there is no need of sliding or revolving sashes; the roof may be made whole, and breakage thus avoided. To secure nocturnal ventilation, where the current moves slowly, these ventilators may be slightly opened, or others made as shown in the cut; *a a* being closed, open *b;* the air will enter *x′ x* and creep slowly along in the direction of the arrows. It will take this course because it will constantly cool faster along the walls and the glass than elsewhere, and the warm air will rise to supply its place.



It must be remembered that all the air we propose to supply to these houses is thoroughly warmed by the hot water or steam pipes before it reaches the body of the house, except when admitted through *a a*, and this entering into the hottest part of the house, warms before it reaches the plants.

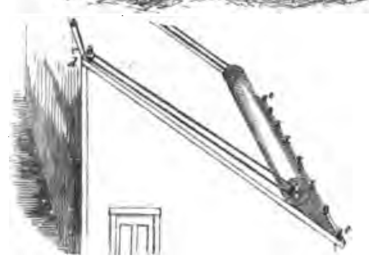
Greenhouses and other glass structures built in this manner, with attention to these various details, are more expensive than when built in the old-fashioned way; and it is true that in the old and ill-arranged houses good plants are grown, and that gardeners are a dogmatic set of men, unwilling to adopt improvements. It is also true that dwelling-houses with unventilated rooms heated by air-tight stoves, allow some children and adults to grow and live and are less costly than houses built with the most improved apparatus for heating and ventilating.

Cold. — Sometimes very cold nights occur in October (in this latitude), particularly toward the last of the month. Such nights, however, are foretold by the character of the day preceding. It is enough when they are anticipated to put up the shutters and cover the roof with straw matting. Various arrangements are resorted to for covering the glass with straw, cloth, etc. Our plan is as follows:



For the front make wooden shutters that will fit accurately between the divisions of the windows. The cut shows the inside of such a shutter made of White Pine and painted boards, and screwed on to two cross strips 4 inches wide, and about 3 inches shorter at each end than the shutter. The appearance of a window without, and of one with this shutter is shown; *c c c*, common iron buttons screwed to the window casing *a*. When you wish to put up the shutter, turn the buttons out of the way, set in the shutter, which must fit tight, and secure it with a turn of the buttons. During the day these shutters should be piled on the border in front of the house, the lowest resting on pieces of joist that it may not freeze to the ground.

To cover the roof expeditiously, another plan is resorted to: take straw matting or sail cloth, in as large pieces as you choose—enough to cover the whole roof, if you please; every 3 feet along one side, insert eyes that will just fit over the heads of spikes or hooks secured to the top of the sash just above the gutters; fasten the opposite side its whole length to a moderately heavy, straight roller. This roller must be heavy enough to descend along the roof by its own weight, taking the cloth with it, unless prevented. Into each end of the roller screw a pulley wheel. Carry a cord through and over the wheel *a*, at the ends



of the roller, and back again through a pulley at c, lead it to E, where it passes through another pulley and drops through the roof to f, within the house, where it is fastened.

Now suppose the sail rolled up at the eaves of the house a as in diagram; if you wish to cover the glass, go to f (within), and pull on both the ropes; you will draw up the roller toward c c, where the ends of the ropes are fastened, unrolling the sail as it rises, and have only to pull equally on both ropes to insure the rising of the roller at an equal rate at both ends. Of course the rope must be secured at f, when the sail is quite unrolled. To uncover the glass, loosen the ropes at f, and let them pass slowly through the hands as the roller descends by its own weight, rolling up the sail as it goes. These protections will be enough till the weather becomes decidedly cold.

If bad luck overtakes you before the fires are lighted, and the thermometer in the house falls below 32°, be very careful in the morning not to allow the sun to shine on the plants; keep the shutters and sail-cloth up, and syringe the plants with cold water; this will take out the frost, and probably prevent any great injury, unless the cold has been sufficiently severe to burst the tissues and sap-vessels, in which case nothing can be done but to cut back the plants, and as it were start afresh.

While speaking of the greenhouse in September, I said, in discussing the causes of failure and success, that injudiciously applied heat or moisture are the chief causes of the frequent failures to grow a completely satisfactory collection of plants.

Some portions of every greenhouse, however perfect its arrangements, will be hotter than others, owing to the way in which it is visited by the sun's rays, or to the natural rise of heated air, or to the location of the hot-water pipes. By ascertaining these places, and judiciously arranging varieties, gardeners might grow hothouse plants in greenhouses with some success, though not satisfactorily, for hothouse plants need not only great but steady heat.

And in order to provide for the culture of some such plants, although we have no hothouse proper, our greenhouse is so divided as to allow the heat in one portion to be increased above the temperature of the other, and this smaller part will answer all the purposes of a hothouse in fact. Here we have some Orchids, although we make no attempt to grow such a collection of Orchids as need peculiar treatment and a separate house; in this part of the greenhouse we start cuttings and stimulate young plants for the greenhouse and conservatory; whilst there are some plants which never leave it.

I shall give some lists of plants adapted to the hothouse, conservatory, and greenhouses, not pretending to give all that may be cultivated, as we have not room enough for a *full collection*, but such as are beautiful and will prove satisfactory if well cultivated. Some of the plants included in this list will live in all our glass houses, others in but one or two of them. In the case of plants not usually cultivated, directions are given.

Orchids need a great deal of heat in the growing season, with abundance of moisture. Some are air-plants, and need only blocks of wood to grow on; some should have baskets in which are various rough substances, as bits of peat, stones, charcoal, etc., to nourish and support the roots, but no earth; others need pit culture; some will exist in a greenhouse, but all are better situated in the hothouse, and should be grown as hanging-plants. The range of heat, and the respective seasons for maximum and minimum heat, show how well we can accommodate the varieties included in the list.

Block, pot, or basket. Barkeria Spectabilis. Max. heat, 60° to 65°; min. 45° to 37°. Growing and blossoming season, January to July.

Pot. Cattleya (varieties). Max. heat, 75° to 80°; min. 55° to 65°. Growing and blossoming season, February to August. Food, the loose fibres of peat, sphagnum, lumps of wood and stone.

Pot. Caelogyne. Moderate temperature. Ordinary food. Growing and blossoming season, April to October.

Pot. Cymbidium. Max. heat, 75° to 80°; min. 55° to 60°. Growing and blossoming season, August to September. Food, twigs, loam, and leaves; abundant moisture.

Basket. Dendrobium Speciosum. Max. heat, 55° to 65°; min. 45° to 55°. Growing and blossoming season, February to May. Many varieties, needing various treatments; bears the coolest temperature of any.

Basket. Lycaste. Max. heat, 65° to 70°; min. 55° to 60°. Growing and blossoming season, February to March. Abundant moisture; well-drained, peaty soil.

Block, pot, or basket. Lælia. Moderate temperature. Growing and blossoming season, November to January.

Pot. Mormodes. Max. heat, 70° to 80°; min. 55° to 60°. Growing and blossoming season, October to November; food, very rough, fibrous peat, sphagnum, charcoal, well-drained.

Pot. Odontoglossum. Max. heat, 65° to 70°; min. 45° to 50°. Growing and blossoming season, September to October. Similar treatment to last.

Block. Oncidium. On blocks well syringed; easily grown in pots; treat like last; rather cool; well watered when growing; dry at season of rest. Growing and blossoming season, May to August.

Pot. Peristeria. Max. heat, 75° to 80°; min. 55° to 60°. Growing and blossoming season, August to September. Stronger and richer soil; ample pot room.

Pot. Saccolabium; abundance of heat and moisture when flowering; at other times dry. Plenty pot room. Growing and blossoming season May to August.

Pot. Stanhopea; moderate temperature. Growing and blossoming season, June to August. Treat like last.

Pot. Zygopetalum. Max. heat, 70° to 75°; min. 65° to 70°. Growing and blossoming season, November to February; light, fibrous soil, well-drained.

Such Orchids are easily managed if attention is given to their times of growth and rest, as only at the growing season do they need extra warmth and moisture; at that time the temperature in the night should never fall more than 10° below that of the day. Their bulbs or roots should never be allowed to remain in a temperature much lower than their minimum, even if in a dormant state. If in flower at a season when the sun is very hot and bright, they should be shaded, as the direct rays injure the blossom; it is true they are natives of the tropics, but they grow for the most part in rather shaded spots. The highest degrees of heat show what the temperature must rise to during the flowering season; the lowest, what it must *never* fall below.

Bulbs.—Bulbs of various species are great ornaments of the green and hothouses, and should generally be started in the latter. To be perfectly successful, they require rather more care than is generally given. Gardeners generally lay the pots containing bulbs that have gone out of blossom under the table or on their sides, until that time next year when they are to be started again.

Bulbs have certain seasons for growth and rest, and they indicate the approach of the former by a heightened color and glossiness, swelling of the crown and starting at the eyes. The season of rest follows flowering, when the leaves decay and the plant becomes practically dead for ornamental purposes. At this period they may be kept more cool, but not cold, as all tropical bulbs need a good degree of heat even when dormant; and they should by no means be laid aside as soon as out of blossom, but should have abundant heat and moisture until the leaves are well matured, and if checked sooner, the bulb suffers.

Pots for bulbs should be of different shape from ordinary pots, narrower and deeper, for the bulb roots to descend. A bulb 3 inches in diameter should have a pot 10 inches deep and 5 inches wide at top; other sizes in the same proportion.

The following are good pot bulbs, not including the garden bulbs, Hyacinths, etc., which are great additions to the beauty of the greenhouse, and may be used according to directions yet to be given.

Amaryllis,	Griffinia,	Massonia,
Coburghia,	Hypoxis,	Oxalis,
Cyclamen,	Iris,	Sinningia,
Eriospermum,	Ixia,	Sparaxis,
Gesneria,	Japan Lily,	Strumaria,
Gladiolus,	Lachenalia,	Trichonema,
Gloxinia,	La Peyrousia,	Tropaeolum.

For most bulbs, soil as follows: rich loam, well-rotted cow manure, one-eighth river sand. The compost should be heated just short of combustion, to kill eggs and embryos of worms.

Potting as follows: put in drainage material, and cover it with a handful of charcoal; fill to within about an inch of top with loam, varying the depth according to size of bulb; sprinkle on a little sand or charcoal dust; then set in the bulb, and fill in round it with loam. As before said, water but little till the leaves show, then give more water and heat.

Some delicate bulbs may be grown in sand mixed with a very little cow dung, stimulated with guano-water.

Other plants proper for hothouses will be found in the following list, though some of them may be exhibited in the greenhouse or the conservatory during the time of flowering.

The greatest care must be observed in the hot part of our greenhouse lest we violate natural analogies. It will be proper to shut up this part of the house earlier than the rest, so as to retain more of the sun's heat, and the temperature may now fall lower than at any other season.

The months of September, October, and November will be a time of rest, as it were, during which the vines that had grown too luxuriantly, and were cleaned and pruned in August, will ripen.

All those plants which showed blossoms in the spring, and which we do not intend shall blossom during the winter, may be kept for the present in the greenhouse, to be brought into the hothouse for forcing as spring approaches. During the present month ventilate well and water sparingly, syringe rarely; and remember that the ease of our future task in managing the plants depends upon keeping them as cool and hardening them as much as possible now. Many gardeners make sad mistakes by keeping the heat too great during all the cold months; the lower the temperature outside, the higher it is raised inside. All you need is to keep it uniform, and slowly increase it toward spring. It is unnatural for most plants to blossom in the fall, whilst all feel a natural impulse after the turn in the year.

Many plants that are native of hot countries need much less heat than some natives of more temperate regions; the difference depending mainly on their wood, whether it is hard or soft and succulent. Ericas, for instance, came from the Cape of Good Hope, but many or most of them may be allowed to experience several degrees below 32°, whilst other plants from the same country, as Pelargoniums, are destroyed by much less cold.

A word here on the treatment of Ericas. They must be brought into flower in the hot part of our greenhouse, but may be kept very cool after flowering. This family of plants has the reputation of being difficult and shy; but is very easily managed under uniform treatment. The majority of heaths prefer a sterile soil upon dry bottom; the best material for their compost is dry and well decomposed peat mixed with sharp sand; the most vigorous varieties like an admixture of strong loam. Water in generous quantities is most important to their healthy growth; rain-water is best, soft well-water next; but water containing mineral matter is injurious. In potting, do not make your compost very fine; it is a common mistake. Early spring, just before the commencement of a new growth, is the best time to repot. Shift into considerably larger pots; for soil, mix largish pieces of turf, say an inch square, with very fine peat and sand, and use the mixture both for potting and shifting. This, if well drained, and with a free supply of light, air, and water, will insure good specimen plants. They are readily grown from cuttings, which should be taken in spring. As the Ericas rarely seed, cuttings are the only reliable means of propagation. The proper treatment of their cuttings is described in an old number of the *Gardener's Magazine*, by a former gardener at Winship & Co.'s, as the practice of the Messrs. Winship at their nurseries, Brighton, Mass. I have condensed the following from his verbose description: "In July if the plant has made a good growth, cut the young shoots off the parent plant, about an inch long, with a sharp pair of scissors; remove the leaves from its lower half; after the leaves are removed, cut its end square close to the joint with a sharp knife, and a quick, clean cut. Prepare a pot, of that size which will best suit your bell-glass, by filling it half full of broken crocks, the rest with fine sharp sand; water the sand and smooth its surface; into this set the cuttings, making a hole for them with a sharp-pointed stick. Water gently, to settle the sand, and cover with the bell-glass. Keep constantly moist. Some kinds will root in three, some in six months, and others in less time. When rooted, put in thumb pots in sandy peat, or in a compost of decayed leaf mould and one-third sand. Set the pots in coal ashes, in a frame under glass, or on the upper shelves of the greenhouse; shade during the heat of the day, and keep moist for two or three weeks; after this,

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cool and harden. According to the habit of the plant is to be the future pruning and culture.„

Plants which need early culture in the hothouse if they are to flower well, are:—

Achimenes,	Euphorbia,	Mesembranthemum,
Æschynanthus,	Franciscea,	Moussonia elegans,
Aphelandra,	Gardenia,	Passiflora,
Begonia,	Gesneria,	Pharbitis,
Billbergia,	Hibiscus,	Philibertia,
Cactus,	Hoya,	Poinsettia,
Caladium,	Ipomea,	Portlandia grandiflora,
Charianthus coccinus,	Ixora,	Quisqualis indica,
Clerodendrum,	Jasminum,	Stephanotis,
Combretum,	Lantana,	Strelitzia,
Eranthemum,	Mandevilla,	Tillandsia.

In the greenhouse, as before said, the treatment is to be much more cool and dry than in the hothouse. During this month keep well ventilated in dry weather; shut up early. The plants which will make a good stock for the greenhouse, and which may be shown in the conservatory when in blossom, beside those already given, are as follows:—

Abelia,	Coronilla,
Abutilon,	Cosmelia,
Adenandra,	Cuphea,
Amphicome arguta,	Dielytra,
Anagallis,	Diplacus,
Aotus,	Dolichos lignosus,
Aphelexis,	Erodium incarnatum,
Astelma,	Escallonia macrantha,
Bejaria,	Fabiana incarnata,
Bouvardia,	Fuchsia,
Browallia,	Gazania,
Burtonia,	Gnidia,
Calandrina,	Gorteria,
Calceolaria,	Helichrysum,
Ceanothus,	Iberis semperflorens,
Chenostomia,	Lantana selovii,
Chorozema,	Lapageria rosea,
Cineraria,	Lechenaultia,

Lobelia,
Loddigesia,
Mahernia,
Malva,
Maurandya,
Muraltia,
Nierembergia,
Pelargonium,
Petunia,
Philibertia,
Primula,
Rhyncospermum jasminoides,
Ruellia, varieties,
Russelia juncea,
Salvia, vars.,
Selago, vars.,
Sphenotoma gracille,
Sprengelia incarnata,
Stadmannia australis,
Statice, vars.,
Stenocarpus cunninghamii,
Stylidium,
Sutherlandia fruetescens,
Tasmannia,
Teopea speciosisimea,
Thunbergia,
Torenia,
Triptilion spinosum,
Vaccinum cocineum,
Veronica.

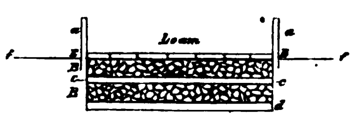
ROSES in varieties.—Verbenas, Chrysanthemums, Rhododendrons, Viburnum, Azaleas, Lauristinus, Deutzia, Cytisus, Alyssum, Calystegia, Acacia, Genista, Mignonette, Gilliflower, Wallflower, Ten-weeks Stocks, Hydrangea, etc.

CHAPTER XV.

THE CONSERVATORY.

The conservatory is to be treated like the greenhouse. Keep it cool, yet above frost. The plants in pots must be watered rather oftener than those in beds. In bright weather syringe frequently.

The beds of the conservatory are made by raising a border, *a a*, one foot above the level of the floor; under the floor drain thoroughly with 18 inches of loose stones, B, laying under them a drain, *d*, which will quickly remove superfluous water. As a precaution, it would be well to lay a flue or hot-water pipe, *c c*, through this drainage, which could be connected with the boiler, as there are times in our very cold winters when the earth about the roots of the plants is cooler than the air, and the growth of plants may thus become feeble and spindling. Many plants very desirable for such beds, but rather belonging in the hothouse, are especially liable to such injury. Over the drainage stones lay a course of turf, E E, to prevent the loam from washing away; over this fill to within 3 inches of top with rich, light, yellow loam; after planting, cover the top with a light dressing of good dark loam.



No plant should be set in this bed with its roots in the close ball made by pot culture; they must be opened out. When all is complete and the plants set, plant some Lycopodiums, Sedums, etc., among the other plants, to cover the surface with their delicate foliage and make a perfect bed of green, out of which the other plants shall rise. After arranging the beds and grouping the plants, follow previous directions.

RUNNERS FOR POTS AND WALLS OF CONSERVATORY.

Billardiera ovalis,	Mimosa prostrata,	Smilax, vars.,
Brachysema, vars.,	Passiflora, vars.,	Sollya, vars.,
Clematis Convolvulus,	Rhyncospermum jasminoides,	Swainsonia galegifolia,
Jasminum, vars.,	Rodochiton volubile,	Tacsonia, vars.,
Kennedyia, vars.,	Roses,	Tropeolum, vars.,
Mandevilla suaveolans,	Rosteria,	Zichya, vars.

PLANTS FOR BEDS.

Good varieties of

Calceolaria,	Heliotrope,	Perpetual Roses,
Chrysanthemum,	Hydrangea,	Petunia,
Cineraria,	Lantana,	Salvia,
Calystegia,	Lemon Verbena,	Steevia,
Coronilla,	Lobelia,	Thunbergia,
Cuphea,	Mignonette,	Verbenas.

PLANTS TO PLACE ON TABLES

may be selected from both the cold and hot parts of the greenhouse.

TO GROUP ON THE FLOOR IN POTS.

Acacia,	Daphne,	Magnolia,
Agave,	Erithronia crista galli	Oranges,
Azalia,	Genista,	Pittosporum,
Brugmansia,	Laurestinus,	Poinsettia,
Camelia,	Lemon,	Rhododendrom, etc.
Cape Jessamine,		

It is more difficult to keep such a conservatory in good condition than ordinary houses, because more is expected of it. It is emphatically a showhouse, no propagating or cultivating being done, with the exception of the plants in beds. As these last must remain till worn out, careful attention must be given to secure a good succession of blossoms.

The conservatory ought to be during the winter like a vast bouquet, only the more beautiful from the size, which admits of combinations impossible in any bunch of flowers. Where there is a well-arranged greenhouse connected with the estate, it is not very difficult to keep up a good display; but without it it is impossible, and the so-called conservatory becomes one of the anomalous glass houses before referred to.

The heat must be more decided and constant than in the greenhouse; otherwise plants brought from thence full of vigor and blossom will be checked, their flowers will dwindle, the whole plant will become stunted and sickly.

To make our conservatory all we have described, we must start the fires earlier than in the other houses, and rely less on the shutters and sail-cloth. The number of plants which will make a fine show under glass in October will be less than afterwards. Gilliflowers, Salvias, Amaranths, the Dwarf and Giant Chrysanthemums, and other annuals and perennials, with Roses, Heliotropes, etc., will make a good show; the shelves and tables should be filled with these fall flowers, and some may be placed among the groups of evergreens (now out of blossom) on the floor, to brighten them.

CHAPTER XVI.

GRAPERY.

THE retarding-houses must now be more carefully watched than before. Shut up early at night to retain sun warmth, and yet admit air abundantly during bright, sunny days, to keep the temperature low. If there should come a period of decidedly cool weather, start a little fire under the boiler; but delay as long as possible; give the fruit trees but little water, to ripen the wood.

The vines in the forcing-house should now be pruned, as they come into a nearly quiescent state. Before pruning, remove the ripe and ready-to-fall leaves. There are several systems of pruning and training vines.

When a vine is carried up the whole length of the rafter, its upper end is of course in a better atmosphere than the lower, and consequently tends to ripen its fruit sooner. This would be no disadvantage where the fruit is grown for private use, and a succession is desirable, were it not that the fruit above grows large at the expense of that below, owing to the tendency of the sap to ascend, thus strengthening the upper eyes, and giving them all they can use before it lingers and settles in the lower eyes.

To counteract this tendency, various methods are resorted to; the most common being to take down the vines and lay them in a horizontal position, in their dormant season; there they are kept till all the eyes have "broken" equally, when they are again fastened up to the wires. In this way equality of size is more nearly attained, while difference in temperature gives the desired succession in time of ripening.

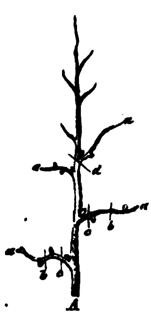
Where fruit is grown for the market another plan is sometimes followed, which is to carry the main cane up a certain distance, and then bend it as nearly as possible at a right angle, and carry it along the whole length of the house. This of course keeps all the bearing part of the vine in the same temperature, and insures a nearly uniform supply of sap to all the eyes. But the practice has its disadvantages, such as the unequal length of cane in the different vines before they are bent, and therefore rafter training is úsually preferred.

The methods of pruning are more various than those of training, and each method has something to recommend it. We practice spur pruning.

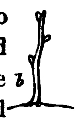
This being the second year of forcing, and the fourth of the vine's age, it will perhaps be well to state the proper method of pruning from the time of planting the vine.

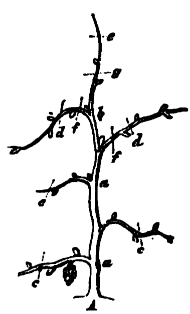
The system for the forcing-house and the cold grapery differ a little from the retarding-house.

PRUNING. — The vine is generally first started in the hotbed, or in the pit in pots, so that it will have attained some length by the time the spring sun has thoroughly warmed the border. Early in June, having the vine in a pot with 3 or 4 feet of top, plant it in the border, and take in the top through the wall opposite the rafter upon which it is to run. The warm, rich border will stimulate to a rapid growth; allow it to grow without stopping, even after it has reached the top of the house, when it may be trained along the back wall, pinching off its end a few weeks before cutting back. Pinch off at the first bud any lateral shoots that appear, and all tendrils. When the vine is within a quarter of the whole length of the rafter, begin to prune; cut out the lower laterals close to the wood, being careful not to injure the bud or eye at the base of the lateral; and thus continue to cut as the wood ripens. In this diagram A is the main stem of a vine; *a a a a*, laterals; *b b*, first cut; *c c*, second cut. As winter approaches, and the leaves fall from the vine, cut it back to *d*, three eyes from the bottom.



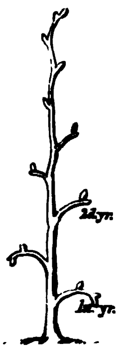
In December paint the vines with a mixture of sulphur and soft soap; untie them from the wire on the rafter and lay them down on their sides, covering with mats, etc., as a thorough protection against frost. In the coldest weather some little fire must be kept in the forcing-house, lest frost prevent the early swelling of the buds in the spring. During the earliest months of the year, do not let the sun heat the house, but keep it rather cool till April; then gradually uncover the vines. The buds will soon begin to swell, and just as they are breaking, tie up again to the rafter. The vine will now have this appearance. As it begins to grow, all the eyes will push out shoots; allow the end shoots to grow at will, but pinch off the laterals at the second point or eye. The first eye of the lowest lateral may be allowed to bear a bunch to test the fruit. After these laterals are pinched they will break the last eye and start again, and after each pinching they will repeat this process at the bud nearest the end till fall. They must be pinched back every few weeks during the season. When the main branch has reached the top of the house, stop it, and continue to stop each new growth it makes from the leading bud. Nip all the laterals at the first bud, as last year. The diagram shows the appearance of the vine after this; *a a a*, first laterals left as buds last year; *b*, new lateral; *c c c*, points at which first laterals are again stopped; *d d*, first pruning new laterals; *f f*, second pruning of same; *e*, vine stopped at top of house; *g*, final cutting back of vine.





In the fall cut back the leader to about one-third its length, and all but the two spurs to the first eye, as last year, leaving the two lower spurs and the eyes above for the next year. Treat through the winter as before. In the spring of the third year the vines will swell their buds in March; begin heating the house with fire the middle of February, and increase the heat in March; follow the same system as last year, only you may allow each spur and eye to bear one bunch of grapes. This brings the vines to the fourth year, which is the age of our vines.

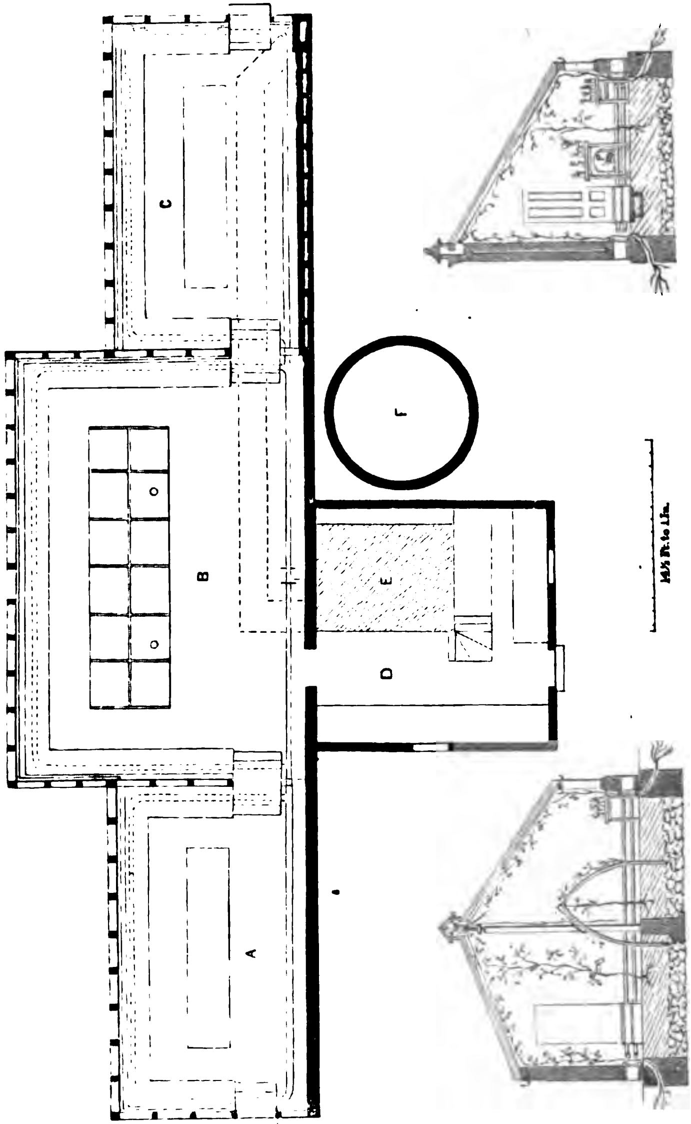
In October, if the wood is well ripened and the leaves are falling, give the final pruning. Cut back the leaders two-thirds of the length of the rafter, and all the laterals of this year's wood to the eye, the spurs of last year to the first eye, those of the year before to the second, as shown in the cut. The spurs should range about 8 inches apart on the cane. When this system is pursued for a number of years, the spurs become unwieldy; in which case every other one may be cut back to the stem, thus forcing out a new shoot; or at the end of ten or twelve years every other vine may be cut back to the bottom, which will develope the latent eyes and give a new cane for the next year. You will lose one year's crop from every vine thus treated, and renew the vine. It is the practice of some growers to train up a new leader beside the old for a year or two before that is cut down; but it is poor economy, for although there is then no entire loss of crop, the grapes are few and poor, while the growth of the new wood is liable to be feeble and spindling. Another system of pruning, by which a new cane is got each year, is called the long cane renewal system.



As has been said, this pruning also applies to the cold grapery, with the single exception that the vines should be started later in the spring.

By thus cutting back close to the main stem, the eyes are started early, those nearest the leader being the first to start. It is then a natural inference that in the retarding-house a different system of pruning must be followed, the object there being to delay growth as long as possible in the spring. Directions for pruning in the retarding-house will be given in the winter.

There is yet another method of forcing grapes, which may be practised in any ordinary greenhouse, or to still better advantage in a forcing-house; viz., in pots. Grapes grown in pots generally ripen earlier than those grown on rafters. The temperature of the earth about the roots of the vines in pots is the same as that of the air about the leaves, and thus the whole plant is equally stimulated. The roots of the vines on the rafters are in the border outside, and cannot be affected by the heat of the house unless



INDEX TO GRAPERY.

A, Retarding House; B, Cold Grapery; C, Forcing House; D, Potting Room; E, Boiler; F, Cistern.

[illegible] is [illegible] it [illegible] [illegible] stimul[illegible] [illegible] [illegible] [illegible] [illegible] which are to be [illegible] [illegible] better, [illegible] [illegible] first [illegible], to [illegible] [illegible] nine [illegible] winter in so[illegible] dry place [illegible] February shift them for [illegible] not less than a foot in diameter. [illegible] with [illegible] well mixed with [illegible] [illegible] [illegible] grow [illegible] can conveniently be a[illegible] where the pot is to stand; some [illegible] [illegible] or two; perh[illegible] judicious. Stop it [illegible] five fe[illegible] [illegible] stop it, and pinch off the [illegible]

In [illegible] the plant will [illegible] pruned to [illegible] 3 feet long [illegible] a 15 inch pot; every additional [illegible] allowing an additional half-foot [illegible] length must be regulated by the [illegible] If the plant is to be forced [illegible] pot late in December. The after [illegible] described at another time.

DESCRIPTION OF GRAPERY. — [illegible] the practice to be followed in our grapery, I pro[illegible] describe the building itself. Refer to the ground plans [illegible] on [illegible] in connection with the description.

A B C is the grapery; A, [illegible] house; B, cold gr[illegible]; C, [illegible] forcing-house; [illegible], shed for boiler [illegible]; E, [illegible]; F, cis[illegible].

The back wall of A is 16 feet high, the front 5 feet [illegible] which 2 [illegible] is [illegible] glass, as in the greenhouse; the [illegible] 12 feet wide. B is 20 feet wide, 6 feet high in front [illegible] the [illegible], 9 feet at the back. C is 12 feet wide, [illegible] high, 4 feet in front, of which 2 feet is brick, 2 feet g[illegible]

the border is vaulted; they may be thoroughly protected from frost, but cannot be warmed to any considerable extent, and are consequently less stimulated than the cane and leaves, and do not contribute as largely as the latter require.

Vines which are to be grown from pots are started from cuttings — or better, from eyes — which are induced to grow as much as possible the first year, to insure strong plants. When the leaves have all fallen, prune to nine inches in length; keep them through the winter in some dry place well protected from frost. In January or February shift them for the last time into larger pots, — not less than a foot in diameter, — thoroughly drained, and filled with earth well mixed with rather coarse old turf. Allow as many shoots to grow as can conveniently be accommodated in the place where the pot is to stand; some cultivators retain four or five branches, others but one or two; perhaps one cane is as much as is really judicious. Stop it about five feet long; as often as it starts afresh, stop it, and pinch off the laterals.

In September the plant will lose its leaves, and should be pruned to about 3 feet long for a 12 inch pot, 4 or 5 feet for a 15 inch pot, every additional inch in the diameter of the pot allowing an additional half-foot of cane, although the ultimate length must be regulated by the space allowed during forcing. If the plant is to be forced early, set the pot over the flues or pipes late in December. The culture of potted vines will be described at another time.

Description of Grapery. — Having explained the practice to be followed in our grapery, I proceed to describe the building itself. Refer to the ground plans and elevations on next leaf, in connection with the description.

A B C is the grapery; A, retarding-house; B, cold grapery; C, forcing-house; D, shed for boilers, etc.; E, boiler; F, cistern.

The back wall of A is 16 feet high, the front 5 feet high, of which 2½ is solid, 2½ glass, as in the greenhouse; the building is 12 feet wide. B is 20 feet wide, 6 feet high in front, 14 feet in the middle, 9 feet at the back. C is 12 feet wide, 13 feet high behind, 4 feet in front, of which 2 feet is brick, 2 feet glass. The arrangement for ventilation through the wall at the side and top is the same as in the greenhouse and the conservatory. The back wall of C is 2 feet thick, 6 inches of the distance being an air chamber. The back walls of A and B are 1 foot thick; all front walls are 1 foot thick; side walls to glass, 1 foot; above glass, posts, and window sashes, 6 inches in the rough, worked down enough to look well without losing strength. E, the boiler, will be described hereafter. F, the cistern, collects the water from the roofs; there is a well in the shed which can force water into the cistern at need.

The heating is done by means of 4 inch iron pipes, which are carried round the inside of the different buildings, just as in the greenhouse, only that the hot water may be carried into either division of the house without warming the rest any more than would be done by one-half the leading and returning pipes through the grapery, as the water is carried either to the forcing or retarding-house. The heat derived from this amount of pipe is not enough to much affect the cold grapery; it does not do much more than take the chill off the air at those seasons when this part of the house is intended to be dormant.

The smoke is carried in a brick flue shown by dots, into a flue which runs under the walk in the cold grapery, through to the farther end of the forcing-house, and thence up the chimney. In order to allow the pipes free range about the house, without the extra expense of bends, elbows, etc., the sill of the door is raised so as to be reached either from without or within, by two steps, under which the pipes pass quite out of the way.

On all sides of the forcing-house, grapes are planted. The border is at one end and in front, and takes the roots of the vines in those parts of the house; at the back and the inner end vines are planted in the floor of the grapery, which is a regularly prepared border, and is enriched annually with liquid manure. There is a table on the right of the walk, on which vines in pots are placed for forcing; and over the whole course of the pipes is a narrow table, on which strawberries and some early vegetables may be forced. The vines are brought into the house through cylindrical, oblique holes, 6 inches in diameter in the front and side walls, just between the foundation and the first course of bricks. The hot-water pipes are 1 foot from the vines, along the front and back, 6 inches at the ends. Under the middle table is a mushroom bed.

The arrangement of the retarding-house is similar; but the front shelves may be used to start hothouse bulbs, and low growing plants for exhibition in the greenhouse and conservatory.

The cold grapery has vines along the sides and ends, and one row in the middle near the walk; but the immediate front is occupied by an espalier, on which are grown Cherries, Peaches, Apricots, and Nectarines.

It is a very nice matter to heat such a building as this, for it is difficult to calculate how large a boiler, or how many feet of pipes are necessary. A formula is given below by which the necessary calculations can be made.

The amount of heating surface of pipes to be allowed, depends on the number of cubic feet of air which are to be heated per minute, and on the difference between temperatures within and without. Upon the number of feet of pipes depends the size of the boiler; and the efficiency of the boiler is determined by its shape, setting, and the distance between the furnace bars. Messrs. Tredgold and Hood, in England, have made the most reliable calculations on this matter, and their directions are accordingly quoted, as follows:—

"If," says Mr. Tredgold, "the cubic contents of air to be heated per minute be multiplied by the number of degrees it is to be warmed, and the result be divided by twice the difference between the temperature of the house and that of the surface of the pipes, the result will be the feet of surface of iron pipe required.

"Thus, if 1000 cubic feet per minute are to be warmed, and the extreme case is supposed to be that when the external air is 20°, the house should be warmed (to) 50°; and therefore the air is warmed 30°; and with water (within) the surface (of iron pipes which contain water) will be 190° when the water boils, but only 180° in its average state; therefore,

$$\frac{1000 \times 30}{2\ (180-50)} = \frac{30000}{260} = \text{116 feet of surface."}$$

Mr. Hood gives another formula for ascertaining the number of feet. He says that $1\frac{1}{4}$ cubic feet of air must be heated for each square foot of glass in the building. Multiply 125 by the difference between the proposed maximum temperature within and the temperature without, and divide this product by the difference between the temperature of the pipes (average of surface 180°) and the proposed temperature of the room or house; then the quotient thus obtained, when multiplied by the number of cubic feet to be warmed per minute, and this product divided by 222, will give the number of feet in length of 4 inch pipe, which will produce the desired effect. If 3 inch pipe is used, the number of feet of 4 inch pipe must be multiplied by 1.33; if 2 inch pipe is used, by 2.

The number of feet of pipe being thus obtained, the corresponding boiler surface may be ascertained from a table of proportions given by Hood as follows:—

"When the difference in temperature between the pipes and the air to be heated is 140° (pipes 200°—air 60°),

Surface of boiler exposed to fire.	4 inch pipe.	3 inch pipe.	2 inch pipe.
3 1-2 square feet will heat	200	266	400
5 1-2 square feet will heat	300	400	600
7 square feet will heat	400	533	800"

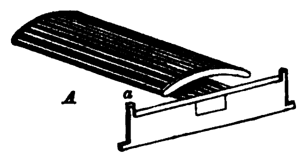
and so on; the figures of the 4 inch column being increased one-third to give those of the 3 inch, and doubled for the 2 inch. "Again, when the difference in temperature is reduced, say to 120° or 100°, a boiler of the same size as above will heat one-sixth and one-third more than when at 140°."

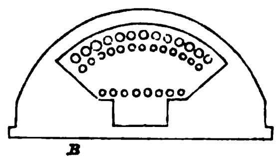
A Formula for Calculating Size of Boiler.—Take the cubical contents of house, and to every 100 feet allow 10 square inches of boiler surface, and 1 square inch of fire grate.

Much depends upon the distance between the pipes at their junction with the boiler; they should not be less than 16 inches from centre to centre of 4 inch pipes.

When the boiler is not more than 18 inches deep, it is best to lead the flow pipes from its top, and insert the return pipes as near the bottom as connection can safely be made. The main feeding pipe from the boiler, which has to supply several circulating pipes, should be no larger than they, unless more than 4 pipes are to be served, as the rapidity of the current in the feeding pipe will be in proportion to the demands on it.

The forms of boiler are various, and almost every cultivator has his favorite. One of the very best was exhibited by Weeks & Co. at the Crystal Palace, London. It is a saddle-shaped pipe boiler, — the diagram will explain itself. The fire is made on the lower set of pipes, which serve as furnace grates. The return water passes through them, consequently they are always kept below the fusing point of coal and iron, so that they never clinker or burn out.





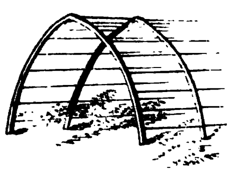
Vertical transverse section of same boiler.

A, view of boiler from above; B, vertical transverse section. The connection between the top and bottom pipes is made at the back in A; the supply pipes are led away from the top of the back side; the cold water is returned at *a* (A).

Those vines in the cold house which are carried from floor to ridge without any support from a sash, may be tied to a strong wire, fastened below to a post in the earth and above to the ridge. The trellises for vines along the rafters are made thus: At intervals of 4 feet along the under side of the rafter carry out iron rods a few inches long, with an eye at the end; provide curved strips of iron a foot in length, $\frac{1}{2}$ inch wide, $\frac{1}{4}$ inch thick, pierced with three holes, one for each rod. Through the eye of each rod and the middle hole of each strip carry a wire and fasten it above at the top of the glass and below near the entrance of the vine stem. A wire of the same length is to pass through the side holes on each side of the first, and fasten as that was. You have now a trellis in front of the rafter along its whole length, which may be taken down very easily if the eyed rods are so put up as to be quickly detached.

The espaliers for fruit trees are curved back enough to spread the branches well out to the light. Fruit grown in a cold grapery will not be forced very much out of season, but may be expected from a month to six weeks before that grown in the open ground is ripe, and has besides the advantage of being thoroughly protected from insects, if properly cared for.

The patterns of espaliers differ nearly as much as those of boilers. The cut shows a very good kind. The tree being grown with a single stem till it reaches the top, when branches are allowed to develop, and are trained down over the sides, thus getting, besides a thorough spreading out to the sun, the advantage of the delay of sap, and consequent formation of fruit buds in the place of the leaves which preponderate in more vertical branches.



When fruit trees are cultivated in a grapery where vines are planted in the floor and fed from the bed there prepared, the roots of the trees should be confined by borders of slate or other material within certain limits; their soil must be prepared for them, and when it is exhausted must be renewed, or liquid manure must be supplied.

Grape Borders.—The only part of the grapery yet undescribed is the borders, which in the estimation of most cultivators are the very foundation of all success,—the alphabet of grape culture. From the many minute directions given I quote the advice of J. F. Allen, of Salem, already referred to.

Some of the very best English cultivators of the present day are of the opinion that thorough draining at the bottom, and subsequent filling with the best of loam, is all that any grape border needs, and that the future stimulation and growth of the vines is to be effected by copious supplies of liquid manure. This course is rational, cheap, and in accordance with the views I have already expressed.

Mr. Allen's directions are as follows:—"The border should be 20 to 30 feet wide; if but 12 feet can be had, the vines must be set farther apart. If the soil is a good loam, begin at one end and trench it: mark off 10 feet the entire width; throw out the soil 2 feet deep; if bones or the carcasses of animals can be had, cover the bottom well with them; if these are not readily procured, slaughter-house manure may be substituted. Mark off 10 feet more of the border, and cover this manure with part of the soil from it. Upon this put an inch or two of oyster shells or old lime rubbish mixed with broken bricks; over this put some soil from the border, then a good covering of cow manure, upon this a slight covering of loam again, followed with a good portion of oyster shells or the substitute, and over this a thick covering of stable manure well rotted; finish with a thick covering of loam. The whole length is to be made in this manner, in alternate spaces of 10 feet each trenching. After it is finished, the border should be 3 feet 6 inches deep; it will settle to less than 3 feet in a few months. The proportions recommended for this border are $\frac{1}{2}$ loam, $\frac{1}{4}$ bones or other strong manure, $\frac{1}{8}$ oyster shells or lime and brick rubbish, $\frac{1}{8}$ rotten stable manure.

"Before planting the vines the border should be spaded over to mix well the top substances, being careful not to disturb the strong manures at the bottom, as these substances when decomposing would destroy any of the roots of the vine with which they came in contact. Should the soil be poor, decrease the proportion of loam and increase the manure, and use the top soil of a loamy pasture. If the soil is very poor and unsuitable, use the following compost: $\frac{1}{2}$ top soil of old pasture, $\frac{1}{4}$ bones, $\frac{1}{8}$ oyster shells, $\frac{1}{8}$ rotted manure; throw these materials together and leave them till decomposed; then throw loosely into the trench. Those of my borders which have the most slaughter-house manure and offal continue as they ever have to produce the best fruit."

Very few situations in this country need other drainage than loose stones.

CHAPTER XVII.

FLOWER-GARDEN.

If the bulbs were planted last month, there will be comparatively little to do in the flower-garden.

All beds which are nearly emptied of their annuals and bedding plants, should be manured and dug over. Wherever enough flowers are left to make a pleasant show, pains should be taken to preserve them as long as the frost will allow.

During this month the flower-garden must depend principally on Verbenas, some perennials, Gilia, Alyssum, Candy-tuft, Mignonette, Giant and Dwarf Chrysanthemums, of which the variety is so great, that with a little care in selecting colors, the summer flowers will hardly be missed. Some late flowering bulbous roots, if sheltered at night, will still be in blossom, as Tuberoses and the other autumnal bulbs.

The monthly Roses in the Rosary will continue in blossom till winter, and in the shrubbery, the St. Johnswort, Cinque-foil, Tamarisk, Daphne, and Wigelia Amabilis, together with the White Snowberry, Scarlet Winter Green, parti-colored Euonymus, red-leaved and redder berried Barberry, and the black berries of the Privet, will help to disguise the rapid approach of winter. Any bulbs not planted must be got in as soon as possible. The perennials now claim attention, and the borders and beds not devoted to bulbs and bedding plants, should be stocked with a good variety of them. The beds in front of the conservatory, and those in the middle of the garden, should depend entirely on annual planting of bedding plants, bulbs, and flowers from seeds, which are certain to give a satisfactory bloom; besides, it is desirable that the flowers here should be of a low habit of growth, sure not to exceed a certain size; and we obtain this desideratum by using Verbenas, Heliotropes, Salvias, etc., with which we may secure just the effects we fancy, assured that one part of the bed will not overtop the others. In the border beds this is of no consequence. They back upon hedges and shrubbery, and do not depend entirely on their own beauty of color, form, etc., for the gratification they can give; the eye will certainly wander over them to the hedge or shrubs beyond, and will blend all into one agreeable or disagreeable whole. Were all the plants in these borders of a uniform size, they would lose the charm of variety and grace; but by mingling different perennials, annuals, and greenhouse plants, their effect in connection with the shrubbery, is the most charming that can be imagined.

Perennials as a class are more satisfactory than any other flowering plants, for when once planted they are no trouble for years, beyond digging over the beds and occasionally cutting down the stools to reduce them to a convenient size. If the varieties are well selected, they will give some flowers during every month from April to October, one variety coming forward as another goes to seed. The following list gives the names of a few varieties for each month, with the height of the flower stems just before they blossom: —

Name.	Month.	Early or late.	Size.	Color.
Anemone, double and single,	May,	early,	6 in.	pink.
Thalictrum Anemanoides,	"	"	6 in.	white.
Uvularia (Bellwort),	"	late,	1 ft.	yellow.
Solomon's Seal,	"	"	"	white.
Trollius Europeus,	"	"	"	yellow.
Columbines,	"	"	"	variety.
Saxifrage,	"	early,	1 1-2 ft.	white.
Pedicularis,	"	late,	1 ft.	variegated.
Violets,	"	early,	6 in.	several.
Moss Pink (Phlox),	"	"	3 in.	variety.
Polemonium Reptans,	"	late,	"	blue.
Primula,	"	"	1 ft.	yellow, red.
Corydalis,	"	early,	6 in.	red.

Name.	Month.	Early or late.	Size.	Color.
Dialytra,	May,	early,	1 ft.	pink.
Pulmonaria,	"	late,	6 in.	purple.
Peony,	"	"	1 to 2 ft.	red, white.
Dog-tooth Violet,	"	early,	3 in.	yellow.
Delphinium,	"	late,	18 in.	blue.
Hellebore,	"	"	1 ft.	white, blue.
Double Butter-cups,	"	early,	6 in.	yellow.
Lysimachia Nummularia,	"	late,	1 in.	yellow.
Lily of the Valley,	"	late,	3 in.	white.
Iris,	"	whole month,	various,	all colors.
Double Ragged Robin,	"	late,	1 ft.	red.
Houstonia,	"	early,	3 in.	blue, white.
Pentstemon Ovata and Atropureus,	June,	late,	2 ft.	yellow, purple.
Soapwort,	"	early,	1 ft.	red.
Hairy Phlox,	"	late,	6 in.	red.
Purple Lupine,	"	whole month,	various,	many.
Peony,	"	"	"	"
Double White Rocket,	"	early,	1 ft.	white.
Phlox, varieties,	"	whole month,	various,	several.
Scarlet Poppy,	"	early,	6 in.	red.
Blackberry Lily,	"	"	1 1-2 ft.	yellow.
Yellow Lily,	"	"	2 ft.	"
Canadian Lily,	"	"	6 in.	red.
Yellow Day Lily,	"	late,	1 ft.	yellow.
Double Larkspur,	"	"	"	blue, white.
Crane's Bill,	"	early,	"	purple.
Cucumber Root,	"	"	6 in.	white.
Senecio Aurea,	"	"	1 ft.	yellow.
Spirea (sorts),	"	whole month,	various,	all colors.
Garden Pinks,	"	early,	1 ft.	pink.
Polemonuim,	"	early,	3 in.	white, blue.
Campanula sorts,	"	whole month,	1 ft.	" "
Antirrhinum, sorts,	"	"	"	variety.
Lychnis,	"	late,	1 ft.	red.
Vervain,	"	early,	1 1-2 ft.	blue, purple.

Name.	Month.	Early or late.	Size.	Color.
Aconite,	June,	early,	1 1-2 ft.	blue, white, purple.
Perennial Flax,	"	"	6 in.	glorious blue.
Evening Primrose,	"	"	1 ft.	yellow.
Indian Hemp,	"	"	"	white, pink.
Spiderwort,	"	whole month,	"	white, blue.
Asphodel,	"	late,	2 ft.	white.
Fraxinella,	July,	whole month,	"	white, blue.
Penstemon,	"	early,	1 ft.	white.
Monarda,	"	late,	1 to 3 ft.	red, purple.
Evening Primrose,	"	whole month,	"	yellow.
Sedum,	"	early,	6 in.	white.
Vervain,	"	whole month,	1 to 3 ft.	blue.
Veronica,	"	"	"	"
Double Lychnis,	"	"	1 ft.	red.
Chelone,	"	early,	"	white.
Dracocephalum,	"	whole month,	2 ft.	pink.
Anterhinums,	"	"	various,	various.
Perpetual Pea,	"	whole month,	2 ft.	pink.
Hibiscus,	"	early,	"	various.
Mallows,	"	"	1 ft.	white, pink.
Lilies, sorts,	"	whole month,	all sizes,	various.
Blue Catananche,	August,	early,	2 ft.	blue.
Fumitory,	"	late,	1 ft.	pink.
Orange Galliardia,	"	early,	2 ft.	orange.
Hemerocallis,	"	late,	"	white, purple.
Dianthus,	"	early,	1 ft.	various.
Lobelia,	"	"	2 ft.	scarlet.
Chinese Lychnis,	"	late,	1 ft.	orange.
Willow Herb,	"	early,	2 ft.	pink.
Yucca Filamentosa,	"	early,	"	white.
Phlox,	"	whole month,	"	many.
Blazing Star,	"	late,	"	blue.
Coreopsis,	"	whole month,	"	yellow.
Cassia,	"	early,	3 ft.	"
Asters,	"	whole month,	all sizes,	various
Golden Rod,	"	late,	various,	yellow.
Ladies Tresses,	"	"	6 in.	white.
Orchis,	"	whole month,	6 in. to 1 ft.	various.
Asclepias,	"	whole month,	2 ft.	many.
Achillea,	"	early,	1 ft.	white, pink.
Coreopsis,	September,	early,	2 ft.	yellow.
Achillea,	"	"	1 ft.	white, pink.

Name.	Month.	Early or late.	Size.	Color.
Asters (sorts),	September,	whole month,	all sizes,	many.
Golden Rod,	"	"	"	yellow.
Gentian,	"	"	1 ft.	blue.
Eupatorium,	"	early,	various,	several.
Blazing Star,	"	whole month,	3 ft.	purple.
Globe Thistles,	"	"	"	"
Chrysanthemum,	"	late,	various,	various.

Some of these continue to blossom during October, till severe frosts destroy all vegetation.

All perennials may be transplanted without fear of injury, for they have a multitude of fibrous roots; but though they will bear rough usage, no class of plants is more grateful for kindness and care. By means of transplanters they may be moved even when in blossom without being affected at all.

To insure a satisfactory flower-garden, that portion of it which is chiefly devoted to perennials must have open spaces, in which annuals and greenhouse plants may be set. Our list shows that during the early summer perennials are abundant, while they diminish in variety as the season advances; thus being precisely adapted to supply the need of flowers before the time arrives when annuals and greenhouse plants are in perfection; viz., July, August, and September.

The arrangement of perennials as respects size, form, and color, must depend on fancy, only observing the general rule to place the larger plants toward the back of the beds which are near the shrubs, and in the middle of open beds which are not connected with taller objects, with such variations as will prevent monotony of effect.

Much of the satisfaction derived from such a garden as ours, depends on the judicious selection and grouping of shrubs. Throughout the season you may have some shrub in blossom; and by their flower, and the color of their leaves or berries, they fill the gaps among the perennials.

Neatness is essential to the well-being of the flower-garden; the more orderly the borders, the more complete the absence of all signs of decay, the greater the satisfaction we feel. Neglect of this spoils the richest collection of flowers, while its careful observance renders the most meagré collection beautiful.

As soon as the frost cuts any plant down, remove it, as its blackness is disagreeable. Dahlias touched by frost should be cut half way down only, so as to ripen the tubers.

CHAPTER XVIII.

KITCHEN-GARDEN.

THE work for October in the kitchen-garden is a continuation of that described for September.

Lettuce plants which are to be headed for winter, may now be pricked out into the hotbed frames, and covered at night with the sashes. Cabbages for early spring must be planted in frames, and for a short time be kept under glass and watered gently, to enable them to get well rooted; when that is done, the sashes must be removed, and the plants kept cool to harden them. The plants should be set down to their leaves in the earth, as the stem is the most tender part; if well watered and set low, they will need no outside covering till the end of November.

Such Cauliflowers as are showing their blossoms should be sheltered from rain and frost by some leaves broken down over their heads. Ripe Onions, if not gathered in September, may be pulled and left on the ground to dry; late in the month the Onion Pips for spring use are to be gathered, or left covered with Pine branches till spring.

There is a variety of Onion resembling the Potato Onion, grown near Philadelphia, which once planted goes on year after year without replanting; the bulb throws up its seed-stalk and ripens its seed, and at the same time produces a new bulb by the side of the old one which is all ready for the next year's growth, and, if undisturbed, will surely produce another crop of seed and another bulb.

Cabbage and Broccoli now need their last attention in the way of hoeing.

Bank your Artichoke Chard, Celery, and Cardoons, but never when wet, even with dew. Cut the Parsley well back to force out a new growth, and transplant enough for winter use into the frames.

Finish gathering Pickles. Any melons not larger than the fist should be picked for mangoes.

As the frosty nights approach, cover enough Tomatoes for daily use, with cloth or straw; a very light covering will enable them to defy early frosts. If the frost comes sharp enough to cut off the vines, gather all fruit of sufficient size, and lay it in a warm and sunny place, covering at night; if thus treated it will all ripen and prove good, though not so high-flavored as when ripened on the vines. Tomatoes may be kept in this way many weeks after the vines are gone, they being much more tender than the fruit.

Treat melons like Tomatoes. Watermelons may be kept till Christmas.

Cut the herbs down to the lower leaves or stems, to be ready for next year.

Transplant Currants and Gooseberries, pruning the old wood from both; the rust or mildew so common on the fruit of the latter, is often avoided by removing old wood and letting light and air into the middle of the bush. For full directions see Summer.

If the Raspberries were not pruned last month, see to them now. Last year's wood is now worthless, either for growth or fruit. Prune Thimbleberries and Blackberries, and make new plantations.

For Espalier fruit follow the directions of last month. Filberts will soon be ripe and show it by the gradual opening of the husk, and the brown color of the nut.

Where there is a demand for Salads, Cress, Mustard, Radishes, etc., during the winter, sow them now in very warm borders, or in frames. They will need close care and attention, and must be protected at night. Just as soon as the weather grows decidedly cool, frames must be kept over those in the borders. They may be sowed in boxes and removed to the grapery on the approach of cold weather.

Large Onions may be planted for seed, in order to get it earlier and in greater abundance than is possible when we plant for this purpose in spring. The beds should be well dug and trenched, about 4 feet wide, and 18 inches apart; set the Onions in the bottom of the trench, and cover with 3 or 4 inches of earth. Cover the beds with a light dressing of leaves or old manure for the winter; they will start in April and begin to grow in May, and as soon as they have attained their full height, should be tied up to stakes, as the head is very heavy when full of seed; the seed when ripe should be dried a day or two and kept in paper bags for use.

Endive, though rarely grown for the Boston market, is a very excellent vegetable; it should be blanched from time time as it is wanted for use; this may be done under endive or flower pots, by earthing up, or by covering with boards or straw; the first is the best method. The same is the treatment of Sea-kale: see hereafter.

Dill, Alexanders, Skerrits, Rhubarb, and Sea-kale should be sown, as their seeds are very slow to germinate, and will come forward more surely and quickly in the spring, if subjected to the action of the winter's frost.

Make the Mushroom bed in the forcing-house and others in the cellar of the barn or house. Mushrooms to be productive must be kept warm and moist, but not wet. When not kept in this condition, the bed is unproductive, though not spoiled, for the application of warmth and moisture will rouse its activity again.

Many methods for making Mushroom beds have been proposed. The simplest is that of Mr. James Galbraith, described in the *Working Farmer* of November, 1854. "The Mushroom may be successfully cultivated in dry cellars, provided the temperature ranges from 50° to 55°, or thereabouts.

"The mode of culture I have practised is simple, and sure to produce an abundant supply.

"Let the groom or coachman collect the horse droppings in the stable, and let them be deposited every morning under a dry shed, open in front, facing the sun, to be thoroughly dried. Hang an old fishing net over the pile collected, to keep off chickens or other animals that might break the droppings to pieces, as they should be dried as entire as possible. The material collected in the shed should be turned over every day, to prevent fermentation taking place.

"Construct a frame of boards, say 30 × 4, 2 feet high behind and 18 inches in front, or smaller in the same proportions, if thought best. When there is enough dry material collected to cover the bottom of the frame two or three inches thick, put it in and trample it all over to make it solid.

"Repeat the same process as you collect material, until the bed is complete. Lay 4 inches of light vegetable mould on top. In the course of four or five weeks there will appear in the mould something like white threads running all through the mass. When this takes place, water the bed moderately, and cover it with dry Grass cut from the lawn, as it contains but few seeds to shake out and grow in the bed: it is better in this respect than common Hay.

"Water cautiously. In a short time the bed will become an entire mass of spawn, and continue to bear for twelve months, provided the cellar is not too damp and cold. Should the materials heat in the process of drying, or afterwards during the process, all will prove abortive."

A bed of this sort is, as the writer truly says, a mass of spawn. Beds may be made in hotbed frames; the bottom being filled in with dry, heating manure, which is to be well trampled and left till the violent heat is abating; then cover with two or three inches of earth, in which spawn is to be placed. The bottom heat, with moisture, will cause this spawn to increase rapidly, and the bed will yield Mushrooms for a long time.

Spawn for planting may be prepared in many ways. Make a brick of cow and horse manure; into this brick put a small piece of spawn; lay the brick in a warm place, and in a short time it will be full of spawn. "Spawn" is the white radicles of the mushroom plant, which may often be seen in the earth of old pastures, where horse droppings have dried.

There are many varieties of fungus that are edible, a few that are poisonous; the rest are disagreeable rather than injurious.

The "gills" of a fungus are the thin leaves seen when it is turned over, filling the concavity of the lid with their paper-like lobes, which radiate as the sticks of an open umbrella. Their color varies with the variety of fungus, being pink in the Mushroom.

In gathering Mushrooms, be careful to twist them off in the ground at the root, for if any of the stem is left it will decay and fill with maggots, which will destroy the other Mushrooms as they begin to grow.

Beds may be made by raising a wedge-shaped pile of well-trampled and rich manure; leave it till it heats; by inserting sticks into different parts of the pile, and testing their heat when withdrawn, you may learn the temperature of the bed. Cover it with loam, and in that plant spawn; cover all with straw. Keep thoroughly moist, and in a few days the spawn will fill the loam, and the Mushrooms begin to grow, and they will continue to appear for six months or a year. Examine the bed frequently, to gather the fungi, and prevent their over-growth and decay, and the consequent incoming of maggots. If the bed yields more than enough for daily use, make catchup.

So few Mushrooms are grown for our market that we may be said to know nothing of them. Many market gardeners near London have several acres at a time in different stages of growth; and before leaving the subject I will quote the method of cultivation followed by such gardeners, it being very successful:—

"The essential points to be regarded are: proper material, good spawn, moderate temperature, uniformity of humidity according to the state of the beds or crop,—as while the spawn is running, and until it is desirable that the crop shall appear, they can hardly be kept too dry. Afterwards they require a greater amount of moisture, and this, particularly during the winter, in a tepid state. Darkness has by some been deemed essential, but experience has shown that larger, better colored, and more healthy Mushrooms are grown in the light. London market gardeners cart home from London stables long manure; the short material is shaken out of it, and the long, stringy part is kept for covering, as well as for forming the interior of the ridges. The manure is not allowed to heat before it is put into the beds, if it can be prevented, for previously heated material does not produce so fine Mushrooms; the fresher the horse dung is, the longer will the crop last. If this is properly attended to, it does not signify what kind of mould is used for surfacing the beds. The short manure is to be piled in wedge-shaped ridges, or flat, square beds, the shape being a matter of fancy so long as provision is made for the rapid removal of rain water; the middle of the bed, varying in size according to the ultimate size of the bed, is made of the long and coarse strawy manure, which, as we have just said, is covered thickly with the short manure, and this again with loam. When the interior temperature of the beds gets down to 80°, they are spawned with pieces of spawn about two inches square, placed one foot apart; the bed is then covered with earth two inches thick, which is to be well packed with the feet or a spade, then carefully watered. The more compact the bed, the better the Mushrooms; compactness, and green, unheated manure constituting the secret of successful Mushroom growing. Beds made in this way ought to be watered but rarely, if the weather is reasonably moist, and when watered, if possible, use liquid manure.

"Cover the ridges, after making, with straw or mats, and examine frequently; when well made they will bear abundantly for two or three months."

Constant reference has been made to artificial spawn. It may be made in the following manner: gather horse droppings, sheep or deer dung, and lay in a dry place; then chop in a hay cutter straw or fern leaves; — not a large quantity, but enough when mixed with the manure and clay or loam to give the mass consistency; — mix together the manure, stubble, and clay or loam till the mass is about as pasty as grafting clay; spread the mixture evenly over a warm floor, to the depth of three or four inches. When about half dry, cut it into bricks of a convenient size; let the bricks dry a little more, and then make holes an inch deep into their upper ends, into which put pieces of spawn the size of a walnut; now cover the holes with more of the mixed material. The bricks being prepared, pile them in small stacks against each other, and cover with fresh, hot manure, putting on enough to keep the temperature of the mass at 50° to 60° degrees, too much heat or cold being fatal to Mushrooms. In a few days the spawn will have run through the bricks in all directions, making the stack a mass of spawn. Now open the stack, take down the bricks and lay them in a warm and dry place; here they may be kept for years as a supply for forming Mushroom beds.

If you have not spawn to begin with, collect from cattle on dry food 2 parts cow dung, 1 part horse droppings, 1 part sheep, deer, or pigeon dung; dry under cover, and break them till they will pass through a half-inch sieve; mix all together, and lay the mass closely packed and trodden in a conical heap; keep the temperature at about 60°, by coverings of litter, mats, or manure. In about four weeks the spawn will begin to form, and in a short time the heap will be filled with it. This spawn may be kept a long time in a dry place, or may be made into bricks as just described.

I have gone thus fully into the method of producing this esculent, because it is so easily grown, and is capable of so many uses in its simple form or in catchup. Few persons are aware of the profit attendant on its culture, or how completely the grower may convert it into a salable form by making catchup.

Espaliered trees are to be treated as they were last month, the fruit being carefully gathered and disposed of.

You can begin to prune as soon as the leaves fall.

During the month be sure to select and store all the seeds not yet gathered for spring planting.

Whenever a crop is removed, dig the ground over and leave it rough and unraked, that the frosts of winter may mellow it and kill the eggs of insects and the seeds of weeds.

Cut down all decayed stems and branches of the herbs, culinary or medicinal,—all the half-shrubby kinds to the old wood; the herbaceous perennials, like Rue, Sweet Marjorum, etc., to the ground. If the beds are old, spread and dig in carefully a light dressing of manure well rotted; where they are too much covered to admit of this, dig up the alleys and scatter some of the loam over the beds, together with a top dressing of light manure.

Well-rooted plants of all the herbaceous and half-shrubby herbs may be planted early in the month in beds, borders, or rows, care being taken to enrich these beds, etc., well, before planting.

Beds of Horseradish may be made by planting small pieces of the root of old plants.

Peas sowed in the last of October and November will come up in the spring ten days earlier than if sowed in the spring, but not so thickly; as an extra early crop it is worth while to plant some. Pot, the first of October, strawberries for forcing, and if they start well give a shift by the last of the month. Remove figs in tubs to the cellar or shed, and cover at night those which are standards or are on the espalier. They will not need covering with earth before November.

CHAPTER XIX.

ORCHARD.

The fruits which demand attention this month are Apples, Pears, Quinces, and Walnuts. I will first give directions for harvesting the Apples.

The first of the month, overhaul the stock of barrels, and if the number is deficient, purchase more at once; be sure that there are enough heads and hoops. When all is ready, begin to gather the fruit as soon as ripe, and by no means wait till hard frosts set in; the slightest skin of ice upon standing water should stimulate to the greatest exertions. It is very true that the leaves of the trees protect the fruit against frost, but it is not all protected in this way, and if frozen, however slightly, it is likely to decay very rapidly. Apples when ripe readily come off in the hand if gently turned round, and should be left on the tree until they will do so, unless the near approach of winter renders immediate gathering necessary. When the fruit is ready for picking, carry ladders of different lengths into the orchard, so as to prevent any necessity for beating or shaking off the fruit. Clear some place on the ground large enough for a heap which would fill several barrels; cover this space with dry straw or old hay. Fasten a hook of iron or wood to the handle of each basket, that it may be hung on the tree or ladder, so as to leave both hands free. Let your pickers understand that it is a fixed law that every apple, small or large, is to be picked by hand. Every basket as it is filled, must be carefully emptied at the appointed place, by being laid on its side and slowly turned, that no apple may be bruised. It facilitates this labor and insures greater care in handling, to have one person with an extra basket constantly employed in exchanging the full baskets of the pickers for empty ones. When one pile of fruit is large enough, make another. There will probably be a small portion of the fruit which cannot be reached by the hand; this must be shaken down after the hand-gathering is done, piled separately, and used or sold as soon as possible.

When the day's work is drawing to a close, cover the heaps with straw, hay, or hay covers, for the night, and do the same on wet days. Leave the fruit for several days, according to the weather, to cool and dry. When dried enough, have the barrels carried into the field and the Apples put into them by hand, carefully sorted, according to quality. Let one man fill the barrels as full as possible without crowding, and lay on the heads, which another person should fasten in firmly. When this is done, the carts are to be sent out, and the barrels *lifted* into them. Roll them as little as possible; carry them into the fruit room, where they may stand on end or be piled on each other. If they must be left out through the night, or in wet weather, lay them on their sides, and pile them up so as to shed rain, and cover the upper ones with boards.

These directions may seem unnecessarily minute, but the common method of picking all that can be easily reached and shaking off the rest, heaping all together into barrels without any care, except to have a show of good ones at each end, though it may seem easier than that which I have described, will be found in the end not only less thorough, but far less profitable. For when the Apples are gathered and housed, nearly all the expense is over, and is the same whether the work has been well or ill done. The carefully picked, assorted, and packed fruit will keep till late in the spring, at no extra cost, and will then be worth several dollars a barrel more than in the autumn; whilst the Apples carelessly harvested not only will not keep till spring, but will command an inferior price when sold.

In all marketed produce, appearance has a great influence on the sale. Even roots which are clean and neatly loaded and packed, will sell better than roots of the same quality put up in a slovenly manner. It is natural to suppose that extra care in packing would not be given unless the articles were worth it; and a purchaser decides accordingly. So that the small difference in trouble necessary to assort and barrel apples with care, often makes all the difference between a *fancy* price and the ordinary one, in selling them.

The varieties of Apples in our orchard are the following: Baldwin, Rhode-Island Greenings, Roxbury, Hunt, and Golden Russets, Northern Spy, Belle Fleur, Danvers Winter Sweeting, Hubardston Nonsuch, Newton Pippin, Pearmain, Red Gilliflower, Ladies' Sweeting, Spitzenberg, Wine Apple; of these, Baldwin, Greening, the Russets, Northern Spy, Belle Fleur, Newton Pippin, and Ladies' Sweeting keep till very late in the spring.

Tar trees to catch canker worms, as hereafter described; continue to tar till winter.

Pears. — Pears must be gathered about the same time as Apples, and their fitness for harvesting is to be decided in the same way; pick into baskets and carry at once into the fruit room, where they may be laid, either in heaps, to be afterwards distributed according to variety, or on the shelves in the same way once for all. If they are to lie on the shelves till consumed, lay them just so near each other as not to touch. Those laid in heaps may be left for a day to dry and cool, and then packed away for winter.

Divers plans for preserving fruit have been invented, and some very expensive fruit rooms have been made, warranted to keep Pears perfect till spring; but the cheapest and simplest method has proved the best. One objection to all fruit rooms has been that fruit stored in them till spring has been very apt to shrivel, and never become high-colored; but the following method avoids this evil: —

Pack either in champagne baskets or in light, wooden buckets with tight covers; Hingham buckets they are called in and about Boston. If the baskets are used, place the fruit in layers, with one thickness of flannel or cotton batting between the layers, till the basket is full; then place it on a shelf and leave it untouched till the fruit ought to be nearly ripe. If your experience has not taught you when this is to be expected, you must examine occasionally. Pears thus preserved will gain in plumpness, and as they ripen each variety will attain the richest color of which it is capable. If the buckets are used, proceed as with baskets till they are full; then set them aside, uncovered, for a few days, to cool and sweat, after which cover tight and hang up in the fruit room.

These Pears will command the very highest price in the market, and many varieties which almost never attain a high color under other methods, will in this way become really rich.

No fruit is more widely cultivated than the Pear, and the number of varieties is great; only a few, however, pay for cultivation; and what the desirable varieties are, it is hard to learn, so greatly is their flavor influenced by soil and exposure, even within the limits of a town. It may be said with truth, that no two cultivators agree as to the best dozen varieties for a given latitude. In a future month I shall discuss the differences in Pears, and explain the respective advantages of Quince and Pear stocks, and the treatment requisite to produce the best fruit from either stock.

Our Pear orchard is planted with Bartlett, Beurré de Capiument, Beurré Bosc, Beurré diel, Dix, Duchess, Flemish Beauty, Fondante d'Automne, Louise bonné de Jersey, Napoleon, Rostiezer, Sieulle, Seckel, Urbaniste, Beurré D'Aremberg, Easter Beurré, Chaumontel, Glout Morceau, Passe Colmar, Winter Nelis, Beurré de Rantz, St. Germain.

Quinces. — Quinces are not so generally cultivated as they deserve; the bush occupies but little room, and that the least desirable, is hardy, a superior desert fruit, and generally certain to bear a good crop. The Apple or Orange Quince is the only variety worth cultivating. The mature tree ought to yield from 2 to 4 bushels of fruit, which when well harvested is rarely worth less than $1.00 to $2.50 per bushel, thus giving a large profit for the small surface under cultivation. They may be set 8 to 10 feet apart, and will soon cover the ground so as to keep down weeds, and render the labor of cultivating slight. They have a decided enemy in the borer, and must in their early years be closely watched; if during the first few years the borers are hunted out and killed, and the earth around the bushes be covered with coal ashes, they become thrifty and able to defy the borer in future; if the but of the tree is surrounded with common tea or sheet lead for a few inches above and below the surface of the ground, the borer will be effectually excluded.

No fruit is more easily injured in its appearance by careless harvesting than the Quince; every bruise on its skin is followed by discoloration and decay, and consequently by slow sale in market. Pick by hand and lay in the basket; remove thence by hand into barrels, and afterwards treat like Apples.

WALNUTS. — Walnuts and Shagbarks ripen this month and should be gathered as they fall. After a sharp frost at night, the ground will be covered with them, and we must wait for the frost to open the outside shell and let us at the nut; the Black or English Walnut is surrounded by a thick and spongy husk or shell, which is very hard to remove by hand, as it clings closely and stains the skin badly, but it yields readily to frost.

The husk of the Butternut is thin and clings closely to the nut.

All these nuts when gathered should be carried to a warm place, and there spread out to dry; when well dried, the kernel is oily but rich in flavor.

Nut trees of these last two varieties are easily and rapidly grown, and though not so beautiful as the Shagbark, are yet very ornamental, and a few should be cultivated on every even small estate.

The Shagbark is the staple nut of the Eastern United States, and the tree is one of the most ornamental of the deciduous trees, and easily transplanted when young, though it does not bear moving well after it becomes large.

CHAPTER XX.

NURSERY.

In October the nursery demands a large share of attention. Trench now wherever you did not in September, and then plant stocks for budding and grafting. Make layers of Roses, Honeysuckles, and those shrubs which propagate more easily by layers than by seed. As a general rule seeds are the most reliable means for getting larger quantities and varieties of trees, though the process is slow. Many seeds are hard and tough in themselves, or are enclosed in some kind of tough shell or stone. Such seeds should always be planted in the fall, and left through the winter and spring to the action of frost, which by its expansive power breaks or disjoints their hard covering, and lets the tender germ and radicle start on their upward and downward journey.

Time and again cultivators have been utterly discouraged in their attempts to grow varieties of plants, because the seed seemed invariably to fail. Much of this failure is owing to the seed having been planted at the wrong season; the seed of Roses, Hawthorn, and Buckthorn, for hedge plants, if sown in the fall will start in the spring, and make strong growth during the summer; but if planted in the spring they often do not appear till the next year, and the nursery man, finding no growth from his seed during the first summer, concludes that it was worthless, and probably digs the land over and plants other seeds of the same kind; when, had he planted the fall before, or waited till the next year, he would have succeeded with his first lot of seeds.

The stones of Plums and Peaches, and other hard seeds, must either be planted in the fall, or be cracked and planted in the spring; cracking the stone is rather dangerous, as it is very apt to injure the germ of the kernel. Walnuts, Shagbarks, Filberts, and most other nuts are subject to the same laws of planting and germination.

Acorns, Chestnuts, and Horsechestnuts grow whether planted in spring or fall, their shells being so soft as to offer but little opposition to the swelling kernel; but they do better when planted in fall, for all seeds are more ready to germinate when first ripe than after being kept for some time and getting somewhat dry. You may see in your autumnal walks in the woods Acorns sprouting under all the Oak trees, even when merely lying on the surface of the ground. This natural process teaches us what to do if we would be perfectly successful with such nuts. Keep them in a box till spring, covered with moist sand, and soak them twenty-four hours in tepid water before planting.

Directions for forming nurseries, seed-beds, etc., will be given hereafter.

Autumn has as great advantages over spring for *layering* hard-wooded plants and shrubs as for planting nuts; the tongue and cut of the layer heal and granulate somewhat during the winter, and the whole skin and wood seem to prepare for a ready growth in spring. Canker worms will begin to run after the first hard frost, *and the trees must* be tarred to protect them.

CHAPTER XXI.

THE FARM.

OCTOBER is a very busy month on the farm. Continue to make and clean out drains, and prepare for thorough irrigation. At every leisure moment draw muck and litter to the yard for manure.

During the latter half of the month dig the Roots, beginning with Potatoes, then Beets, then Carrots, last Ruta-Bagas and Turnips; the latter may even be left till November.

There is a machine for cutting off the leaves of Carrots and Ruta-Bagas as they stand in the ground. Directions were given last month for Potatoes and are good now.

When ready to harvest other Roots, begin as soon as the dew is off, in a bright day, pull them out and lay them on the surface to dry. A tool much like a spade cleft into four fingers is very convenient for raising roots, as it does not break them like a spade, and its blades are not pointed like those of a dungfork.

Beets should be drawn without first cutting the leaves; lay them on the ground long enough to dry off surface moisture, then gather into heaps; twist off the tops, and cut off the tails and small roots with a sharp tool. Some English writers recommend that this last process be done as the roots are drawn. Our farmers find that the leaves are readily eaten by cows for green fodder, and when judiciously fed out conduce to a full milkpail. To top and tail properly, hold the Beet or Ruta-Baga in the left hand, and in the right a tool made from an old sickle or grass cutter ground sharp; one blow will remove the top, another the tail of the root, which is then thrown into the heap or the cart. When the weather promises to be fine and dry, it is well to leave them in heaps for a few days before storing, as they sweat a little, and will keep the better for the drying.

In harvesting Mangel Wurzel, also, *twist* off the leaves.

When the Roots are all thrown into the cart, drive the full load into the root cellar, where they may be piled in their proper bins. While emptying or filling the cart, do not throw the Roots about more than is absolutely necessary, for although rough and harsh to look at or handle, they decay faster for every bruise.

The cellar should be well ventilated and drained. The perfect preservation of Roots depends mainly on these two requirements. Darkness is not so essential as is sometimes asserted. Light does not necessarily stimulate growth, nor darkness prevent it; it depends much more on warmth and moisture.

Until the nights become very cold leave the windows open, as the exhaling warmth of the Roots will keep the temperature high in the cellar long after it freezes outside.

Root cellars are very important in our latitude, and in making them their location should be carefully considered in relation to the barn. We grow Roots to feed to stock through the winter, and the greater the daily distance over which this bulky material is carried in feeding, the greater our labor, the less our profit. All new barns should be built with a reference to the storage and transport of Root crops. A good plan is to have the stalls for cows and other neat cattle in the cellar, if removed from the manure, as it is easier to feed with Hay from above, and with Roots from the same level with the cattle; but it is then more difficult to dispose of the manure. By carefully considering all these wants before erecting a barn, we can provide for them all in the most convenient and satisfactory way. Refer to the ground plan of our barn and see how this is done.

BARN. — The general (see March) plan shows that it stands on a side-hill. The slope of hill from end to end is 12 feet in 100, so that much of the cellar is above ground. It is divided into two stories, and one story of wood rises over it. The lower, the manure cellar, in which are kept the hens and pigs, is 6½ feet high. The next story is for ¾ of its length 7½ feet high; the remaining 20 feet being 6½ feet in height, is at the extreme west end, and is devoted to Roots, of which it can hold at least six thousand bushels, its area being 50 × 20 feet. Directly in front of the root cellar is a carriage-way 10 feet wide, extending from one side of the barn to the other. Loaded teams may thus enter at one side and leave at the other. Two large sliding doors 10 feet wide give entrance to the root cellar, so that a cart full of Roots having entered by the road-way may be backed into the root cellar and there unloaded.

Through the wall in the middle of the root cellar is an aperture which may be kept tightly closed by a flap-door, through which is laid a railroad that is traversed by a small car. This car being taken into the cellar and there loaded with Roots, whole or cut, may then be drawn out along the railroad, which extends down the centre of the barn, and its load distributed on either side as wanted, or carried to the boiler. When the car comes out or goes in, the flap-door is let fall and the aperture is closed. The car may be stopped in front of the mash-tub, and there have meal mixed with the Roots, or take in cut feed, and then run out, and its contents be distributed.

Such an arrangement tends greatly to the economy of labor, and also saves material and wear and tear.

In the south-east corner of the root cellar is a wooden box through which the manure of the carriage horses in the stable above may be discharged into the lowest cellar. Under the front edge of the root cellar are spouts for emptying swill, etc., to the pigs. A boiler is set in the corner of the meal storeroom for cooking food, and the car can be run directly to it.

In speaking of topping Roots, I said that the tops should be fed out to milch cows; this does not apply to all Roots; for instance, Ruta-Bagas, leaves of which some cows will not eat, and which if eaten in large quantities generally loosen the bowels overmuch; if but a small quantity is fed at a time, there is no danger, and an increase of milk. Again, cattle will often utterly refuse to eat the tops of Carrots and Parsnips, while sheep eat them readily. Under all circumstances, however, it is better to carry the loads, tops and all, directly to the barn, and top as you unload. Such leaves as the stock will not consume, may then be thrown through the muck-traps in the floor, shown in the plan, into the manure cellar, where the pigs will eat some and make manure of the rest.

I have said nothing of Potato tops, which are usually dry before the Potatoes are dug; in this condition they are called "haulm," and may be collected into heaps to rot, or carted to the manure cellar as bedding for pigs, or burned, and their ashes spread on the spot.

The Corn crop is to be harvested now. If not cut during September, send your men into the field early in the present month, with tools made from old scythes, or reaping-hooks, to cut it all about 6 inches above the ground, leaving one hill in six uncut. As cut, lay each hill on the ground by itself during the heat of the day. Early in the afternoon begin and gather five hills; stand them on their butts about the uncut sixth hill, which will steady the whole; this being done, draw all the tops down a little, and tie firmly together with a straw rope. You will thus stack the whole firmly, and may leave it for weeks without injury from weather. The outer leaves will wither down, and as they dry will offer a perfect water-shed to the rain; whilst the bulk of the stack is not so great as to prevent the ready access of sun and air in fair weather.

Corn thus stacked will ripen thoroughly, dry hard and glossy, and the stover will cure into a sweet and good fodder, which will be eaten almost to the last but by cows during winter, particularly if first cut in a stubble cutter. All corn-fodder should be cut up before feeding, to insure the thorough decay of those portions which the cattle may reject, and which are consequently thrown into the manure heap. Were it fed out in its long state, the cattle would pick off the leaves and reject the buts, which must then be thrown into the manure heap, where they will remain undecomposed for a year, their glossy, flinty exterior defending them from fermentation and the action of the various acids and gasses generated in the manure.

Many farmers practise a different treatment of the Corn crop; and I will deviate from the rule laid down at the beginning of this book, to make a short inquiry into the relative merits of the two methods.

It is the practice of most New-England farmers to go into the field as soon as the Corn is glazed, and top it; *i.e.*, cut off the tops just above the highest ear. These tops are stacked in bundles to dry, and then stored in the barn for fodder; and it is urged that thus good fodder is made of the tops which cattle will eat, while the buts which cattle will not eat are left. It is true that tops saved in this way do make excellent fodder if not too long dried, but it is at the expense of the Corn. The Corn is not fully ripe when thus topped, and depends on the nourishment supplied by the leaves, for its full perfection. Cut off these leaves and the grain is cut off from some portion of its food. The experiment has been thoroughly tried, and it has been proved that Corn topped weighs 3 to 5 lbs. per bushel less than the same kind of Corn in the same field, saved in the manner I have directed. Again, by cutting the tops you make the buts utterly worthless, whilst under the stacking method, the buts cure with the tops, and will be eaten when cut and fed out; and when cut in the method first given, before it is glazed and ripe, through fear of early frost, more Corn will fill out and ripen in the stook uninjured by frost, which would quite destroy it if treated by topping. There is a simple reason for this difference. The leaves of plants are their lungs. Sap is supplied by the roots in direct proportion to the demands of the leaves; but when it first ascends the stem, it is crude and innutritious, as far from perfection as is unfermented cider or unleavened bread. It ascends through the fibres of the stem and spreads itself to the sunlight in the sap vessels of the leaves, where it becomes refined and perfected; it then returns to the tissues, the fruit, or whatever part needs it; unfit before to perfect the Corn, it is now fit and is appropriated by the peculiar sap-vessels of the ear. Beside this function of the leaves, they act — *how*, has not yet been definitely ascertained — like the exhausting or suction valves in a pump; they draw on the roots for moisture, and the roots furnish it, and just in proportion to the demand. Therefore, whenever the leaves are removed the demand ceases. Suppose, for instance, instead of "topping," all the leaves above the ears were picked off; no appreciable demand for sap would be felt above this point, consequently none would be supplied. If all the ears were ripe, this would not matter, the plant being cultivated for the grain; but when the Corn is unripe it must surely suffer for the lack of those supplies of sap that are needed to perfect it. What is true of gathering the leaves, is equally true of topping, which is merely the same thing more thoroughly done; by either process any farther growth of the Corn above the lower leaves is stopped.

It is then plain that the farmer who cuts off the top of his Corn before the grain is fully ripe, cuts off the food necessary to insure perfection in that grain, and loses in corn what he gains in fodder.

Return now to the plan I advise. Suppose the Corn to be cut at the root at the time when it would be topped under the other process, although that would be too early. It is evident that the broad leaves will draw up into themselves all the crude sap still lingering in the stem, of which we know there is a large quantity in the thick and succulent Corn stalks. This crude sap will pass through the leaves as it did before cutting, will be elaborated and returned to the ears, and so down through the stem, adding just so much to the value and perfectness of the grain.

I have treated this matter at length because it is of great importance to a people who depend largely on Indian Corn.

Cutting at the but seems to those who have not tried it, more troublesome and expensive than "topping," because it necessitates, first, cutting and binding; then, re-opening and plucking the ears; then, re-gathering and mowing away the stalks; but if the work is done judiciously, it is not as expensive as the ordinary method, in pursuing which we must first, cut, bind, stook, and cure the tops, then gather and store them; second, gather the ears into the wagons as they are driven through the field; then cut, stook, and store the buts, or throw them to the pigs, or burn them in the field. Three processes.

In my method you cut, stook, and thoroughly cure both corn and fodder; when once well stooked it may be left until it is convenient to remove it, without injury to either corn or fodder; the less time the fodder is exposed after getting dry, the better for it. The centre hill which was left uncut may either be cut at first, and all the bundles well braced against each other as in stooking wheat, etc., or when the stooks are opened to gather the ears this hill may be cut, and, if not thoroughly dry, be laid in the sun a short time. When we are ready to put the Corn into the crib, we send two wagons into the field, open the stooks, pick off the ears and throw them into one wagon, fork the bundles of fodder into the other, and drive each to its appropriate place. We thus have but two operations instead of three, and have all the fodder together where it may be fed out or made into manure. The centre hill is well opened and laid in the sun when the carts are first driven round the field, and by the time the loose bundles are all collected, will be dry enough to be gathered in their turn.

Continue at intervals of leisure to open and drain ditches and collect materials for manure. If any of the much-travelled and level roads need gravel, dress them this month, as the long interval of open weather before winter will allow the gravel to become well trodden, and will insure a firmer and better road than if the gravel is spread in the spring. But do not put gravel on roads of steep grade, as the frost and rain of winter and spring will wash them badly.

The principal marketing of this month will be Roots, Cabbages, and Apples. Where the accommodation for the crops is ample, and they are well gathered, it is better not to sell them before spring; the chief part of the expense and labor of the crop is over with the harvest, and the increase of price before spring is generally large. In the autumn many farmers of small capital or inferior accommodations are compelled to sell, and thus the market price of green crops is much lower than in the spring, when the supply is small and the demand active.

Cows. — Towards the last of this month the winter milch cows will be near calving, and they should have rather more generous food than the other cows. Every effort should be made to have a large stock of new milch cows in the winter, as then the price of milk is largest, and the manure most easily and entirely saved.

The value of manure depends very much upon the food of the stock, as manure is only the unassimilated food of the animals that produce it. Analyses of the various kinds of food have shown that some are more valuable for manure than others, and that this difference of value is in proportion to the elaborateness of the organization of the different parts of the plant. Thus the seeds are better than the fruit, the fruit than the straw, the leaves and straw than the wood. Rape cake and oil cake, or the pressed seeds of Rape and Flax, when eaten, produce much more powerful manure than the tops of Turnips or roots of Rape or the straw of Flax. Indeed, the latter is often found to be poisonous to vegetation. Many other examples might be offered in illustration of this fact. The reason is to be found in the greater amount of concentrated mineral and other elements, potash, soda, lime, ammonia, etc., which exists in the seed than in the haulm and roots, these elements being the most valuable constituents of manure.

It is a well-attested fact, that the manure of animals fed on grain and seeds is much richer than that of those fed on Grass, Hay, and Roots; so that when the animals come into the barn for the long winter months, we have within our own hands the means, — which we could not have while they were at pasture, — of increasing the value of their manure.

But this is not the only consideration. The Grass on which they have been feeding during the summer is always the best and certainly the cheapest food for increasing the milk of cows and the flesh of fattening animals; of this they are now deprived, and we must find something to supply its place. Hay alone will produce neither of the good effects of the fresh Grass; Rowen is better for milk but not for flesh; but Roots and Grain of different kinds, mixed with Hay and Rowen increase both milk and flesh.

We come back then to the subject of milch cows and their food. In summer it costs but little to keep them, but the value of milk, unless we make butter and cheese, is low, and the manure is badly saved. In winter, on the other hand, the cost of keeping is large, but the price of milk rises in proportion, and the manure is all saved, and can be produced of better quality. If, then, we procure new milch cows at this season, feed them well, and save all the manure, we shall get the largest possible profit from the operation.

Breeds of cattle best adapted to our latitude, and varieties and uses of manure, will be discussed in the winter months.

In September we selected the hogs which were to be killed in the winter. Improve the quality of their food as time goes on, and keep them warm.

As the nights grow cold, the horses should be blanketed and should be protected from draughts of air. Fowls which are to be killed at Thanksgiving, must be separated from the rest and cooped up for fattening. As the days grow shorter and the nights longer and colder, it will be more difficult for fowls to find food for themselves, and those which are to be killed must be carefully attended to. The great point in fattening creatures of all kinds is to keep them always improving, and if they once receive a check it takes a long time and much extra care to start them again. Laying and stock fowls will need but little attention yet.

CHAPTER XXII.

ORNAMENTAL GROUNDS.

DIRECTIONS were given in September for preparing holes for trees and shrubs, and getting the latter ready for transplanting.

Transplanting should not be begun till the leaves have either fallen or changed color preparatory to falling, for at that time, as has been shown, evaporation is at a minimum, and the tree has the best chance for a good future growth with the least amount of pruning.

There is a theory that pruning may be dispensed with, and trees do sometimes live which have been transplanted without pruning, but they are starved and sickly for years. It is useless to expect half the original amount of roots, mutilated, and in a strange soil, to supply sap to the same amount of top as before removal; as well might one expect a full-grown man to live and thrive on a child's allowance of food.

There can be no doubt that the best time for transplanting all trees and shrubs which can bear our severe winter after a fresh removal, is the fall, for at that time both the trees and the earth are in the best possible condition for a successful operation. When a tree is moved, the mutilated roots need both moisture and warmth; the tree taken in the autumn from warm earth is set again into warm earth, and if this is done early in the season there will be time enough before winter for numerous new rootlets to creep out, which will give the plant a new hold on the earth and enable it to resist the winter winds. The rains of autumn will pack and settle the dirt between and about all the fibres, and the tree will become firm and steady. Well planted in this manner, it will be found by the earliest spring warmth that starts the sap ready to begin its circulation and growth quite as early, to say the least, as we could possibly think of transplanting in the spring. There is, besides, an accumulation of sap, made by those roots which are below frost, which is, as it were, so much capital prepared for the spring demand. This sap is what is drawn off from the sugar maple in large quantities. Trees and shrubs planted in the autumn generally get a start of half a season over those planted in spring, and keep their advantage perceptibly for half a dozen years.

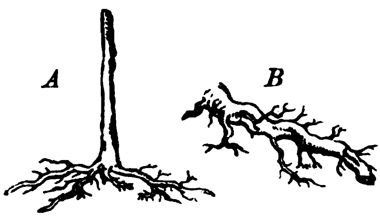
Another advantage of autumn planting lies in the longer supply of water before the summer droughts, which renders the tree much less likely to be injured by them than if planted in the spring.

Strongly as I recommend autumn planting, however, I should advise its total neglect rather than a poor execution of it.

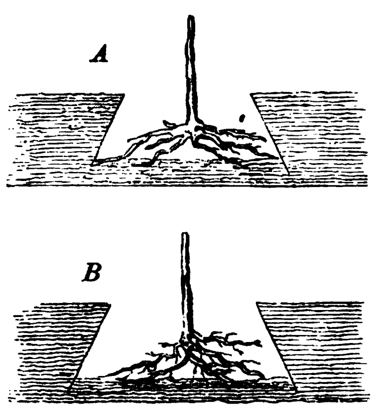
There is great ignorance on this subject of tree planting among those who ought to be best informed, and none the less that every man thinks himself beyond any need of instruction with regard to it, and this unconscious ignorance is the means of much waste of money and temper.

Patience, great patience, is the first requisite for a successful planter. In fact, the first and the most important acquisition to be made before undertaking the management of a country place is patience — a large stock of patience. Demosthenes described action as the first, the second, and the third requisite to successful oratory, so may I say of patience to him who would succeed in the culture of fruit, vegetables, or rural beauty. No natural process can be much hurried; and when once a tree is well planted, a green-house erected, a grapery stocked, a flower-garden laid out, there is need of long and patient waiting, endurance of "hope deferred," before the wished-for result is attained.

Starting then with plenty of patience, dig a hole as directed in September, not less than 4 feet in diameter and 2 feet deep. We want this depth both to secure for the roots free access to the subsoil where moisture is most abundant, and to enable us to fill in at the bottom good food for the tree during the next few years. If the holes were dug in September, or if the ground where these are to be made has been well trenched and enriched, you need only open out space enough for the proper accommodation of the roots. Examine the top of the tree or shrub to be planted, and prune it if it needs pruning; then look to the roots, and if any are broken, cut



them off smoothly with a sharp knife drawn from beneath upwards, so that the cut surface may point downwards, and be left like a newly-made cutting, all ready to grow. Now set the tree into the hole so that the part of the stem from which the roots start may be on a level with the surrounding surface, — just on a level, — if the hole was made in September so that the earth at the bottom has had time to settle; a little deeper when the hole is newly made. It is well enough to have the stem in the centre of the hole, though this is important only when you are planting a row of trees on a line which passes through the centre of all the holes. In general ornamental planting avoid rows. Let your assistant steady the tree in the hole while you retire a short distance and look at the effect of its top; recall to your mind its character when full grown, whether erect or pendant, and see how your tree should stand to give its branches the best chance to develop its characteristic beauty and become a fine specimen of its kind; and let your assistant turn and move it till it stands to your mind. While he still holds it, get into the hole and carefully draw out all the principal roots into the same relative positions they held before transplanting; in the same way comb out the smaller and fibrous roots. And now you will probably find that the point whence the roots diverge is higher above the bottom of the hole than their ends, as in cut A. In this case, either take the tree out and shovel in earth enough to make a little mound in the centre of the hole on which the centre



of the tree may rest, or carefully work earth in by hand without removing the tree, till it stands evenly, all parts having an equal bearing. Now let your assistant shovel in earth upon the roots slowly, giving you time enough to raise the different roots to their proper level; for although all the roots, if long enough, may be brought down to the bottom of the hole, the position is not natural, and if compelled will injure the after-growth of the tree. Cut B shows my meaning. Dig the hole widest at the bottom. Fill the earth in thus gradually till the hole is about half full, or until the *upper* roots are *partially* covered; this, and not the semi-filling the hole being the important point. If the work has thus far been properly done, the tree will stand erect and firm without support from the hand.

I do not advise that tedious process of separating and laying out all the fibres of the roots which is so insisted on by most teachers, but merely direct that main roots and rootlets should be laid and combed out in the same relative positions they held before the tree was lifted. Attend to this and to their being carefully covered and surrounded with earth, and you have secured the important requisites; more minute and fussy attention will indeed make the success of the operation more certain, but not in proportion to the trouble taken, while they are pretty sure to exhaust the stock of that invaluable quality, patience, possessed by most men; and when that fails, carelessness begins, bad habits are formed, and it is probable that the important steps as well as the minutiæ of transplanting will then be slighted.

Leaving the tree in the condition just described, plant others in the same way until you have many in this half-finished state. When the day is so far advanced that there will be just time to finish the work, pour one or two pails of water — varying the quantity according to the size of the hole — slowly upon and around the roots of each tree; no matter if it is raining at the time; this water has nothing to do with supplying moisture to the tree; its use is to separate the little rootlets from each other, which it does better than a hundred fingers, and with no draught on your stock of patience, and to draw down and pack close the finer particles of earth about each fibre. When the water has drained away, throw back into the hole the earth remaining at the side;

when it is all returned you may gently tread it down. Observe that hitherto neither the foot nor any instrument has been used to consolidate the earth, for the effect of treading or any other pressure would have been to injure the rootlets; but now there is so much earth between the foot and the roots, that they cannot be injured by pressure, while they will get all its benefits.

If these trees do not thrive it will be because of some unavoidable accident. They will not even be hurt by the winter winds, though some of the taller ones with large tops may need the support of a stake, which should be driven in within an inch or two of the stem, before any earth is thrown on the roots. If it is driven after they are covered, there is danger that it will bruise the larger and tear the smaller roots.

These directions will not be repeated. They are to be followed in all cases and for all trees and shrubs, unless some physical obstacle prevents, which must be met when it occurs, and cannot be foreseen.

The autumn planting so strongly recommended is not for all trees indiscriminately. Evergreens, as I said in September, should never be planted in the fall, unless from necessity; no stone-fruited trees; none that are but partially hardy; no natives of any latitude where vegetation commences earlier and lasts longer than in ours (although there are some exceptions to the rule), should be planted in the fall. But it is the time to plant almost all our deciduous trees; I have found the Hickory, Red Maple, Birch, Beech, Magnolia, Larch, Three-thorned Acacia, English Elms and Oaks are apt to die when planted in the fall, as are the European Larch, Ash, Laburnum, Beech, and Chestnut.

It may seem to one not familiar with our ornamental trees, that these exceptions cut off nearly the whole number; but a glance at the list of trees offered at any first-class nursery, will show that the varieties mentioned above as exceptions are but a small part of the list; and many of those I except will not die entirely if well planted in the fall; they are sure to spring anew from the root, but the top is apt to be winter-killed.

And once for all, it is better to plant any of the excepted list in October, with the care just insisted on, than in spring in the common, careless method. I repeat that the later in the fall the tree is planted, the greater the danger of its being injured or killed.

Many things are to be considered in making plantations, whether large or small, the neglect of which materially detracts from the beauty of the plantation. In another month will be found some lists of the trees and shrubs most desirable for this purpose.

OCTOBER'S HARVESTS.

When we think of the glowing woods and purple lights and mists of October, it seems impossible that the analysis and description of this month's work can be contained in meagre words and uninteresting narrative. No month is so full of rich and varied attractions, and none offers gratification and satisfaction to the diverse tastes of so many admirers.

Theoretically, October should be a sad month, for then the harvests are mostly gathered in, the fields are bare of the summer's verdure, the woods in the first stages of leafy decay, the birds gone or going to more genial climates, the garden rusty and full of seedy or frost-stricken flowers; every thing telling of the departure of genial summer and the approach of chill winter.

How opposite to this is the truth! Now the farmer's heart overflows with the consciousness of his wealth. The rent roll of the largest land-owner, the stocks and bonds of the richest broker, the ships and warehouses of the most princely merchant, can never give their owners such an overflowing and contented feeling of well-rewarded labor, as the crowded barns and granaries, and well-stocked linters and folds give the farmer. He has labored hard through the summer's heat, has cast many and anxious glances at the clouds and winds, has listened with strained ear for the creaking of ponderous wagons loaded with hay, as his experienced eye read the threats in the gathering clouds. But now under his own roof are gathered the accumulated and condensed rays of the sun and breaths of summer zephyrs; the earth's fatness and its increase have contributed to make him rich. As he stands on his barn floor with the last rays of the sun just gilding the contented faces of the cattle enjoying their evening meal or chewing their cud, and hears the rhythmical beating of the milk on the empty pails, or its muffled sound as the rapid stream is lost in foam, harmonizing with the quiet cooings of pigeons or the occasional drowsy remonstrance of some hen or chick crowded on the well-filled roost, his heart cannot fail to overflow with gratitude and thanksgiving for God's goodness and nature's bounties. The undeniable signs of wealth on all sides give him more positive satisfaction than any less *tangible* property can awaken in its owner. The miser to enjoy his hoard must lock his door and chink the gold pieces together, else half his pleasure is wanting. Bare ownership never rewards men; the reward is in seeing the possession, and showing it to others. The well-filled crib, the high-piled hay-stack or bay, the low of sleek cattle, the peaceful bleat of sheep, all reiterate in tones unmistakable to us and to our neighbors, our prosperity and thrift, and bear constant witness to our summer's work.

Go to a farmer at such a time if you wish him to contribute to any worthy cause, and you will scarcely be refused.

And it is not the farmer only that October cheers and delights. To the eyes of all who love nature, it offers, not decay and death, but a rich display of her choicest beauties. Every tree is now decked in its most glowing attire; it seems as though all the sun's warmth and the earth's rich fatness had been collected and absorbed, only to be returned infinitely increased and improved. The air feels its duties enlarged, and is changed into blue and purple mists, that envelop all the hills and fill the valleys. Nothing is as it was. The hedgerows that all summer long have been the home of the cat bird and the thrush, and whose floral beauties have hidden their heads in the thick verdure and shadow from the too ardent caresses of the sun, are now radiant with the yellow Golden-rod and the purple Aster; in the brown meadows these flowers are almost put to shame by the rare blue of the Gentian. Rising from the meadows through these flower-mists of Asters and Golden-rods, gaining intensity of color as it reaches the Birches, Maples, Chestnuts, and Oaks, blended together and yet made more brilliant by the purple atmosphere, the spirit of Beauty in color grows more and more wonderful and magnificent, till the splendors of the earth rival those of the sunset. It seems as if a consciousness of the long sleep of winter now near at hand had roused the material world to show its gratitude to its Lord and Master for his constant care and kindness — for the gentle rains and winds of spring — for the hot and stimulating suns of summer — for the bounteous harvests of autumn — into one resounding hallelujah, in whose song the voice of the smallest flower is not lost, though blended with the mighty tones of forest and mountain.

His heart must be dead who can walk the woods and fields now, careless or unconscious of the beauty around him.

The harvest of the farmer is nearly over, and although

> "——— like coals of fire the apples
> Glow among the withered leaves,"

he has little more to look for. But now is the very high noon of the harvest of beauty, which beginning for the true lover of nature in the Violet and May-flower of the spring, has been constantly swelling by brook and river, in the deep valley and up the hill-sides, all summer long, till now its fully ripened field is spread out over every foot of the earth's surface, and only waits the sickle of the reapers, who may cut and store away in their memories seed-grain which shall feed their minds in all the years to come, and growing and swelling in them, shall make them fit to participate in all the bounties that God so lavishly pours upon his children through Nature.

CHAPTER XXIII.

GREENHOUSE.

NOVEMBER. The work of the Greenhouse in November is a continuation of that for October. All plants should by this time have been housed, for the most hardy cannot withstand the frosts which may come any night. It will not be necessary to start fires at present, unless we have a long cold rain-storm, or a cold "snap."

This month and the next are the true winter for nearly all the plants in the houses.

Such plants as have been carried in to blossom (Chrysanthemums, etc.) are of course in their glory, and must have abundance of air, sun, and water; all other plants are to be watered very sparingly, and aired often enough to keep them hardy and vigorous; there will be a constant tendency to decay and mildew, which can be prevented by fresh air and the immediate removal of any dead or dying leaves, twigs, etc. Water only when there is a promise of bright weather, evaporation being slow in the present half dormant condition of the plants, and large supplies of water being likely to drown the roots.

Be very careful that no cold finds you unprepared. In November there are often ten days or a fortnight of perfect weather, the true Indian Summer; but the nights are often very much colder than would be expected from the warmth of the days.

If there are any bulbs now going out of flower, as Tuberoses or exotic bulbs, which are not to be stimulated during the winter, cover them with dry sand or moss, and lay them away in a warm, dry place, till spring.

Shut up the sashes early in the afternoon; put up the shutters and let down the cover for the glass by the time the sun is fairly off the house. In this way you may keep a deal of warmth through the night.

The gardener's judgment about keeping up his supply of flowers is severely tested in November and December. No good collection need ever be destitute of flowers; but our chief reliance must be on the common sorts, and principally on those that were taken from the flower-garden; Roses, Heliotropes, Chrysanthemums, Verbenas, and the early-laid Pinks. It is difficult to get much variety beyond this. Cinerarias, Callas, Violets, Cyclamens, Pelargoniums, Nemophilas, should be shifted, as they fill the pot with roots; water the Azaleas sparingly, and give Oranges and Lemons but little water till they grow. Camelias need abundant water, and occasional showering or washing of leaves, to remove dust. As the Carnations thrust up flower stems, tie them to sticks; set Pelargoniums near the glass, and bring Tenweek Stocks into the house near the glass; keep Spring Roses in cold frames.

As in almost every house many plants are kept for the purpose of bedding out in the spring, and others for forcing in early summer, one or more good pits should be made to contain them.

I will describe several kinds of cold or conservative pits, in which plants may be kept either dormant or active. They should be made about November, to be ready for plants when first removed from the garden.

The chief obstacles to wintering plants in pits, is their liability to be harmed by vermin, and the difficulty of regulating light and heat.

A Cheap Pit. — Select a piece of ground sheltered from the prevailing winter winds, and rather level, but with natural drainage enough to prevent water standing within 3 feet of the surface. Mark out a parellelogram of the proportions 2 × 3, the length running east and west if possible, the width never exceeding 6 feet; 4 is better for convenience in managing. Dig this parallelogram 3 feet deep, and throw the earth out; into the bottom of this cellar, and within three inches of each corner, drive into the earth a 3 × 4 joist; those on the back, 5½ feet long, on the front,

$4\frac{1}{2}$; this will leave them 18 and 6 inches respectively above the surface of the ground. To these posts, on the inside all round, nail inch boards from the bottom of the pit to the surface of the ground; this leaves a space 6 inches wide between the boards and the sides of the cellar; fill this space with oak tan or manure, well trodden or rammed. Now nail inch boards to both sides of the joists above ground, and fill the space between with well rammed tan. You have now a pit the top of which slopes to the south or east. Nail across the top grooved strips of wood, at such distances as to receive the edges of sashes and shutters.

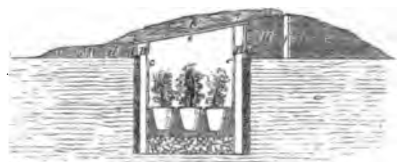
The construction of the pit within will differ, according as the plants are to be kept over in pots or not.

If in pots, cover the bottom of the pit 6 inches deep with stones (having first underdrained, if the natural drainage is bad); over them put 1 foot of oak tan, or coal ashes, into which plunge the pots up to the brim; this may be done any time before the first frosts.

The objects to be sought are dryness, ventilation, and warmth; the first to be secured by drainage, natural or artificial; the second as follows: cover the frames, as you would a hotbed, with sashes, to slide in the grooves before mentioned; in the early morning and late afternoon keep the sashes closed, but open them partly in the middle of the day until settled cold weather comes. At night cover the sashes with mats held in their places by boards; you will thus keep a moderate, uniform temperature in the pit. Just before winter, drive down a post 2 feet from each corner of the pit, and on a line 2 feet from the ends; set those on the back up a little higher, and those on the front a little lower, than the parts of the pit-roof nearest them; board up the outside of these posts, and fill in between these boards and the pit with well trodden leaves. Bank outside of all with leaves or long manure, as high as the shutters and mats.

The cut shows a section of the pit. *a*, interior of pit; B, corner posts; *c*, inside boarding; *d*, outside boarding above ground; *e*, sashes, etc.; *f*, second set of posts; *g*, boards on outside of these; H, tan or leaf filling; *i*, outside bank.

When winter is about to set in, lay the shutters over the glass, over them straw matting, over the matting leaves or straw 6 inches deep, sloping all to the lower side; cover the whole with loose boards to shed rain. Make openings from the outer air into the pit by thrusting a handful of straw at intervals of about 3 feet through the covering into the pit; they will act as ventilators, the air passing up and down the straw. Whenever, during the winter, the outside temperature rises above freezing, and promises to stay so even for a few hours, uncover the whole top and open the sashes, so as to change the air. Before closing the pit in the fall, strew over the surface of the earth plenty of poisoned meal or bread, to destroy any vermin that may burrow in. When the pit is opened during the winter, examine it, and remove any decaying plants or dead vermin, and water very slightly with tepid water, but not unless the earth in the pots is very dry.



As spring approaches, the coverings may be gradually removed, till the weather allows the plants to be treated as if they were in an ordinary hotbed.

The success of the pit depends mainly on good drainage, gradual hardening of the plants during the fall, and as frequent admission of air and light through the winter and spring as possible.

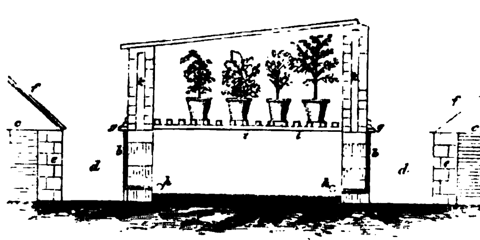
If the plants are put directly into the earth instead of pots, the pit must be managed differently.

First fill in 6 inches of loose stones, then 1 foot of oak tan, or compact short manure; over this 1 foot of rich loam. As early as the middle of September plant in this loam Geraniums, Heliotropes, Verbenas, etc. Treat like a hotbed; give air and water often enough to properly ventilate and stimulate the plants. When they seem to be well rooted, and begin to make a new growth, give all the air possible. Keep the sashes off whenever the nights are not too cold, and gradually reduce the water to a minimum; be careful that they are not touched by frost, and if necessary cover at night with mats or shutters; the aim being to harden the plants slowly, and by checking their growth to throw them into a dormant state.

From this point treat as if they were in pots.

An excellent conservative pit may be made in which to winter all kinds of plants, if we have the control of a small amount of heat. Such a pit should be a permanent structure, and will therefore be rather more expensive than the one just described. I do not mean what is often called a conservative pit, in which flowers can be produced during the winter, but one where plants can be ventilated and kept in a more healthy condition than in a close pit. The objection to the pit before described, is that it is unsightly and clumsy, and destitute of abundant ventilation; the one now to be described can be in any portion of the ground without offending the eye or the nose. There are few or none like it in this country, but it is common in England, and recommended by the best English authorities.

It is 6 feet wide, 3½ feet high behind, 2½ feet high in front, with hollow brick walls, the air chamber thus left being a better non-conductor than 9 inches of solid brick, beside affording a means for ventilating and heating. Length such as you please. The pit may be either wholly or partly above ground. Its site is a matter of some importance, to secure ready drainage and convenience in warming. It would be well to have it near the greenhouse, the dwelling-house, or the barn cellar. The cut shows how it could receive warmth from dung, and more, if necessary, from hot-water pipes. If the plants to be preserved need 2½ feet in the clear, dig 2 feet additional of cellar. Cover the bottom with coal ashes to absorb any water that may fall through. Carry up the walls, *b b*, on the pigeon-hole system; *i.e.*, lay them so as to leave an open space every other brick, the size



of the end of a brick. When you reach the surface of the ground, *c*, begin to carry up either a solid brick wall 9 inches thick, or a double wall; in the latter case, let the air chamber connect with the pigeon-holes below, so that the air warmed by the lining or the fire, may ascend into the air chamber. Carry through the walls near the floor, and thence by an elbow to the surface, pipes, *g*, 3 inches in diameter, and 6 feet apart, with a movable cover, to admit outside air to the bottom of the pit, the chill being taken off in its passage through the lining in the chamber *d*, and the warming being completed by contact with the hot pipes. Build the outer wall, *e*, of solid brick, 2 feet from the inside wall; cover *d* with a lid shutting down tight. The heating pipes are shown at *h*. Build a floor, *i*, about on a level with the surface of the ground, of crossed strips of wood, making an open work, through which water spilled at any time will fall to the coal ashes below and be absorbed; on this floor the pots are to be set.

No provision is made for aeration, as no cold air holes are to be allowed above the surface in severe weather; at other times the sashes may be raised enough to allow confined air to escape; but *fresh* air will be admitted through *b* whenever the valve which controls it at the top is open.

The chamber between the brick walls at *d* being filled with well-trampled, unfermented stable manure, the heat from this will spread through the pigeon-holes in the wall *b*, and suffice for all but the most severe weather; this filling must be changed as often as it loses its heat. When *d* is full, shut *f* and cover it with boards and straw. The pipes *h h* are to be connected with the house furnace or boiler or range, or with the boiler in the greenhouse, or the smoke-flue of some constantly used chimney may be carried under the floor. The sashes are movable, and in cold weather covered with shutters and mats; the latter must be large enough to cover and lap over the joists.

When the preservation of the plants is the sole object, it is well to let the pit face the north, that the plants may not be too much heated and stimulated to grow; but if a gentle, early growth is desired, the aspect should be toward the south or east. In summer the sashes can be removed, and in spring the heat can be regulated by admitting air.

No heating pipes or flues would be necessary, if the depth and width of *d* were so increased as to hold a large body of manure,

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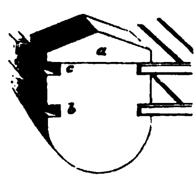
which must be removed and renewed as often as it loses its heat. The outer air should always be introduced into the bottom of the pit, that it may be warmed before it reaches the plants. Remember that perfect dryness is essential to the success of such a pit.

Many of the half-hardy plants can be carried through the winter in a pit thus managed, with but little manure, and that seldom renewed; the half-hardy Roses often live through our winter with only a covering of straw, and Pelargoniums and Verbenas can endure a considerable degree of cold.

Span-roofed cold-pits made in this manner, cost but little more, and like all span-roofed buildings, they are better when light and air can be admitted; but during our severe winters they are protected with more difficulty.

By the use of a peculiarly made rafter, additional warmth may be secured. The cut shows a section of such a rafter; *b* is a shoulder where the sash rests and slides; *c* is another shoulder where a wooden shutter slides; a button, *a*, keeps it in place. The air chamber, 2 inches deep, between *b* and *c*, is a better protection than an additional shutter.



November is the proper month for cleaning and mending hotbed frames, making new ones, and getting them all ready for spring. Hotbeds may be made as simply as one pleases, and at a very small cost. The rough and cheap kinds answer very well, but require more care and watching than the best. We have several varieties on our place, which will be described hereafter.

Many half-hardy and even quite tender plants may be safely preserved till spring, by freezing them up. Surround them with rough deal boxes, leaving the top open until violent freezing weather comes on. When they are well frozen cover the tops and exclude light and air till the spring is so far advanced as to remove danger of hard freezing; then gradually uncover and thaw them out. In many cases it is not so much the freezing which destroys life, as the alternation of frequent freezings and thawings; this may be prevented in the way described.

CHAPTER XXIV.

CONSERVATORY.

THERE is but little to be done in the conservatory this month. The general management is the same as in the greenhouse; but as more plants are in blossom than in that house, there is need of more heat, lest they be checked and their buds damped off. All that is necessary, however, is to keep a mild and uniform temperature, water moderately, and give no general syringing except on bright days.

The Camelias are swelling their buds considerably, and if the gardener has shown due attention, there will be a good general supply of flowers.

In no month is a beautiful collection of flowers more cheering than now, when the glow and beauty of October are slipping away to join the by-gone glories of summer. The trees have lost their leaves, and the occasional Aster or Golden-rod to be met with in our walks, only renders the contrast of naked trees, sere and yellow leaves, frost-burnt grass and deserted garden, more sad.

There will still be beautiful days, and during the true Indian summer, when the skies are full of warm, vague lights, and a mysterious haze clothes every thing and penetrates everywhere, we shall bask contentedly in the sunshine; but such days will soon be gone. They are the last lingering kisses summer is giving the beloved earth ere she goes. They are indeed beautiful, yet always sad. Nature seems tearfully bidding good-by to the loveliness that lingers in the land; and as in our memories the pleasures of the past are most prominent, and veil with their rosy light and pleasant indistinctness the sorrows, the painful experiences, the days of sickness and misery, so is the face of the earth suffused with the exhaling memories of spring and summer; the trees and rocks and grassy meadows are all bathed in rare purple and golden lights, and covered and penetrated with mists and vapors, which seem to clothe lovingly and sympathizingly the trunks and limbs that have stripped in preparation for their coming contest with the winter storms.

But these tender and precious memories are still those that rise as good-by is spoken. As we stroll through the woods, our feet rustle in fallen leaves. We look out through naked stems and branches over wide views, which but a few weeks ago were hidden by thick, leafy curtains. No birds fill the air with cheerful songs, though an occasional partridge whirs away before us, or a quail rises to find more secret cover. The busy squirrel hastens from tree to tree with quick leap and sharp bark, eagerly gathering the remaining nuts for his winter's store. Before our walk has been carried to half its former length, the shortening day and setting sun remind us that home-life and firelight must take the place of the prolonged rambles of the summer that is gone.

In such days we receive peculiar delight upon entering a well-filled conservatory, whose fresh, green leaves, bright flowers, and delicious fragrance beguile the senses, and together with the warm sun and still air, induce the belief that summer has not gone, but has only come in from the fields without, where she was common to all, and yet had about her something of the unapproachable and grand, to our hearts and homes, that nearness and daily familiarity may make us more intimate with her workings, and unlock to us the secrets of her growth and perfection; and, by bringing us closer to her may awaken or strengthen our love for her wonders and beauties, and bring us into sympathy with the floral loveliness so lavishly spread on all sides during the growing year.

RESIDENCE OF J. FRANCIS FISHER, PHILA.

CHAPTER [illegible]

CHAPTER XXV.

GRAPERY.

THE grapery makes but slight demands on the gardener's attention during this month; the retarding-house alone needing careful watching, as the fruit there begins to ripen, and in order to preserve it a long time, a uniform and rather low temperature must be maintained. During bright, dry weather admit air freely, to sweeten and dry the house, but never do this when it is cloudy or damp. Dryness and uniformity of temperature are now the desirable things. If it were possible to darken the house as soon as the fruit is fairly ripe, the Grapes could be better preserved, but it would be at the expense of the vines. Disbud the vines, as directed in February. Grapes on vines, retarded in pots, may be preserved by setting the pots into a cool, dark room, as most cultivators attach no farther value to these vines, which, like all others, are certain to be injured by prolonged darkness.

Many ingenious plans have been invented for preserving Grapes, and with various success. For instance: cut off the bunch, with a bit of the wood, by which it may be hung up in a cool, dark, dry place, and kept for a long time without shrivelling.

The berries, however, lie on one another, and often rot; it has, therefore, been proposed to suspend the bunch by a string, tied to the stem, near the small end, thus inverting the cluster, so that every berry may fall back from its neighbors, and contact be avoided; cut a long cane with the bunch, and set its end in water, removing a section occasionally, to ensure absorption.

Again: lay the bunches in drawers covering, and supporting each with cotton batting; this keeps them pretty well. Undoubtedly the method given before for pears — packing between layers of flannel or cotton, in tight buckets, would be excellent for grapes.

But the vines are the best place for them as long as they can well be kept there.

With a separate house or compartment for each kind of vine, the fruit could be better preserved, as different vines ripen at different seasons, and need different degrees of heat and moisture to bring them to, and keep them in, the best condition. But this is not within our means.

Prune vines in forcing-house, and cold grapery, as the wood ripens; also the fruit trees.

Mr. Allen, to whom I have frequently referred, gives, as the best vines for retarding-houses, the following names, and proportions. If the house is small, have fewer vines; if large, more in the same proportion.

Black Hamburgh,	6	Canmon Hall Muscat,	1
Muscat of Alexandria,	2	White Hamburgh,	1
Zinfindal,	1	Escholata Muscat,	1
Black Lombardy,	5	White Nice,	1
Wortlyhall Seedling,	3	Red Lombardy,	1
Tottenham Park Muscat,	1	Queen of Nice,	1
Syrian,	3	Bowker,	1
Black Damascus,	1	Bishop,	1
Black Prince,	1	Black Portugal, or Ferrara,	1
Old Black St. Peter's,	1	Prince Albert,	3

TEMPERATURE.—To ensure the right temperature in all our houses, during November and December, it is necessary to watch the thermometer closely, and have the fires ready to kindle at a moment's notice. Our climate is treacherous in these months, and we often have several days of unexpected and severe frost, followed by many of mild and charming weather.

Now, and in future, it is very important to preserve a standard and uniform degree of moisture in the house; and the only accurate means of determining moisture and warmth is the hygrometer or double-bulbed thermometer. By this instrument you may easily ascertain the precise amount of heat and moisture present in the air at any one time. To understand it, and its use, we must revert to the general laws which govern the atmosphere.

The evaporation which goes on so rapidly beneath a summer sun, is water assuming the form of vapor, and rising in accordance with the general laws of gases. Gases do not generally, when mixed together, form a single gas, but only a mixture, like sand and water. Thus the vapor, in the air, spreads itself by its own elasticity, dependent on its temperature, or is carried about in currents of moving air. The amount of vapor which a cubic foot of space can contain, depends solely on its temperature; although the time required to fill that space with vapor, from water of the same temperature, depends on the density of the air in it, by which the expansion of the vapor is retarded. If air, containing all the vapor which its temperature admits, be chilled in any degree, a part of its vapor will be changed into water, in a state of very minute subdivision, which will float like dust in the air; this is fog, mist, or cloud. If the air is at 70°, but contains only as much vapor as might be held by air of 57°, it is plain that mist would not be formed until the air was cooled down to 57°. The degree to which air must be cooled, to make the vapor in it turn to water, is called the dewpoint; and the dewpoint evidently shows the quantity of water in the air.

When the dewpoint is high, and the air is by any means forced to ascend, and thus by expansion and other causes, to be cooled, clouds are formed. The upward motion of the air is indicated by the barometer's falling.

When any surface is colder than the dewpoint, it chills the adjacent vapor into dew. The simplest exemplification of this is seen when a cold surface is held over a steaming kettle, and condenses into drops the water which we see in the form of steam; and when a film of water collects on the outside of a glass of iced water, in summer, the same operation is repeated, the only difference being that the watery vapor has before been invisibly diffused in the air, instead of being visible as steam. The cold, condensing surface which nature holds to collect a portion of the unseen moisture in the atmosphere, as dew, is the surface of the earth, and the things upon it. Dew falls by night, and not by day, because the sun-heats prevents the earth from cooling during the day, though it is radiating (*i.e.*, parting with) its heat as constantly at one time as at another. All night long the earth gives off heat, while it receives none in return, and thus it becomes colder than the air that is nearest it, and begins to take heat from the air, *i.e.*, becomes at once a cold, condensing surface, and dew is deposited on it. Remember that cold surfaces become condensers in virtue of their power to draw away that heat from the air, on which, as has been said, its power of containing vapor partly depends. The rapidity with which dew is deposited depends, therefore, on the warmth of moisture in the air, and on the difference between its temperature and that of the earth; cold condenses moisture as the hand squeezes a sponge, and when either the air or the sponge is nearly as full of moisture as it can hold, a slight squeeze brings out the water.

Objects with a large amount of surface in proportion to their bulk, as is the case with grass and trees, radiate heat most rapidly, and are, of course, the best condensers, as may be seen by the greater amount of dew on them than on smooth ground or boards. In cold nights the dew freezes as it forms, and we have frost.

Independently of the cooling influence of the earth, the atmosphere cools somewhat at night, though its power of radiation is as small as its power of absorbing the heat radiated into it.

It is for this reason that a covering of mats in a cloudy night protects plants from frost — the mats or clouds acting as a screen to prevent the escape of the heat which the earth is radiating, and to shut it in about the surface which they cover.

Understanding, then, that the power of the atmosphere to contain watery vapor depends mainly on its temperature, its heat, and the amount of moisture already contained in it, we see the value of an instrument by which these two conditions, the heat, and extent of saturation, may be ascertained; in connection with the barometer it enables us to foresee changes of weather. The hygrometer is a thermometer with two bulbs and stems; about one of the bulbs a bit of cambric is fastened by one end, while the other falls into a cup of water, placed just beneath the bulb, and thus keeps the bulb constantly wet, and at the temperature of water standing exposed in the atmosphere, to which temperature the air must closely assimilate before any rain can fall, and this temperature may be read off by the height of the mercury in the wet tube, while that in the other tube shows the temperature of the air not in contact with the wet bulb.

So long as there is much difference in the temperatures shown by the two thermometers, there will be no general deposition of moisture, dew, nor especially rain, for that cannot take place till the general temperature approaches the dew point. But the upper strata of air may be at this point, and the probability of rain is greater or less in proportion to the distance of air thus saturated, and cooled from the earth's surface. The air cools 1¼° and the dew point sinks 1° for every 100 yards that we rise above the earth.

If the barometer is falling while the difference of temperature between the two tubes of the hygrometer is slight, it is plain that we may expect a change of weather soon, at the surface level; and this will come the sooner if the sky is crowded with cirro cumuli clouds, — particularly if the cumuli have flat bases, — the cirrus at such times showing a very moist state of the upper air.

By the following formula the probability of wet weather may be calculated from the hygrometer, the barometer being examined at the same time. When there is a difference of 20° between the wet and dry bulbs clouds can scarcely form; but they form when the difference is reduced to 10° or 12°, and then rain may be expected, provided the barometer is falling.

Multiply the difference between Wet Bulb	and Dry Bulb	by
40°	45°	2.3
45°	50°	2.1
50°	55°	2.0
55°	60°	1.8
60°	65°	1.8
65°	70°	1.7
	above 70°	1.5

Subtract the product from the figures of the dry bulb in the same line, — that is, from the temperature of the air, — and you have the dew point. When the two bulbs are within a few degrees of each other, a very slight commotion in the atmosphere will produce rain. Thus, suppose

Dry Bulb. Wet Bulb.

$$70° - 65° = 5° \times 1.7 = 8°$$
$$70° - 8° = 62° = \text{dew point.}$$

To this point the atmosphere will often cool in summer, and in all cases where the multiplying factor is 1.1, or when, in other words, the thermometers are near the same point, rain is threatening, and will fall soon. For the general use of horticulture, it is enough to compare the two thermometers of the hygrometer, without making a calculation, for this tells accurately enough to what extent the air is saturated.

Thus in the retarding-house in November, we can ascertain at a glance whether the air is too moist, or if with the air in the forcing house at a given temperature we wish to increase the moisture, we can proceed with perfect certainty of success.

It is also a great assistance, in connection with the barometer, to the haymaker, in deciding upon the weather to be expected. And it is the general service which the instrument may render in the hands of a careful experimenter, which has induced me to enlarge to such an extent as I have, on the subject.

The Forcing-House. — This house needs only to be kept clear of all decaying matter, ventilated freely, and kept at a uniform temperature, and, as before said, pruned if the wood is ripe. So with the

Cold Grapery. — Keep the vines here as cool as possible, without risk of injury from frost. As soon as the leaves begin to fall, early in the month, cut back all this year's cane, excepting 4 feet; cut the spurs which have fruited back to the new wood, and those which have not, to one eye which may bear next year. This is a good time to cut out all spurs that crowd each other, leaving the permanent spurs not less than 8 inches apart *on the* *same side of the stem.* Clean the grapery thoroughly, and whitewash the walls, mixing a little sulphur with the wash. Dress the vines, as directed for Peaches in February, with the sulphur wash; towards the close of the month, unfasten them from the trellisses and lay them down for the winter, and as the weather becomes cold, cover with mats.

CHAPTER XXVI.

FLOWER-GARDEN.

NOVEMBER is the last month of the flower-garden for this calendar year; now is to be done every thing left unfinished in the preceding months. Finish planting any bulbs yet on hand. They may be planted, indeed, any time before the frost comes, but will blossom better, if planted early enough to make roots in the autumn. The beds should be covered with litter; common Tulips, Hyacinths, Narcissus, and Crocuses, need very slight protection; the depth of an inch or two of old litter, straw, or leaves, scattered over the bed, is enough; indeed, they are so hardy that they can stand the frost without any covering at all, but they flower earlier and better if they are covered. The choice varieties should be protected, with some well-rotted compost added to the litter.

You may still, if there is room in the greenhouse, etc., take up Daisies and Pansies, Gilly and Wall-flowers, which have not blossomed, for winter forcing. Daisies may be carried through the winter in blossom, if transplanted now, with a good ball of earth, into a common hotbed frame. As soon as planted, put in the sashes, and keep them warm enough to start them; then admit air freely, so as to harden them. From this time, keep the sashes on only enough to shut out the frost; cover them with mats and leaves on very cold days; admit air whenever it is possible. The Daisies will begin to blossom, if attended to by the last of March, and continue till the hotbeds can be removed from around them. The same treatment of English Violets and Pansies will insure a large yeild of flowers early in the spring.

Ranunculuses and Anemones in this latitude are very difficult to raise, unless protected through the winter in some such way as I have just described; some of the latter are so tender as to need as much care and attention as a cold pit.

Early in the month, or before the ground freezes, take up all bulbs not hardy, as Tuberose, Madeira Vine, Lilies, Amaryllis, Gladiolus, etc.; dry them carefully and pack them away in dry sand till it is time to start them in the spring. The foliage of some of these bulbs will have already perished, while that of others will be green unless touched by the frost. Allow the tops of the latter to dry before you separate them from the roots after they are taken up. The sap contained in the tops will settle into and ripen the bulbs.

The Polyanthus is quite hardy in this latitude, but the choice kinds flower much more abundantly when covered during the winter.

Carnations, also, though hardy, are sometimes killed by being started in the warm days in February and March, and ought to be protected by a light covering of litter.

Select from your bulbs such as are to blossom in glasses or pots, in the greenhouse, conservatory, or dwelling-house, in the spring, and plant them or set them into glasses. For this purpose select none but the ripest and healthiest-looking bulbs, as any others will give a weak and spindling growth, and perhaps prove deficient in flowers. The bulbs fitted for such growth are Tulip, Hyacinth, Dwarf-Iris, Polyanthus, Narcissus, Crocus, and Jonquil. Regular bulb glasses are the best things to use; set the bulb into the neck of the glass and fill with water until it just covers the crown of the bulb. If you take a large glass, and cover the mouth with coarse wire gauze, you can set into it several kinds of bulbs, which will blossom together.

Protect the tender Rhododendrons, Half Hardy Roses, Mahonia, and, indeed, all tender Evergreen or deciduous shrubs, with bass mats, Evergreen branches, or straw. For the Evergreens it will be enough to stand branches of Pine or Hemlock closely around them; what they need is protection, not so much against cold as against the sun's rays in the early spring. Most of the other plants should have straw bands twisted around them, but not in thick masses, as the straw is liable to get wet, or heat and decay, and thus destroy the plant. Standard Roses should be laid down on the earth, where they may be held by long forked sticks, and covered with straw or leaves, overlaid with branches of Evergreen.

Bengal and China Roses must be covered either with earth or deep litter; Musk, Noisette, and Ayrshire should bé well wrapped in straw and mats; Bourbon in light litter; Hyb. Bourbon, Hyb. Chinese, Hyb. Perpetual should be lightly wrapped in straw; Provence, French Moss, Rose Alba, and other garden Roses should be pruned and have a little manure piled about their roots and be left. Prune all hardy Roses before covering, leave tender kinds till March or April. For Rose culture see June and July.

Examine the borders and remove every weed, and, if possible, dig them over, also the flower-beds and borders, so that the loosened earth may admit the frost freely, to crumble stones and clods, and kill the eggs of insects and the seeds of weeds. Any beds that will need manure next summer should have a good dressing of long and unfermented manure now; this being dug in will, during the winter, ferment and decay, and bring the soil into fine condition for next season's culture.

As you will want next spring and summer a variety of compost, make into convenient heaps old leaves, straw manure, wood mould, muck and clay, or sand. These mixed with lime and ashes will make excellent compost, ready for use when you want it.

Examine the gravel walks, — dig out any weeds that have been left, and put on and roll well such gravel as is needed; the frost will mix it with the old stock, and another rolling in the spring will give us paths in firstrate order.

Baskets and all wire-work should be removed now into the tool-room for the winter, and the beds enclosed with wire-work be well dug over.

Look over the vines on trellises; clear away dead branches, prune off all straggling ends, and tie the vines carefully to the supports, lest the winter winds thresh them about; untie and cover with straw or mats the tender Roses and Bignonias.

Most of the perennials should have been planted in October, but it is not too late any time before hard frosts. I will accordingly now give a plan for planting one of our beds with perennials, and bedding out plants, to produce an agreeable effect.

See plan, beds R. The numbers on the plan refer to the heights of plants; 1 for the highest, and so on. The following is the list of plants for those beds:—

		Time of Flower.	Height.	Color.	No. Plants.
No. 1.	Saxifrage,	May,	8 in.	white,	1.
	Uvularia grandiflora,	"	1 ft.	yellow,	2.
	Primula,	"	"	yellow, red,	1.
	Double Ragged Robin,	"	"	red,	1.
	Purple Lupin,	June,	2 ft.	blue,	1.
	Iris,	"	3 ft.	blue, white,	3.
	Blackberry Lily,	"	18 in.	yellow,	1.
	Spirea,	"	"	various,	2.
	Lychnis.	"	2 ft.	scarlet,	3.
	Fraxinella,	July,	"	blue,	
	Monarda,	"	"	white, scarlet,	3.
	Hibiscus,	"	"	various,	3.
	Lily,	"	1 to 3 ft.	"	4.
No. 2.	Solomon's Seal,	May,	1 ft.	white,	3.
	Columbine,	"	"	various,	4.
	Primula,	"	"	yellow, red,	2.
	Hairy Phlox,	June,	6 in.	red,	1.
	Canadian Lily,	"	"	"	2.
	Garden Pink,	"	"	sorts,	6.
	Campanula, double and single,	"	"	"	3.
	Flax,	"	"	blue and yellow,	2.
	Double Lychnis,	July,	1 ft.	scarlet,	2.
	Antirrhinum,	"	1 ft. to 6 in.	sorts,	3.
	Lily,	"	"	"	3.
	Aster double,	Aug.	"	"	12.
	Ladies Tresses,	"	6 in.	white,	2.
	Achillea,	Aug., Sept.,	1 ft.	red, white,	2.
	Asters Single,	" "		sorts,	6.
No. 3.	Moss Pink or Phlox,	May,	6 in.	red, white,	2.
	Pulmonaria,	"	"	purple,	1.
	Lily of the Valley,	"	"	white,	many.
		June,	"	white, blue,	2.
	Campanula,	July,	1 ft.	blue, white,	2.

In No. 3 room is to be left for some of the bedding plants. For such a bed, place in the back part near the larger perennials, several roots of Sage; Mexican and Large Purple. Coming forward in the bed, put in Orange Lantana, Heliotrope, Pelargonium (Tom Thumb, Horse-shoe, etc.), Trailing Lantana, and Verbena; in front, along the edge of the path, will be sown Mignonette and Sweet Alyssum.

BED K.

		Time of flower.	Height.	Color.	No. Plants.
No. 1.	Pedicularis,	May,	1 ft.	yellow,	2.
	Uvularia,	"	"	"	2.
	Dielytra,	"	"	red,	1.
	Peony,	"	"	red, white,	3.
	Penstemon,	June,	2-3 ft.	white,	1.
	Double Larkspur,	"	3 ft.	blue,	2.
	Vervain,	"	2 ft.	"	1.
	Peony,	"	3 ft.	white,	1.
	Fraxinella,	July,	2 ft.	blue, white,	1.
	Dracocephalum,	"	3 ft.	pink,	2.
	Lily,	"	1-3 ft.	sorts,	4.
	Cotonanche,	August,	2 ft.	blue,	1.
	Galliardia,	"	2 ft.	orange,	1.
	Yucca,	"	2-3 ft	white,	2.
	Hemerocallis,	"	"	blue, white,	3.
	Cassia,	"	3 ft.	yellow,	1.
	Golden-rod,	Aug., Sept.,	1-3 ft.	"	2.
	Asclepias,	" "	2 ft.	red, yellow,	1.
	Coreopsis,	" "	2 ft.	yellow,	2.
	Chrysanthemum,	September,	1-3 ft.	sorts,	12.
	Gentian,	"	2 ft.	blue,	2.
No. 2.	Saxifrage,	May,	18 in.	white,	1.
	Delphineum,	"	"	blue,	2.
	Dodecatheon,	"	"	red,	1.
	Soapwort,	June,	1 ft.	"	2.
	Double Rocket,	"	"	white,	3.
	Lily,	"	1 to 3 ft.	sorts,	1.
	Senecio aurea,	"	1 ft.	yellow,	3.
	Antirrhinum,	"	1 ft.	sorts,	1.
	Aconite,	"	1 to 3 ft.	blue,	2.
	Chelone.	July,	1 ft.	white,	2.
	Double Lychnis,	"	1 ft.	red,	2.
	Perpetual Pea,	"	2 ft.	"	1.
	Fumitory,	"	1 ft.	pink.	2.

		Time of flower.	Height.	Color.	No. plants.
No. 2.	Lobelia,	July,	1 ft.	blue, red,	3.
	Phlox,	July, Aug., Sept.,	1-3 ft.	sorts,	10.
	Coreopsis,	July, Aug.,	2 ft.	yellow,	3.
	Wild Aster,	Aug., Sept.,	2 ft.	sorts,	3.
	Golden-rod,	" "	2 ft.	yellow,	3.
No. 3.	Solomon's Seal,	May,	1 ft.	white,	2.
	Columbine,	"	6 in.	sorts,	3.
	Violets,	"	"	"	6.
	Polemonuim,	"	"	blue,	2.
	Lily of the Valley,	"	"	white,	3.
	Iris dwarf,	"	1 ft.	blue,	3.
	Hairy Phlox,	June,	6 in.	blue,	2.
	Garden Pinks,	"	"	pink,	3.
	Campanula,	June, July,	1 ft.	sorts,	6.
	Spiderwort,	" "	"	blue,	1.
	Sedum,	" "	6 in.	white,	1.
	Lysimachia Nummularia,	" "	2 in.	yellow,	3.
	Mallows,	July, Aug.,	1 ft.	white,	1.
	Chinese Lychnis,	August,	1 ft.	orange,	1.
	Ladies' Tresses,	"	"	white,	2.
	Asters, double,	Aug., Sept.,	1-2 ft.	sorts,	12.
	Achillea,	" "	1 ft.	red,	1.
	Eupatorium,	September,	1 ft.	blue and white,	1.
	Chrysanthemum, dwarf,	"		sorts,	6.

Plant among these the same bedding plants as before, using as annuals, Candytuft, Gillia, etc.; add, in the first class, Dahlias and Hollyhocks, in the second, Tuberose, Gladiolus, Amaryllis, and Japan Lily, etc.

The question arises here of the grouping of these plants in their different sizes and classes; but no rule need be given except that of placing the taller ones in the background, that they may not conceal the others. In setting out bedding-plants care must be taken also to give harmonious effects of color. This subject will be more fully entered upon in the summer.

Here we leave the flower-garden until April and May with their soft showers and warm sun and winds shall have cleared away the effects of the winter's frosts, and prepared the earth for its work again.

CHAPTER XXVII.

KITCHEN-GARDEN.

THE question of the profit or loss of our kitchen-garden will be settled this month, for there will be no more income or expenditure till another season.

But first comes a very busy time; for we must not only finish all our harvesting, but prepare for spring work, and look to the proper protection of the various crops which are to be kept through the winter, either for consumption or spring culture.

Lettuce, Cabbage, and all small salads in frames, are to be frequently aired, to make them as hardy as possible. As the month advances, the cold will become more severe; there will be some days when the sashes must not be lifted at all, and must be covered with mats. When winter fairly sets in, cover the sashes with straw and leaves, enough to keep out the frost and the early spring sun.

The very first of the month, thin the Spinach plants and the Corn Salad, so that they may get hardy before winter. Handle them carefully, as the leaves are tender, and if broken at all, are very susceptible to the frost; when winter is close at hand, strew over them loose straw or branches of evergreen trees; the plants are hardy, but a slight covering will forward the growth of the leaves in the early spring. Cover young Onions in same way.

Earth Celery and Cardoons, etc., in the course of the month, but only in dry weather, and make preparations for housing them before settled cold weather. The best way is to use one of the hotbed frames; plant the Celery in rows, at the bottom of the frame, and fill in carefully to the top with well-packed, just-moist sand; then lay on the sashes; during mild weather give air, at all other times keep well covered with mats and litter, but ventilate.

It can be planted the same way in the cellar, but it is likely to rot unless kept cool and dry.

Another way of planting, inferior to the above, but still good, is to select a row that runs north and south. Dig the rest of the Celery, and bring it to this row. Take the plants which have been dug, and lay them closely against the unbroken row, planting the roots a little way in the ground. Having laid one row on each side the ridge, cover slightly with sand, or dry loam, and lay another row, and so on until you have laid all you have, or until the ridge is as wide as can be easily managed. Cover the sides with not less than 6 inches of loam, laid over with straw, haulm, or leaves. Cover the top with litter. Drive down a post at each corner of your now oblong mound, and others at intervals of 10 feet along each side, the tops being about level with the top of the ridge. Connect the tops of the posts with a stringer, or wall-plate of 2×3 joist. Upon this wall-plate erect a roof, pitched just enough to shed rain; this roof may be made by nailing boards lapped over each other like shingles. The space between the top of the ridge and the roof should be filled with litter, and the ends of the ridge banked up in the same manner as the sides. The Celery and Cardoons are now safe from frost; and if the ridge is opened only at the ends, and closed up again carefully, its contents may be taken out whenever wanted, and will be fit to use until spring. To avoid the expense of a roof, you can use haulm, or straw, thatched enough to shed rain. It is a good way to pack the side rows, tops and leaves down, and roots up, as when thus laid no water can get into the heart of the plant, and it needs less protection. In all cases ventilate like Turnips with straw.

Cabbages and Cauliflowers are to be preserved in the same way. Pull the Cabbages and lay them upside down on the ground, for a time, to allow all the moisture to drain out; pull off the loose outside leaves, and then take them to a well sheltered spot, and plant them up to the head; when planted, cover like Celery. Another very good way is to build them up into a few triangular stacks, then thatch and cover as before. The worst way is to keep them in a cellar, unless it be very cool and dry. If any of them are frozen before harvesting, leave them in the ground to thaw, as they are more likely to decay if pulled up when frozen.

Late Cauliflowers and Broccoli will produce heads as long as the absence of frost will allow; break leaves down over the heads to protect them against sudden rain or cold.

Finish harvesting the Root crops, as directed last month. If there is not room in the root cellar, the following is the best way to preserve them.

Choose a warm and protected corner of a well-drained field, and there make a furrow nearly 2 feet deep, by running your ditch plough several times in the same line, north and south. Lay the Roots into the furrow in a neatly built triangular stack, throw back the earth all over the Roots, to the depth of a foot, and cover the whole with straw. At intervals of 4 feet set a small bundle of straw on its buts on the Turnips, so that the straw will reach into the air through the earth, and will serve as a ventilator, to prevent the Turnips heating and growing. Open when you want a supply at the southern end, in a bright, warmish day.

All tubers may be easily and cheaply kept through the winter in this way.

The last Roots to be cared for are the Turnips sown in August. If left in the ground, freezing and thawing will injure them but little, and it is better to have them so, than to put them into warm cellars. Very small Turnips often remain in the ground through the winter, and start afresh in the spring, if slightly protected with straw or evergreen. The same is to be done with those Parsnips, Oyster Plants, and Horse-radish, which you do not intend to stack, that they may be easily dug in the spring. All these Roots are better off in the ground than stored in cellars. But a better way than either is to pack them in sand or coal ashes, in hotbeds, as directed for Celery.

Take up Sea-Kale, Endive, Chicory, Asparagus, and Strawberries, for forcing.

At every spare moment continue to dig in long manure and haulm, and to dig over, without manure, those beds that do not need it. Collect all litter, leaves, and rubbish, and carry them to the hog-pen, if you have no other use for them. They disfigure the grounds when left on them, and will be blown about by the winter winds. See that by spring all the manure gets sufficient fermentation to kill the seeds of weeds which have been mixed with the heaps during summer.

Our kitchen-garden covers several acres, and is laid out in straight lines and right angles. All I have said about it applies, of course, to a garden definitely located, and in successful operation; but I shall now devote a little space to the consideration of the general principles which should govern the selection and preparation of a spot for a kitchen-garden.

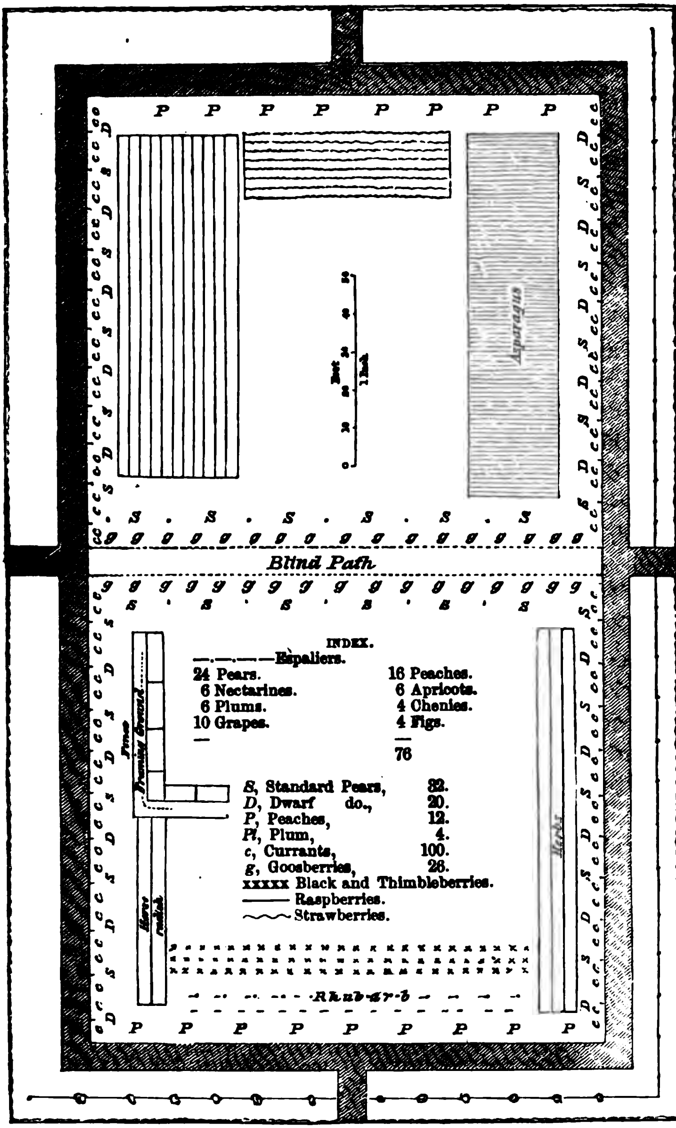
As to selection one must, of course, be limited by the nature of his estate; but the best soil is a deep, rich, sandy loam; the best exposure, a hill-side, sloping to the south or east, down to level meadow or valley, for here earlier vegetables can be grown than on level surface. This is in accordance with the principles referred to in my remarks on the angle to be selected for the roof of a greenhouse; viz., that the sun gives most heat when it is most nearly over our heads; in other words, that any surface is most heated by those rays which are perpendicular to it. Now, in the spring, when the sun is low in the heavens, the surface of level ground gets no rays, which approximate to the perpendicular, but a hill-side, during the middle of the day, receives rays which are very nearly perpendicular, and are, therefore, absorbed, instead of being reflected and wasted.

But this increased supply of heat ceases to be an advantage as the summer advances, and the heat increases, for then the level land has enough, and the hill-side is dried up. In the fall perpendicular rays are again in demand, and the hill-side is again preferable to the level for gardening purposes. We see at once, then, what varieties of crops to grow on different surfaces, and how to vary our garden culture. The hill-side will give us early Radishes, Lettuce, Peas, Corn, Cucumbers, Tomatoes, Melons; the level ground will follow with later Lettuce, Peas, and Corn, Beans, Roots of various kinds, Celery, and the later Salads.

It is well, then, that a kitchen-garden should include both level and sloping ground, but it is vain to expect good crops from either unless they are well drained; thorough drainage, either natural or artificial, being as essential here as on the farm.

But the quality of soil, and the character of surface are not the only considerations in selecting a spot for the kitchen-garden; its position in relation to the house and the grounds in general is important. Let it be near the stables and hog-pens, the framing ground and the hotbeds, if there be proper ground in that neighborhood; but wherever located, let it be for convenience, and not for concealment, as is so often advised. There seems to be a general feeling that a kitchen-garden cannot be in harmony with ornamental grounds, and must, therefore, be removed from them, lest the sight of it mar our enjoyment of their beauty. Now it is not only a necessity, but it may be an ornament to every estate, as much as the lawn or the flower-garden. What though its arrangement be rectangular, while curves preponderate in the other grounds? the two are not necessarily at variance; the effect of each may be much heightened by the contrast which the other presents. The love of the beautiful is often developed and the mind kept active and appreciative by the stimulus of judicious contrast, and a man of taste, who had avoided straight lines, sharp angles, and every thing like formality over the rest of his grounds, might well display all these in a kitchen-garden, as an expedient for increasing the enjoyment which he derives from the general grace and ease of the place. No better reason can be given for adopting such an arrangement in a kitchen-garden, and were it the only reason it would be sufficient, for I hold that convenience is a consideration secondary to beauty, and that this is the true order of motive in all cases where the means of a proprietor are large enough to justify him in gratifying his taste.

But this desire for contrast is not the only reason for adopting the rectangular arrangement. Where single rows of trees or espaliered fruit are to be grown, and where much of the culture will be on a scale large enough to employ a horse, the permanent lines should be straight, if possible; for curved or irregular boundaries are a great inconvenience when teams must be frequently driven or turned close to them.


Asparagus
Feet
1 Inch.
Blind Path.
Forcing Ground.
Frame
Horse radish.
Herbs
Rhubarb
INDEX.
——Espaliers.
24 Pears.
6 Nectarines.
6 Plums.
10 Grapes.
16 Peaches.
6 Apricots.
4 Chenies.
4 Figs.
76
S, Standard Pears, 32.
D, Dwarf do., 20.
P, Peaches, 12.
Pl, Plum, 4.
c, Currants, 100.
g, Gooseberries, 26.
xxxxx Black and Thimbleberries.
—— Raspberries.
~~~ Strawberries.
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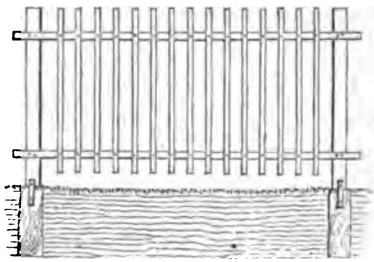
How to lay out a Kitchen-garden. — The spot selected, its preparation is the next question.

First for the level portion. Decide how many trees or grape vines you wish to have on espaliers, how many standard fruit trees, how many dwarfs, and then stake out, just 15 feet within the limits of the level portion, a walk, B, not less than 6 feet wide, and surrounding the square.

The space between this path and the boundaries all round is for a border. From B, in the middle of each side of the square, carry in both directions a path also 6 feet wide; this will give four side entrances. Having staked out your paths, dig them out from 1 to 3 feet deep, and spread the earth on the adjoining ground. Now trench the remaining surface 2 feet deep (digging it over, the whole depth of a digging-fork, is the best course for those who cannot afford to trench); throw out every stone as large as an egg; collect these stones and empty them into the open paths, until they are filled within 6 inches of the adjoining surface. Then send a man with a small stone-hammer to lay these stones smooth, crowning them so that the middle of the 6 feet path may be at least 2 inches higher than its sides; as he does this let him break into fragments every stone larger than an English walnut, and thus smooth the surface still more thoroughly, and bind the whole well together. Over his work lay 3 inches of gravel — coarse, but free from large stones; as it is laid in heaps on the stones let a man rake it toward him, bringing along the stones which his rake takes out, and covering them with the fine gravel remaining behind. When all the gravel is laid, the surface of the path will be perfectly uniform; then roll it well to bind and harden the whole. Such a path will never be troubled with weeds.

Having made the paths, estimate how long a range of espaliers is desirable; you can do this by multiplying the number of trees and vines to be grown on espaliers by 10; or, if your limits are confined, by 8 feet; espaliered fruit may be grown as near as this without danger of injuring the trees. If there be enough to surround the whole garden, begin at one corner and 6 feet from the boundary; set posts 9 feet long and at least 3 feet in diameter into the earth to the depth of 3 feet, and 8 feet apart, or fasten them by



iron straps to blocks of stone, sunk in the ground; connect them by two transverse bars 2 inches square, the first of which may be screwed to the posts at the distance of one foot from the ground; the second at the same distance from the top of the posts; now fasten to the bars, and perpendicular to them, strips one inch square and 6 inches apart; give the whole at least two coats of dark-colored mineral paint. If the amount of espaliers decided on is not enough to surround the whole garden, put them up on the north side first, then on the west, then east, last south. In our climate good fruit may be grown on espaliers facing the north.

It will be well at this stage of proceedings to erect along the north and west sides a fence or screen of some kind against cold winds, unless the garden is sufficiently sheltered by high woods or land in the immediate vicinage, in which case a hedge will answer all purposes; make it of thorn if you wish to exclude vermin. An Evergreen hedge is best for beauty and warmth, and if you will have the kitchen-garden screened from observation, summer and winter, nothing but Evergreen or boards will answer your purpose; for a summer screen the espaliers and the foliage on them will be quite sufficient. Of course something more is necessary if you are exposed to thieves.

The espaliers just described are cheap, and in the opinion of many are the best kind; others prefer iron and wire for material.

They should be put up in all gardens where high cultivation is practised, as they give a large amount of fruit in proportion to the surface covered, without materially shading the ground. They may be made against the dead walls of buildings, garden walls, etc., and enable the cultivator to grow many rather tender kinds of fruit (even figs), the degree of success varying with the locality. By means of them Nectarines, Plums, and any fruit usually attacked by insects may be made an almost certain crop. Different kinds of insects are troublesome at different seasons, but none for more

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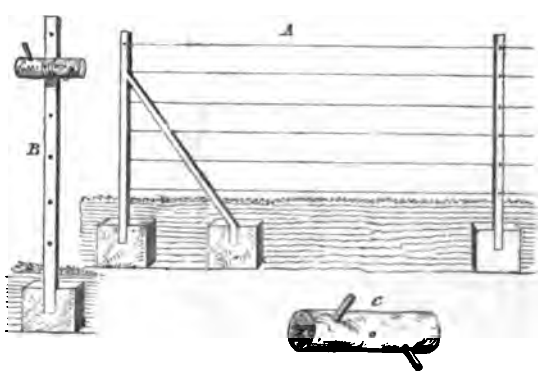
than a few weeks at a time, either at the flowering season, or during the formation or the ripening of fruit; and at these seasons espaliers may easily be covered with mosquito-netting, which, without excluding the sun, rain, or air, effectually shuts out all insects.

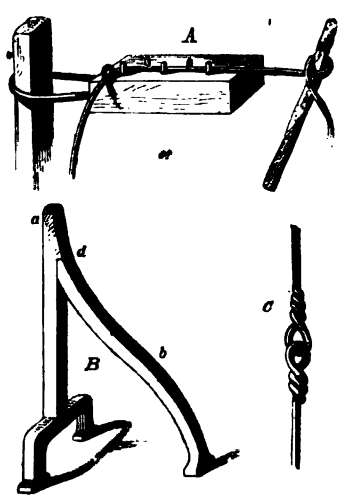
Our espaliers are of several kinds. Those of iron are made as follows: Sink blocks of stone 2 or 3 feet into the earth, out of the reach of frost, as for the wooden espaliers, and 9 feet apart; set into each stone "uprights" of iron $1\frac{1}{2}$ inch square at the bottom, 6 feet long and tapering to the top; tie these "uprights" with top and bottom rails $2\frac{1}{2}$ inches wide, $\frac{1}{2}$ inch thick, and pierced so as to slide over both the upright posts, and the smaller uprights, which are $\frac{3}{8}$ inch square and 8 inches apart, and of iron, as are also the rails. When completed, paint with a proper metallic paint. Such espaliers are very costly, and many think that the iron injures the trees by its excessive cold in winter and heat in summer.

Wire, A, makes a better and cheaper espalier. Stones are sunk as before, but at the distance of 10 or 12 feet apart, and into them are set iron posts, $2 \times \frac{1}{2}$ inches thick, and 6 feet high; the corner posts are to be particularly well secured, so as to bear the strain necessary for tightening the wire. 2 feet from each corner post sink another stone, to which the corner posts are to be firmly braced.



When all the posts are up, begin to strain the wire; a convenient and powerful instrument for this, may be made as follows:

into a log of wood, C, 18 inches long and 6 inches in diameter, put two handles at opposite ends, but not at right angles to each other; through the middle of the log bore a small hole. The wire, $\frac{1}{8}$ to $\frac{1}{4}$ inch in size, having been fastened securely to one of the corner posts, lead it through all the holes in the same line in the posts; bring its end through the hole in the log, which should be placed against the corner post, and twist it once or twice round the log to make it firm and tight. Now turn the log by the handles, and wind up the wire as tightly as possible; — and it is possible to strain it very hard; — when it is tightened enough, let an assistant drive an iron or a hard wood wedge firmly into the hole in the post through which the wire was strained; this will prevent the wire from slipping back when it is unwound from the log, as it must be before it is secured by winding it round the post and then twisting it about itself on the side of the post opposite that on which it was strained. When you break it, leave end enough to admit of the repetition of the straining process, when this may be required. The instrument, and the method of applying it, are shown in the preceding cut at B. Simple as this instrument is, its power is immense; it is on the principle of the wheel and axle, and the longer the handles or levers, (radii of the wheel) are, and the smaller the log used (provided it be strong enough), the greater the power which can be employed. Quite large trees have been pulled up by its strain, when they were used for corner posts.



Before putting the wire into the fence it should be straightened, which may be done by laying the coil upon the ground. Fasten a board, A, to a post; the board is filled with two rows of iron pegs, in parallel lines; carry the end of the wire between each alternate peg, and fasten its end to a pole or short bar, B, which a man holds in both hands; walking backward, he draws the wire through the pegs, straightening it; a second man delivers it slowly from the coil; C shows a splice in the wire; B represents a portable straining post for corners, etc., where no good fixed posts can be set; *a* is to be left in the fence, but *b* is to be removed after the wire is strained, and be set into another straining post, as a brace; it is put under the shoulder of *a*, and fastened with a screw-bolt through *d*.

The espaliers being arranged, trees or vines may be planted in the ordinary way, to grow upon them. The common espalier fruits are Peaches, Apricots, Nectarines, and Pears, but, as has been said, Plums and Cherries, and, in sheltered places, Figs and foreign Grapes may be grown.

There are as many plans for training trees on espaliers as vines in houses, but nearly all are varieties of the "fan" system, which spreads out the branches on the espaliers like the ribs of a huge fan. Each cultivator must decide for himself on the best means for effecting this, the guiding principle being to cover the trellis well with fruit-bearing wood, but to check over luxuriance of merely leaf-bearing wood, and to admit sun and air freely while you protect fruit and wood from too great heat.

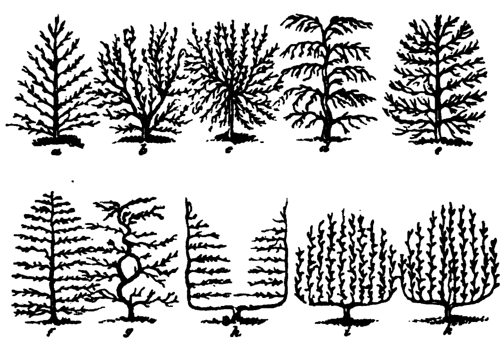
When you desire a luxuriant growth of wood, prune in the fall; when a diminished quantity, in the spring; and bear in mind that summer pruning is one of the means for producing well balanced and thrifty trees. Were a thorough system of root-pruning to be followed, summer pruning would hardly be advisable, as the tree would make only wood enough to keep up a good supply of fruit; this, however, is scarcely possible when espaliered fruit is grown in the enriched borders of a kitchen-garden, all the area of which must be devoted to some kind of esculent crops.

Summer pruning differs from autumn or winter pruning. The gardener should examine the trees late in June, or early in July, and selecting those shoots which seem most desirable, either because they will fill a gap or are particularly promising, should nip off the end and tie them down to the espalier; such shoots as by their luxuriance overshadow or crowd the fruit and old wood, are to be cut entirely off, and the rest pinched back to about one-third of their growth. By tying the new shoots with an inclination toward the ground, you lead the sap to settle in them, and they tend to form fruit rather than leaf buds; but the theory that general summer pruning has the same tendency, is not supported by the best experinece.

Summer pruning saves winter work, and saves the fruit from being threshed and bruised by the long new shoots shaken by high winds.

As a general rule, pruning has much the same effect at all seasons. It is best to prune stone fruits and all other rather tender trees towards spring; but the best fruit growers have not found by observation and experience any other rule for the time of doing general pruning than the amount and urgency of the work on hand, though trees bear careless pruning better at some seasons than at others.

Trees for the espalier should be in the second year from the bud, if they have been budded, and should be cut back to the third or fourth bud from the stock. As I have said before, their subsequent training and pruning must depend on the fancy of the cultivator. The following examples are taken from Loudon's Encyclopædia of Gardening, and show the best practice of the best English cultivators.



a, the herring-bone fan; *b*, the irregular fan; *c*, the stellate fan; *d*, the drooping fan; *e*, the wavy fan; *f*, the horizontal; *g*, the horizontal with screw stem; *h*, the horizontal with double stem; *i*, the vertical with screw shoots; *k*, the vertical with upright shoots.

So much for the espaliers.

If the garden is small you may now plant dwarf trees in the outer edge of the border, and alternate with the espaliered trees, *but nothing but want of room and subsequent high manuring can justify such overcrowding.*

The proper place for dwarfs and standards is on the opposite side of the walk, and around the inside square. The dwarfs here should be 10 or 12 feet apart; standard Pears 20 feet apart; Peaches, too, may be planted on the edge of this square, 15 feet back from the walk, while the Pears need not be more than 10 feet from it.

If there is not room enough here for all the fruit trees desired, set a double row through the middle of the square, 20 feet apart in the row, and 20 feet from each other. These trees should connect the entrance paths on the sides by a blind walk; that is, the land between the double row should be used for culture, and to walk and cart over at different seasons of the year.

Having placed the trees, ascertain how many Currant bushes will supply the family; set them opposite each other, but independent of the trees on the two sides of a path, 3 feet back from the edge of the path, and 6 feet apart; in a small garden they may be set only 3 feet apart; begin at the corner of an entrance path, and follow round to the next corner, or farther, if you need so many bushes. Gooseberries may be set out in the same manner.

Next select the best place for an Asparagus bed. Have it as near the stables as the character of the land will admit. The bed may be made ready for the seeds or roots either in the fall or the spring. It is rather a slower process to get Asparagus from the seed than from the root, but the first cost is less, and the process often easier, though beds are better and more speedily productive when made from roots.

Cover the bed with a thick dressing of manure; then trench thoroughly, 3 feet deep, and loosen the bottom of the trench beside; take care that the manure is well incorporated with the soil, and at the same time work in not less than a cubic inch of salt for every square foot of surface. If this work is done in the fall the land is left till spring. Autumn-made beds may have a very heavy and coarse manure worked into them, as the winter frost will decay it, and take away its harshness. It is well to mix in a large amount of broken bones while trenching. You need have no fear of making the bed too rich; Asparagus is a very gross feeder, and the bed cannot be thoroughly manured again without being remade; liquid manure and top dressing are the only means of enriching it after the crop is started.

The preparation and future treatment of beds will depend upon whether it is proposed to force Asparagus at any time, and whether the bed is to continue permanent as long as productive.

Good permanent beds may be made from seed. Sow the seed in 3 drills, 18 inches apart, — the bed to be 4½ feet wide, — cover the seed 2 inches deep, — sow it the first of May. When the plants have grown 6 or 7 inches high, thin them into straight lines, and leave them 12 inches apart. "Beds raised from the seed will need a pint of seed for a bed 4½ × 30 feet. If roots are used, 160 will plant the same area."

In transplanting Roots, it is all important that they should never get dry, or be bruised. Select only the best Roots, which will be well grown, and have an abundance of buds around the crown.

Some cultivators prefer plants two or three years old. Yearlings are quite as good, and as no bed should be cut for two years, the yearling plants will have time to get their full strength.

The plants may be set in drills or in beds. To make a bed, stake out a parallelogram, as long as you please, and 4½ feet wide, dig trenches transversely, 3 feet apart, and 12 inches deep; if that depth will allow the roots to be set with their crowns 2 inches below the surface, and yet not compress the smaller roots. As fast as you set them cover with loam. If you do not wish a regular bed set the plants in single drills; when cultivated by the acre, set the roots deep enough to plough in manure over them.

As I have before stated, after-enrichment is to be applied by forking manure into the alleys between the beds, by top-dressings of well-rotted stable manure in the fall, which may be very lightly forked in in the spring (great care being taken not to touch the crown of the roots with the fork); by top-dressings of guano just before rains, or, lastly, by liquid manure, diluted urine or cow manure, or guano mixed with water.

The size of beds will depend upon many local circumstances, but a bed of less than 30 square yards will not furnish a reasonable dish; and a bed of 6 square rods will give two or three bunches daily through the season.

The Asparagus bed being decided upon, select the best position for Horse-radish, which will grow in any soil or situation, but well repays good culture. A large bed is unnecessary for a private family; therefore, to economize room, choose some strip between the espaliers and the fence or hedge, or any other convenient spot. If you wish to grow Horse-radish to perfection, you can imitate the English gardeners, who are as particular with it as with Celery. It is desirable to get long, thick, and straight roots, therefore thoroughly manure and trench the beds to the depth of 3 feet. Open a trench in the ordinary way, 15 inches deep and 2 feet wide; plant sets 9 inches apart each way, keeping their crowns upright; cover with the earth of the next trench, and continue to plant. When more than one bed is to be made, leave a space for a second bed and open the third.

The sets during summer grow vigorously; rake off the decayed leaves in the autumn; early the next April lay a foot of earth from the unplanted bed over that of one year's growth, and then prepare and plant the new bed. In the autumn open the older bed at one end and take out the roots as you come to them; they will have a size and perfection that can only be understood when seen. You may have Horse-radish sufficiently good, however, from any ordinary soil, with common planting and care.

Now select a place for the culture of pot herbs of various kinds. Most of the ordinary herbs are perennials, and must occupy the same ground for several years; therefore as for Asparagus, trench, dress, and manure richly before planting. Sow the seeds in the hotbed in March; thin out the plants as they grow, and give air enough to make them hardy. As soon as the weather will permit, set them across the bed, 1 foot apart, in lines 15 inches apart. Or, sow the seed in the open ground in May or June, but it will be much slower in coming to a good growth. Cuttings of the new growth may be made and set in nursery beds as soon as the wood ripens; as soon as rooted they may be transplanted into permanent situations. The beds will last three years or more, according to culture, soil, and exposure. There are both annual and perennial varieties of Sweet Marjoram and Savory; the perennial are the best, and may be readily propagated by seed, cuttings, or divisions of the roots. Seed should be sown in the spring, cuttings be made in the summer, and divisions of the roots in September.

Pennyroyal is of similar character, and may be grown in the same way. Other herbs, like Basil, Dill, Anise, Caraway, Angelica, Coriander, Thyme, etc., are of but little use, and it is not advisable to cumber the garden with them.

Our kitchen-garden is now pretty well stocked with all the fixtures excepting Strawberries, Raspberries, and the annual crops, all of which will be deferred until the appropriate time.

The garden being thus laid out, and partly planted, as soon as time allows some kind of edging should be put to the walk. The best is slates. They should be half an inch thick and from 3 × 12 to 12 × 24 inches in surface. They need not be more carefully cut and made than for roofing, but must be of the best material and free from cross grain and waves, so as to be strong enough to resist all ordinary concussion. Draw the garden line straight along the edge of the path; set the spade down perpendicularly into the edge of the bed, working it backwards and forwards to make a space into which the slate is to be set. Set the slate 10 inches deep into this place, leaving but two or three inches above the ground. Set them edge to edge, perpendicularly, and in straight lines, then thoroughly press and pack the earth of the beds and the gravel of the paths against them. The deep setting will not only keep them firm in their places, but will prevent the roots of grass, weeds, or other plants from straying beyond their proper limits; while the few inches above ground give a clean and precise edge to both path and bed, and make them look trim and orderly.

This is a sufficient description of the method of laying out the level part of the kitchen-garden. The sloping and irregular portions should not be treated in this geometrical manner, but in a more graceful and varied style.

I shall postpone the description of such a garden to another month.

CHAPTER XXVIII.

ORCHARD.

THE fruit harvest proper is over before November, but if any fruit has been left ungathered, lose no time in securing it.

Thoroughly dig the orchard over with long-tined forks, so as to leave the earth light and open to the frost. If manure is needed for next year's crop, dig it in now; you can use long manure, as the winter's action will decay it before the young root fibres need it. As you dig, cover the ground before you with a good dressing of the following mixture, — one barrel of oyster-shell lime, slaked with the water which has dissolved a bushel of salt. This preparation is a very powerful stimulant to apple trees, and a great destroyer of insects and their eggs. If orchards were laid down to grass, as some are, we should still be obliged to dig up the earth round the trees, for a distance at least as great as the spread of the branches. The first time the application of this mixture is made, two bushels should be used, but afterwards one every year is enough.

Manure the Pear-trees well, as no fruit is more grateful for manure, which increases the crop greatly, both in size and number. The secret of pear culture indeed, is to give the trees plenty of manure and moisture, and to thin out the fruit. If there are any gaps in the orchard, made by the death of trees, or other causes, set out new trees now; the earlier the better, as this work should have been done in October, if possible. Stone fruits must be left till spring, as the winter is very apt to injure them. Cherries may sometimes thrive when planted in the autumn, but it is not best to try the experiment.

Untie the Figs from espaliers, and wrap the branches in straw, and then lay them down on the ground, covering with a little light litter, or lay them down and cover with earth, like Raspberries. Treat all tender Grapes in the same manner. Isabella, Concord, and Diana do not require this attention; but many growers think they thrive better, and ripen earlier for it. When vines are to be laid down prune them thoroughly. The system of pruning for out-of-door grapes is the same as that for the grapery, but it is not customary to prune them quite so closely as when in-doors.

The first year cut back within three eyes of the old wood; the second year allow three main canes to grow, and spread them out on the trellis or wall, fan-shaped. During summer pinch all side shoots two eyes beyond the bunch, and as often as they start, pinch back. In August pinch off the ends of the growing shoots, so that the wood may ripen well. New shoots will start after pinching, which may be treated in the same manner.

In the autumn of the second year cut down within six eyes of the old wood, and cut out or back, to one eye, all side spurs on what is left. The third year allow your three leading canes to branch out as much as you please, so as to cover the wall or trellis. The lower eyes will all break. Pinch off the fruit-bearing shoots, two eyes from the bunch, after the fruit is set. The last eye will start again, and must be allowed to grow for a few weeks, and then be again stopped. This practice will hasten the ripening, and improve the quality of the fruit.

By no means pinch back the first time to within one eye of the bunch, as, if you do, that eye may start to the injury of the fruit, and to the loss of the bud for next year's growth. Stop the leading canes in August, as before. In the fall cut off at least half the new growth, and shorten in all the side spurs to within two eyes of the cane. Continue this practice year after year until the trellis is well covered, then keep well pruned.

The wood of the grapevine in a few years solidifies; that is, the sap deposits its solid particles in the sap vessels, until they are finally filled up, and no longer afford free channels to the sap. Therefore when your vine is six or eight years old, in November or January it is well to cut back one of the original three canes to the but. The next spring new canes will start from the latent buds on the side of the old stock, which may be trained and pruned as at the beginning. When they are well grown, and fruit-bearing, cut down the other old canes, and proceed with them in the same manner. This practice, in the grapehouses, is called the long cane renewal system.

November is a good month to prepare vine borders for hardy grapes. It is not necessary to take so much care as for those indoors. A deep, well-drained, well-manured loam is good enough. In manuring give a large dressing of oyster shells, old mortar, and bones. An annual top dressing, lightly forked in, or liquid manure, will be the only subsequent enrichment necessary. Nothing is better for vines than soapsuds, and the suds from the weekly washing, if saved, and thoroughly applied, will produce a large crop of Grapes.

Having disposed of your vines, begin to prune Apples and Pears. This work will be light if it has been well done before. Be sure, in *trimming*, to cut off all the twigs and branches to be removed smooth with their main stems, and with a clean, upward cut.

In *pruning*, always cut about midway between the buds, with an upward cut. In pruning Grapes the whole internode (or space between the buds) should be left, as the frost is apt to kill the bud if too near the cut. This danger is less with fruit trees, but it is prudent to leave half an internode, when the trees are pruned, in fall or winter.

Have in your mind, in pruning, a distinct idea of the shape which you desire to give to the tree. Every kind of tree has some characteristic form, to which each individual of the species conforms, with greater or less exactness, and the same is true of different varieties of any species of plant. Thus the general form of an Apple-tree is quite distinctive from that of other trees, and yet different varieties of Apple-trees have still further peculiarities. The Rhode Island Greening, the Hubbardston Nonsuch, and others, tend to grow and branch low, and cover a large space.

The Northern Spy grows tall, but weeps very much, with long and switch-like branches.

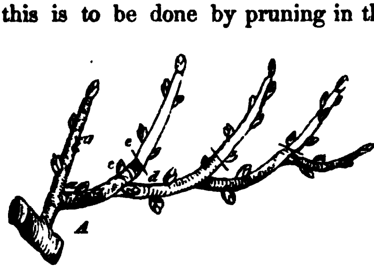
The High-top Sweeting also grows tall, but with rather stiff and stubby branches.

It is folly to try to counteract these peculiarities; they must be borne in mind in pruning, and the natural shape of the tree conformed to as much as possible.

In pruning, cut off all branches which chafe each other, all those whose ends strike together, and all suckers which crowd the tree. There is a dangerous tendency to overprune. The leaves are the lungs of the tree, and should only be removed enough to give the light and air free circulation among the branches, and not so much as to deprive the tree of its necessary breath, or the fruit and stems of shelter from the too scorching sun.

The general shape to be aimed at for Apple-trees, is a well-balanced, rounded or umbrella shaped top, so thinned of small branches as to admit light and air freely, but not the direct rays of the sun.

In pruning Pear-trees, a difference is to be made between standards and dwarfs. Standards grow tall and are generally of fastigiate or birch-broom shape, the branches coming out from the stem near together, and running in a vertical direction. This method of growth brings the branches too near each other, so that they chafe and injure the fruit, and also prevent the free access of sunlight, as well as offer great obstacles to the fruit gatherer. The branches must therefore be brought towards the horizontal position, though not without care, as the wood of the Pear-tree is not sufficiently tough to bear great weight of leaves and fruit, except with the mechanical advantage which it derives from the natural uprightness of the tree. However, to some extent it is safe to train the branches into a convenient form, and this is to be done by pruning in the following manner. In the accompanying cut you have part of the stem of a standard Pear-tree, with a branch A, growing upwards, in its natural position. The buds, *a b c*, if suffered to grow, will grow into the tree and crowd it; rub them off, therefore, and cut the branch off at *e;* the bud, *d*, on the outside, will



will then start, and form a branch growing *from* the stem, and less vertical than A. When this branch has grown a short time, and begins to tend upward, repeat the operation, and you will thus gradually flatten it and others in the same manner, as much as you please.

Standard trees are those which, growing freely, attain naturally a considerable height and size. They are often inconveniently large, and it takes several years for them to mature sufficiently to bear good fruit. The attention of horticulturists was early given to discover some means of avoiding these evils, and it was found that they might be modified by what are now called *dwarf* trees. Soon after the discovery of the arts of budding and grafting, it was found that by these arts the fruit of tall growing trees could be obtained from small ones of the same species, if the former were budded or grafted into the latter, thus reducing the size of the tree, and consequently hastening its maturity. For the new bud cannot receive from the smaller roots and stem of its adoption that amount of sap which it naturally demands, and therefore, suiting its demand to the supply, contents itself with what it can get, and makes its growth with less material, and thus produces a tree of a smaller size. Thus a new kind of tree, the *dwarf*, is produced. Experience has proved that these trees have not only the advantages above mentioned, but also afford a greater and better yield of fruit, proportioned to their size, than that of standard trees of the same species, for being less freely supplied with sap than is the case with standards, they cease to grow earlier in the fall, and consequently ripen their wood earlier, and mature their buds and elaborate their juices better, which of course improves the yield of fruit. Therefore were this the whole statement of the relative value of these two forms of trees, the case would be greatly in favor of the dwarfs, and all growers would at once destroy their standard trees, and make fruit and money by dwarfs instead. But there is another side to the question. The dwarfs have the great drawbacks of being rather short lived and very fastidious about the soil in which they stand. Besides, many of the choicest varieties of Pear refuse to be dwarfed.

To meet the difficulty of dwarfs being shorter lived, it is well that every third tree in your Pear orchard should be a standard; it will have room enough, and will be in its prime, when the dwarfs die.

To humor their fastidiousness, place dwarfs in a rich loam, deep and moist, but not wet; gravel they abhor, and in a close clay they never thrive long. Set them so deep that the Quince-stock will be buried from borers, and in time the Pear will throw out its own roots above the Quince, and independent of it. But fruit growers have been most aided in their struggle against these difficulties by the discovery that trees can both be dwarfed and brought to early maturity on their own roots. The process is as follows: Sow seeds of the Wild — but not of the Button — Pear, or transplant stocks as yet unbudded. In the fall of the next year, move them into a new and rich soil, cutting off the tap root; do the same in the following fall; thus moving the stock three times, the seedling twice, in two years. The effect of these frequent removals is to check the tendency to make long tap roots, and cause a mass of fibrous roots to be formed. Graft or bud at the proper time the next year, and in the succeeding spring cut down to the bud; either before or after cutting down transplant to the place where it is to bear fruit. Or you may vary the process thus: In the second fall, when the stocks are removed, they may be packed in damp moss and laid away in the cellar; during the winter, graft them; the next spring set them out in nursery rows again, and the fall or spring after, do the final planting, as just directed. Pear-trees treated in this manner have produced large crops five years from the seed, or the first setting out of the budded stock.

The dwarf has much less waste room than the standard; for as fruit grows on the small branches, or only on the ends of large ones, the latter loses all the space occupied by its large branches. The branches of the former being dwarfed as well as its height, the fruit is brought nearer the main stem of the tree, and the strain upon branch and stem is much diminished. The system of pruning recommended for Pear-trees may therefore be carried out to its full extent with such trees, without the danger that attends its too free application to standards.

Dwarfs should be grown in pyramidal form, that the lower branches may bear the most fruit, being in less danger of breaking from the weight, than those above. This form also occupies less room and gives more fruit to the acre.

Begin to prune as soon as the leaves drop in the autumn, and continue the work until spring. There is no danger to be feared of canker or loss of buds, if all cuts are made as directed, — neatly and smoothly, and in an upward direction. Some care must be taken, however, with the larger branches, to protect the cut surface from the air and water, which would cause the wood to decay, aud send disease throughout the tree. Where the cut is small, this surface is covered in the next season, by a natural growth of wood and bark; but otherwise, some artificial application must be made.

Many good receipts for such coverings, are given in treatises on these subjects. The two following are effective: —

Melt over a slow fire, three parts of clear resin to one of shellac, and apply while warm, with a brush. It will harden immediately, and be both air and water-proof. This preparation can be kept and used at any time, by adding to it as small a quantity of alcohol as will dissolve it.

The other receipt, which makes also a good grafting-wax, is 2 ounces of common resin, melted over a slow fire, till it is clear; add 1 ounce of alcohol, and bottle it; add enough alcohol from time to time, to keep it liquid. When about to set a Pear orchard, dig or trench the land thoroughly, even if you are able to plant but a very limited number at a time, the profits will be great in proportion. Cherries do not generally need much pruning, beyond the removal of dead wood and chafing branches. They should be dug round, but not manured.

The principles already stated, apply to the care of all other fruit trees.

Nut-trees need no more care than Cherries.

Be sure before the winter is over, to haul all the prunings from the orchard to the brush heaps, as you will be too busy in the spring to attend to it properly. They should be cut into short pieces, ready to use, as they make admirable fuel for heating boilers.

The proper pruning of Peach and similar trees, will be described hereafter.

CHAPTER XXIX.

THE FARM.

On the farm as over the rest of the estate, the last work of the season is to be done, and it is apt to be done in a hurry.

The remainder of the Root crop is now to be gathered, and with it the harvest closes.

Send the teams into the manure cellar, clear out what remains there, and draw it on to those fields which you intend to manure or to top dress during the winter, or early spring, unless the ground is too soft.

If the month prove wet, do not team the manure on to grass land, as the wheels would cut the soil badly. Any reclaimed meadow, dry enough for grass or culture, where heavy teams cannot go while the ground is open, must be dressed after it is frozen, when it will bear up the wheels,

Having cleared out the manure, draw into the cellar as much muck, leaves, litter, loam, or even sand, as you have time to collect. Fill the pig-pens with the same material, to the depth of a foot or two, for the pigs to work over during the winter (which they will do the better if you occasionally scatter a little corn over the surface), and as an absorbent of liquid excrement.

Draw into appropriate bins as large a quantity of leaves as can be collected for bedding. Neat cattle and pigs do not absolutely require bedding, but they are benefited by such care, and fatten much better. Farmers who most truly study their own interests, are careful to keep their stock warm and well bedded; knowing that this is a cheaper way to warm them, than by feeding alone.

A temperature of about 100° must be maintained in the bodies of all the higher animals to secure the performance of their vital functions; and in moderate weather this heat is maintained by the furnace within them; *i.e.*, by the combined action of the digestive, circulating, and respiratory system, which supply and bring into contact oxygen, carbon, and hydrogen in such a way as to effect slow combustion over the entire body. Food is the fuel in this process, better or worse as it contains carbon and hydrogen in larger or smaller proportions. In cold weather this vital heat is taken from the body by the atmosphere, and must be supplied faster or be prevented from escaping, if the animal is to be kept alive; just the same thing as is true of the fires in our houses.

The Creator has provided for this necessity by the warmer covering furnished constantly to those animals which live in Arctic regions, and periodically to those that are exposed to the winter of the Temperate Zone; and also by the instinct which leads every animal to prefer in cold weather those articles of food which are the best fuel, or in their absence to eat more freely of such food as has less power of maintaining heat. In the case of man reason teaches him to increase his clothing; instinct leads him to eat animal and fatty food at the proper time. Any excess of fuel in food is stored up in the form of fat, and in time of need is again absorbed and burned, as are our wood-piles. Of course this is not the only use of food, but it is the use with which we now have to do.

Nature then provides animals with means for resisting cold, and unless we are willing that our stock should be worse off than wild animals, we must give them in winter more fattening food than in summer, — grain, meal, roots, in addition to hay. If we wish them to be in better condition than wild animals, we must make it still easier for them to keep up the vital heat. In no other way can fat, the extra fuel, collect on them. But the fattening articles of food are the most expensive, and it behooves us to shut in the heat given by them and bring the atmosphere about our creatures as near as possible to that summer temperature, which does not chill them and urge them to eat largely in proportion.

In short the more heat without the less fuel needed within; in proportion as stock is well housed and bedded will it fatten with less food.

Bed all your creatures well, then; it saves the covering which nature gives them. Let none of them show bare knees, hips, or back from which hair has been rubbed by the hard floor or stall, but let every part of every animal tell the same story of care and kindness. Pile up leaves high in the bins, and even make temporary stacks of them.

It is true that you are thus robbing the soil for the time of its natural manure. Leaves are Nature's return, her interest paid for the summer's crop which she has borrowed from the earth, and the profit on the earth's invested capital, and rightly belong to the spot which produced them. By their decay beneath the trees woodland is annually enriched; by their removal it is impoverished. But one of the laws of agricultural improvement is that man may with profit impoverish one portion of his land, if by so doing he more than proportionately enriches another. The gain need not be made in the same proportion from every rod of land; the balance sheet may be struck for the whole farm. At another time the woodland may be attended to, enriched in turn, and the balance restored. Therefore be unwearied in collecting leaves from the woods and road-sides. The manure made from a given weight of leaves may be less in quantity than that from the same weight of any other material used for litter, but it is better in quality.

Blankét the horses as soon as the nights are really frosty; as with bedding the cattle you will both save in food and gain in appearance. A horse well blanketed and groomed is not the same as when his neglected coat is filled with dust and his shivering hide sets every hair on end. Cleanliness and friction are as good for his skin as for ours; their good effects are evident in his appearance and in his work. See that the cattle, too, old and young, are from this time well carded and brushed every morning.

As the nights grow cold the fowls will go to roost earlier and more regularly; let none of them roost out of their proper places; the younger ones particularly are inclined to seek new roosts about the stables and sheds; break up all such irregular proceedings as soon as you detect them. Feed regularly every morning — not much to the stock fowls, but enough to assure that their crop shall be full once in the course of the day; in accordance with the principles before recognized, increase the food of the fattening fowls, for all kinds of which there will be a great demand in the latter half of the month; for stuffing two or three weeks with boiled barley, corn meal, bits of bread, will entirely change the quality of the birds you propose to eat or sell at Thanksgiving. The rapidity with which they fatten, when once the process is fairly begun, is almost incredible. In all animals this process begins inside; they must store up quite a stock of fat amongst the muscles, along the bones, around the various internal organs, before the gain is at all apparent on the surface; but when it does begin to show there, the creature seems to gain while you look at it.

The greatest benefit will now be found in an abundant supply and use of water of irrigation; the Grass will be kept green and sweet long after it would be worthless unless so protected.

As good opportunities offer, purchase stock to be fattened in the winter. Sheep pay rather the best. I shall give you directions and advice hereafter.

TOOLS.—On the first wet day collect into the toolhouse all the tools, great and small, which belong there; scrub and polish them well with sand and water; oil with any cheap oil such as are not to be used again till spring, and hang them up; mend forthwith any that show the least need of repairs; carry to the carpenter or blacksmith those that are beyond your skill, and do not leave this to be done "any time," which is no time. When in good condition let them be returned to their shelves. You will find plough-points worn or broken, nuts and bolts gone, handles loose,—a thousand little things that have escaped notice, or been tolerated during summer and fall; and you should improve your leisure, and by attending to these little things, and by comparing the stock of tools on hand with the list of last spring, you will know not only what is left over from the summer, but also what can be depended on for next year.

Where the owner of tools is the only user, they are broken very frequently and mysteriously, but when they are committed to the tender mercies of hired laborers, the loss and breakage are frightful. The best spring supply of shovels, spades, hoes, and scythes will present, at the November muster, as sorry an appearance as

Falstaff's ragged regiment; hoes without handles, rakes without teeth, shovels with broken corners and centres, scythes gapped, snaiths broken, whetstones in pieces. Be courageous and undismayed at the result, and be sure of one thing, by making this November examination you will have twice as much next spring as if you leave the matter till then. A winter's cold and snows are a sponge to the memory of farm servants, and an excuse for all losses. No one knows any thing in the spring; the laborers, discharged at the close of the last year's work, and now scattered far and wide, are made to father all losses, and bear all blame; every new man will assure you, upon an honor not to be doubted, — because not yet tried, — that he never loses, nor mislays, nor breaks tools; he is the "new broom."

Any tools, the wood-work of which was originally painted, must be touched with paint wherever they are rubbed.

Run the hay-wagons, ladders, etc., under the sheds, and wash them clean; then examine, repair, and paint at once, for here, too, "delays are dangerous." Examine, repair, repaint the sleighs and sleds, that they may be ready for use when the snows come.

Go over the farm, and repair any fences where loose ends, boards, posts, or material can be in any way harmed by the winter's storms.

Haul an ample pile of short brush into a shed, for the use of the house and farm boilers. There is a double advantage in this; the farm is made clean and tidy, and a supply of the very best fuel for boilers is secured, which kindles quickly, burns fiercely, heating the boiler at once, and as soon as the need of fire is over goes out, with little or no loss from unnecessary fire.

As you now begin to feed regularly, *if you have fuel in abundance* boil or steam all the food used, unless it be hay, and even hay has been found to gain in nutritive quality from steaming. The water of boiling or steaming, called "hay tea," when fed out to milch cows, increases their milk cheaply and economically, and when mixed with the solid food is very nutritious.

Be sure to feed regularly, let the food be what it may. Remember how faint and irritable you become when one of your meals is delayed; not only are you so annoyed that the food gives less than usual satisfaction to the palate and mind, but your digestive organs are weak with emptiness; and in your haste to satisfy hunger, you probably eat too fast, fill the vacuum with half-chewed food, to your discomfort for a long time. Thus the foundations of dyspepsia are laid. Cattle suffer in the same way when their food is delayed beyond the proper time.

The same is true of food taken before the accustomed time. If you, like a rational being, live on plain but wholesome food, to eat a hearty meal you need a good appetite, more than if you were in the habit of creating an artificial appetite by stimulating condiments; when the proper time comes, hunger is the best sauce; but if food is placed before you too soon, you feel but little desire for it, and do not eat as much as usual. So with the beasts in your barn, whose only sauce is hunger. If fed before their stomachs are ready, they will smell over and reject much that would have been eaten with a relish if offered at the proper time.

See, then, how necessary it is to feed regularly. Feed often. Do not allow so long a time between meals that the hungry animals gorge like Boa Constrictors, when their food comes. Feed in small quantities, that all may be eaten, and no rejected and fouled remainder may lie before the animal to disgust it with similar food when next presented. Feed late at night; cattle do not, like men, sleep only at night; whenever there is nothing else to do they sleep; so our dietetic analogy no longer holds, and we need not fear that they, like us, will suffer from late suppers. On the contrary it is a weary interval for them to wait from the early supper through the long, cold night, till breakfast. Go into the barn just before your bed-time, and give all the animals a little, if it be but a forkful of hay. They will eat it up clean, and go to sleep much more contentedly for it.

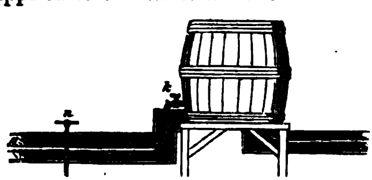
I know that animals, like men, may acquire habits of fasting; and if you kept animals without any interest in their welfare, and without a qualm of conscience, sought (like some keepers of stables) to get your money at the expense of others, it might — for one season — be for your advantage to disregard the natural requirements of stock placed under your charge. But you keep your creatures for their milk, their flesh, their labor or speed, and when the special object for which you bought them is attained you dispose of them. Consequently it is for your interest to aid the development of those peculiar qualities for which you procured each, and to this end all my directions have been tending. If you neglect them it will be from laziness, — either that laziness which prevents our acting upon our convictions, or that which prevents our being convinced, when we foresee that conviction brings with it increased labor.

Supply water regularly; animals need great quantities of it. Water is supplied to our barn in the following manner; of course other methods may be better for other localities. By a stop-cock the water can be at once let into the trough before each creature, so that he may then and there drink his fill. The advantage of admitting water thus is apparent in many ways. Careful milk growers have found, from experiment, that a cow's milk is shrunk appreciably by her being turned out on a cold day, into a barnyard to drink and shiver.

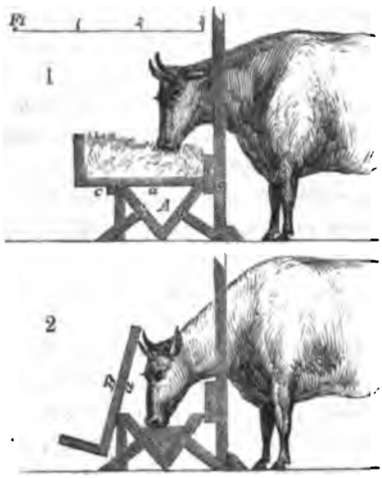
Horses, too, suffer more from want of water than can easily be imagined. Your horse is led out to water at sunset; from some reason he does not want to drink; perhaps it is but a short time since he had his dinner drink; he may be almost thirsty, but his instinct is not reason, and he does not know how to provide against a future want; he does not, like man, drink when he is supplied, though he may not need it, but only when his stomach cries "give." Hence the old proverb, "Any fool can lead a horse to water, but the Devil can't make him drink." He is returned to the stable and left with his supper of cut feed or of hay and oats before him; his stomach loaded with bulky food, soon craves water, but he must go without it; not for the few hours between breakfast and dinner, or between dinner and supper, but for 10 or 12 hours; and we all know how hard it is to bear thirst.

Within the barn water is supplied to our cattle as follows: —

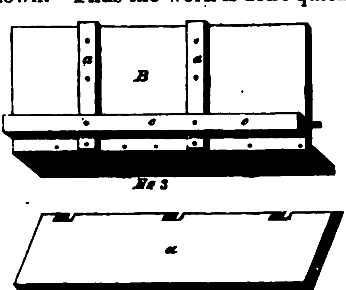
A pipe is brought from a spring into a hogshead which stands higher than the mangers. This pipe is laid below the reach of frost, and when it rises to enter the hogshead,



is enclosed in a charcoal-filled box 1 foot square, and thus secured from freezing, by an excellent non-conductor. By the faucet *k*, water may be drawn from the hogshead for any purpose. The pipe *g*, leads from the bottom of the hogshead to a set of mangers, and is also boxed in charcoal; the turn-cock *n*, controls the water in it.



The mangers are double and V shaped; the lower part (A in the wood-cut) is of 2 inch planks spiked together — or better of slate, — and is water-tight. Over this is a lid B turning on a rod by means of the wheel and axle. The upper surface of this lid is the bottom of the manger *a*, which is spiked or cemented to the trough below. When the lid B is down, the manger is entirely shut off from the water, and from it the cattle eat their food. When the food is eaten and it is desirable to let in the water, turn the cock *n;* a single turn of *c* throws up the lid B and admits the creature to the water in A. When all are satisfied, shut off the water at *n;* a waste pipe at the other end empties the troughs, and the lid is again shut down. Thus the work is done quickly, neatly, and under cover. For greater convenience in turning, the wheel and axle may be at the same end with *n*. Where there are several separate mangers, water may be carried to each in succession, from the same or from different heads; a water arrangement of a similar kind is working most successfully in the barns of Dr. E. Hobbs, of Waltham, Mass.



No. 3, bottom of manger.
No. 4, one side of the trough.

Remember that mineral poisons injure cattle as they do men, though not in the same degree, and do not use lead pipes, unless all the water which has been standing in them can be drawn off before any is offered to your cattle, either to drink or mixed with food.

Another advantage in not turning cattle out, is the saving contusions and similar injuries. In every linter there will be some cattle by nature bullies and quarrelsome, who will be sure to try to crowd and hook their weaker companions, who are often much injured in this way; besides the bullies often keep the more timid from the water troughs, even after they have themselves drank enough, from mere mischief; and the weaker creature will stand shivering and shaking, till the desire to drink is lost in the wish to hurry back into warmer quarters.

THANKSGIVING. — Taking leave of November, we close our out-of-door work for the year; and its end in that part of the country for which this book is particularly intended, will be wound up and celebrated by the annual Thanksgiving.

And what more fitting close can the year's work have, than a true and hearty thanksgiving for the blessings and mercies that God extends to all, but to farmers in particular.

Well may he, looking with overflowing heart at his abundant and well-housed crops and his happy cattle, return hearty and repeated thanksgivings for all this bounty.

Our Puritan fathers, when they instituted this holiday, little thought that they were but following the example of Pagan men, set long before the coming of Christ. These Pagans, after the harvest was gathered, met for joy and congratulation, and feasted on the fat of the land; but they went farther than this; they selected the choicest of the flocks and herds, and offered them in sacrifice on the altars of their heathen gods. Let us follow their example; let us remember that though our God is a Spirit, and cares not for the flesh of ox and lamb and fowl, and has no need of the tithings of corn and wheat, he yet claims his share. He has expressly said, "Whatsoever ye do to the least of these, *my children*, ye do also to me." Let us then select from the best the tithing for God, and divide it among the many poor, who have little to eat or wear; let their hearts, too, overflow with the gladness of the harvest time, and their store of comfort and prosperity so swell, that they may truly say, "Our harvest is gathered."

It is fitting that the farmer and his children, his servants, his very cattle, should each feel the glow of enthusiasm, now that they pause and look back on the successful year. No more joyful sight than the loaded table, the cheerful faces of kindred, young and old, the merry games of blind-man's buff, after the table has been cleared and set aside. Truly delightful it is to watch the fire as it flashes and flickers through the gathering shades of evening, when all draw their chairs around the welcome blaze, and listen to tales of the good old times, or recall the hurry of the past summer, when man, woman, child, and beast, each seemed nerved with a new and resistless zeal to hurry the hay-cart out of the way of the coming storm.

Then remember the poor, the sad and gloomy homes where no fire lights the hearth, where hungry and half-naked children quarrel over the fragments picked up by the road-side, or sorrowfully begged at the rich man's door; they sit in no cheerful firelight; they tell no tales of the happy past; their only memory is of sorrow, their best recollection of some fitful time when chance gave them food and fire enough for a few days. Remember them now, farmer, whether rich or poor! If you are rich, you are but the steward of a larger bounty; if poor, you are richer than those who have nothing. Go over your stock, select some fatted lamb, some well-grown turkey, some sacks of corn, some load of wood, and with truly thankful heart take it to those whom our Saviour has said "ye have always with you."

Such a close to the year may well crown it with honor, and save you from that mortifying self-reproach which ought to visit "the unthankful," when God sends "his sun to shine, and his rain to fall," on them even as on the thankful.

Now that the evenings lengthen and the cold drives you to the fireside, do not imitate the black bear, who at this season takes to his warmest hole, and there sucks his paws for dear life, content if he but get through to another spring. Remember that we do not live to work, but work to live; that the accumulation of wealth is not the end, but a means by which you and your children are to develop your minds, to cultivate your intellects; and to cultivate them for their own sakes, not for the money they may return to you in shrewder management and keener bargains. Your plainly spoken mission in this world is to fit yourself for another, — not by merely being or doing good, but by expanding your mind, and filling it with knowledge, which will in that other world, where the pursuit and attainment of knowledge will be the end and the occupation of each day, put you on a level with those with whom you are thrown, and will enable you to sympathize and advance with them.

Think over the year's work not merely to see how money has been made or lost, but how far you have increased your knowledge of the wisdom and mysteries of Nature.

Lay out your plan for the coming year; go over every field and every crop in your mind; see what is best adapted to each, and consider both how you may get the largest yield, and how when harvested it may best be used.

For the next few months there will be but little to say of the monthly routine of the farm, and I shall devote the space hitherto occupied by these details to a general inquiry into farming, its theories, its capabilities, how it may be of the greatest benefit to all, and what the country and country life offer to every man.

CHAPTER XXX.

ORNAMENTAL.

The ornamental grounds receive in this month the last touches for the season; for the next few months their beauty, for a certain beauty they will have, will not depend upon or arise from what we can do for them.

Go over the grounds, and trim and tie up all the ornamental shrubs which need attention, as directed in the flower-garden; surround tender plants with straw and Pine branches.

Spread over the lawn and all ornamental Grass, a good top-dressing of the finest and best-rotted manure. It will make the surface unsightly, but will compensate for this evil in the spring. Either before or after this dressing, the Grass should be well rolled, as it will thus be kept firm during the winter, and be less in danger of being thrown up by the spring frosts.

Examine all the roads and paths, and be sure that their surface is even and the gutters and drains clear, so that rain and melting snow may be rapidly removed without wearing and washing the gravel.

Take up and house all ornaments which will be injured by winter storms; renew any paint upon them, that requires it, early in the winter, that it may be thoroughly dry before spring.

Examine the dams and banks of the artificial water; at this season muskrats are very apt to burrow into them for winter homes, and do serious damage by letting in water, which gradually undermines the banks. Wherever there is danger of ice freshets in the spring, the banks may be fortified by sinking squared logs along the shore, by one end, while the other end rises several feet above the water; the ice will slide against the timber, and be caught by it, so as to leave the water free to pass off without injuring the bank. Unless this precaution is taken, the rapid rush of the water will plough the ice into the ground, and perhaps wash the bank entirely away. Mere water freshets need not be much dreaded, if the bank is covered with close, firm Grass, which will shed the water like a floor. To prevent injury from freshets, ponds are sometimes made large enough to hold this occasional increase of water, but this is a poor expedient, which sacrifices the beauty of the pond through the greater part of the year; and quite unnecessarily, as even close sodding is a sufficient protection to the banks. Sods laid even as late as November will be very useful in this way.

Planting ought to be quite finished before this time, and if it has not been done there is no time to be lost, as during the last of this month there will be heavy and cold rains, that will cool the earth and prevent the roots acquiring any hold. Trees planted now should be well staked.

The ground is generally frozen up by or before Thanksgiving. As soon as it is frozen have all the dry leaves raked up, or they will be blowing about all winter, and keep the grounds dirty and littered. If you have enough in the barns and cellar for bedding and manure, make a pile of those now collected and cover it with boards and branches. Or, better still, if there is any hole or pit about the place, fill it with the leaves wetted and matted together with the salt and lime mixture; in the spring they will have been converted into the best kind of mould for potting and for general greenhouse uses.

Go over all the trellises on which you have had deciduous vines, as Clematis, Madeira, Convolvulus, Apios, etc.; cut the straw away at the surface of the ground, untwine them from the trellis and throw them with the dry leaves.

The ornamental trees and shrubs may be pruned and trimmed into any shapes you please; but do not prune the tender ones, lest the operation should expose them to greater danger from winter killing.

The work is now to be closed for the winter, and during the long interval of frosty weather there will be ample time to lay plans for next summer's work.

CHAPTER XXXI.

GREENHOUSE.

DECEMBER. The care of the green and and other glasshouses now becomes the gardener's principal occupation, but it will be found enough to keep him very busy. Should the first of the month be warm, it may be possible to get along without fires, but only if the weather is very clear and bright; then the sun's heat will warm the house so thoroughly, that by putting up the shutters and letting down the covers early, we may retain heat enough to prevent frost during the night. The advice so often given that the house be covered with mats and shutters during all moderate weather, is "penny wise and pound foolish;" for plants are very much injured by darkness, particularly in cold weather, and even with the closest covering it is but rarely that fires can be dispensed with in December. Start your fires every cold afternoon, but do not let them heat the house higher than 45° to 50° at any time in the month.

Air the house thoroughly on bright and warmish days, and admit some air by the sashes every sunshiny day, unless there is a high and very cold wind, when all the sashes should be closed as tightly as possible, and the house be ventilated and aërated by the opening in the front wall, where the air enters upon the hot pipes, and by the ventilators in the back wall. Through them no high or cold wind can harm the house.

Carefully examine the plants daily, and pick off decaying leaves. Water sparingly, and syringe only on bright and mild days, when some air can be admitted. Give little or no water to the Cactus family and all similar plants.

In the hot portion of the house more fire heat must be kept up, so that the temperature may never fall below 45,° and may average 55° to 60.° Not only are the plants here natives of warm climates, but many of them are to be forced into flower in order to take their place in the conservatory. Water more freely than you did last month, and set pans of water over the pipes that they may send a constant and warm moisture through the house. Admit less direct air than in the greenhouse, as a chill will be much more severely felt than there. Let the ventilators be nearly or quite closed at night, unless the weather be very warm.

The exotic bulbs planted in the fall have now grown considerably, and must be treated like all other plants in the same stage of growth.

FUMIGATION. — It may be necessary to fumigate the houses this month, to destroy aphides and other vermin which are always present, and begin their work on tender shoots and foliage, as soon as they start. For fumigation take one or more common portable furnaces, such as plumbers use; make a charcoal fire in them, and set one under the middle, or at each end of the stagings; on the fire lay common leaf tobacco, — no matter how cheap and poor, — it will fill the house with a dense smoke. Do this about sundown, and leave the smoke in the house all night.

For aphides a gentle fumigation is enough, but for coccus and thrips, you must make a dense and pungent smoke. About 11 A.M., the next day, if it be mild and bright, open the sashes as freely as is safe, and let the air circulate.

This fumigation will destroy all living insects, but has little or no effect on their eggs, some of which will hatch in two or three days; so repeat the fumigation three times at intervals of two days. By the last time, you will probably have destroyed all that would trouble you for some weeks. A single fumigation injures the fragrance of the flowers as much, and renders the house as disagreeable, as three, while it does not half do the work. After the last fumigation, air freely, and syringe well with water which has been standing in a warm place long enough to lose its chill; this will remove all dead insects and feeble leaves. Thorough fumigations early in the winter, often suffice for the season. The gardener must judge however, as to the necessity of a repetition. To fumigate a few plants, you may put some charcoal coals in the bottom of a small pot; on this lay tobacco; invert over it another pot of the same size, or a trifle smaller. The smoke will come out through the hole of the top pot quite cool.

Another kind of work should also be done often; viz., washing the pots, were it only to improve the appearance of the house. Many gardeners insist that the green and slimy accretions on the outside of the pots do no harm, and may as well be left there. That the injury to the plant in the pot is small, is doubtless true, but such collections of fungi, foul the air of the house, and render the task of keeping it clean and sweet much more difficult. Scrub the pots clean occasionally, with sand and water.

Cleanliness is a leading principle in all successful hothouse culture, and it will be found that the houses most infested with mealy, scaly bugs, aphides, etc., are those where the pots and plants are allowed to become dirty and mossy.

Bulbs from Seeds. — The last of December is the time to sow seeds of Ranunculus, Anemone, Auricula, Cyclamen. When large quantities are required, separate beds must be formed and treated with special care; but we need few. Ranunculus and Anemone are rather shy.

Take shallow garden pans, with holes for drainage, and cover the bottom with an inch of good potting-earth, from which all earthworms have been carefully removed, Sow the seed thinly over the surface, and cover with a shallow dressing of the same earth, never more than quarter of an inch; set the pans where there will be direct light and a moderate bottom heat. The earth must be kept moist by daily gentle watering, through a pot with a very finely pierced rose; the water must fall very gently and regularly. Keep the pans always in a uniform temperature and state of moisture. When the seeds have germinated and begun to grow, treat like all other bulbous plants. They will grow rapidly, and mature in the early summer. As soon as the leaves have fairly withered, carefully examine the earth in the pans, and pick out all the roots; many of them will be very small. When all are gathered, dry and lay them away like the larger ones for planting, in the following fall. They will begin to blossom the third year from the seed.

Examine the cold pits as often as the weather permits, and give air and light; remove all decayed leaves, and, if the plants seem to be suffering for want of moisture, water gently and slightly, through the nose of the watering-pot. Daisies and Neapolitan Violets may be brought into the house to flower; repot Carnations coming into bloom; nip back strong shoots of Pelargoniums, to make them stocky, and repot young plants; water Cyclamens liberally, and repot Achimenes and Gloxinia. Head back plants lately removed from the ground, for reasons already given.

Persons who have no glasshouses, and wish to grow a few bulbs for the early spring flower-garden, need not start them till later in the winter, when directions will be given.

You may now pot out of the seed pans, some Lobelias, Nierembergias, Gilias, Nemophilas, etc., which are to be suspended in different parts of the house, from the pillars and brackets, as hanging plants. Select for the same purpose some of the fine foliaged and drooping Verbenas, and Lantanas.

Attend to the bulbs in glasses. If you have not put them into glasses, do it at once. Bulbs usually grown in glasses may be set out in pots, like those previously described for that purpose. Do not cover the bulbs to more than half their depth.

Any Pinks, Chrysanthemums, or bulbous plants, taken from the garden, which have ceased flowering, may now be removed, and the bulbs left to dry up slowly. Remove the Pinks and Chrysanthemums when out of bloom, to the back of the house; set them under the shelves, or in a cold pit, and supply their places with succession plants, or some taken out of the pits. Water them very rarely. the bulbs and Chrysanthemums may be allowed to grow quite dry, but the Pinks will need water and care occasionally, till spring.

Pot well-started cuttings which are for spring bloom; repot Roses which are growing strongly; Tree Peonies will bloom in spring, if taken out of the garden and potted; Japan Lilies can be set in pots in the cold frames.

CHAPTER XXXII.

CONSERVATORY.

The directions for the conservatory are nearly a repetition of those for the greenhouse; as before said, keep it warmer than the greenhouse.

Daphnes, Pettosporums, and similar plants are coming into blossom, and need more water than before; all these plants, Camelias, Azaleas, and the like, are much alike in general character, and need similar treatment; they should have a peculiar house to themselves. As we have no such house, but are obliged to keep them in the conservatory and greenhouse, I will describe the treatment of the Camelia, which is the most capricious, with some minuteness, premising that the others are to be managed similarly.

Camelia. — The Camelia can endure a very considerable amount of cold for a short time, during the season of rest. The thermometer may fall 2° or 3° below freezing, and yet the plant be uninjured; but this tolerance of cold is only at certain times; when the plant has blossomed and begun to grow, it needs a great deal of heat and an abundance of water; — there is but little danger of giving too much; — when it has made its growth and formed its flower-buds, it relapses into a dormant state for some months, and so remains till vegetation begins again, a period which varies according to the time of flowering. The proper time to examine and repot such plants is just before the renewal of growth. The Camelia generally blossoms very fully, then rests a few days, and sometimes a week or two, then begins to make its new growth, and needs, as I have said, plenty of heat and moisture. When the new wood is formed, the flower-buds make their appearance. When they are formed, gradually diminish the supply of water and heat, giving only water enough to prevent drought, till it recommences its growth. It is impatient of standing water, and requires thorough drainage. In the summer, which is usually its dormant season, it may be removed from the house, and set in some cool and shady place, where it is well to bed it in coal ashes to insure the immediate and thorough absorption of falling water, and to prevent insects or worms from getting into the pot.

As before said, examine its ball of earth just before the roots begin to grow again, give fresh loam, and if need be, repot; it is rarely necessary to repot large plants oftener than once in two or three years, the time depending on the thoroughness of its drainage and the quality of the loam in which it has been planted. Many specific preparations of earth have been proposed for Camelias. The best and most reliable is good virgin loam. If this is rather tenacious, reduce it with pure sand. The only means of subsequent enrichment is liquid manure, which should be applied, according to the best English growers, only during the season of the plant's repose, never during flowering or growing.

As soon as growth recommences the flower-buds swell; two, or at the most three, are all that should be allowed in each cluster; if more appear, thin them out with sharp-pointed scissors; if this be not carefully done, they will crowd each other off.

By no means bring them at this season into a very warm house, for much heat will cause the buds to fall off; keep them as cool and well aired as possible. If they get dusty, sponge the leaves or syringe very thoroughly. The general health and good treatment of the Camelia are proved by its breaking all its buds at once, as it starts afresh. It is very apt to lose its lower buds and grow from the top only, thus spindling up and becoming naked below. Take every possible means to prevent this. Be sure that the supply of water is regular and abundant when the buds are developing, or they will drop. The other plants named are not so shy or difficult to manage as the Camelia, but need the same general treatment.

AZALEAS. — As regards soil, the Azalea, Erica, and Rhododendrons prefer peaty soils, and if good peat can be had, it should by all means be used especially for the Ericas.

The variety of Azaleas is great, and they are a beautiful family of plants, whether we refer to the Azalea Viscosa of our own swamps, the Azalea Pontica of the flower-garden and shrubbery, with its many varieties, or to the yet more varied Azaleas of the greenhouse. They are easily grown from the seed, from side cuttings, and from grafts. "For seeds, the soil is made smooth by white sand; as soon as the seedlings have made two or three leaves, transplant them to store pots, — many together, — in sandy peat. The seed pans should be put where they will have bottom heat. Cuttings are prepared by taking the tops of the young shoots when 3 inches long, cutting off the lower leaves, and leaving the upper; many should be put together into a pot three-fourths full of peat, one-fourth white sand; water gently upon planting, and cover with a bell glass; set in a shady place, where the temperature will be from 50° to 60°; after they have made roots, remove the bell glass — during the night at first, and finally dispense with it wholly — to harden them; at last, pot in 2½ inch pots, and keep them shady and warm till they are well established, then treat like all other hard-wooded plants;"—like the Camelia, in general they bear pruning well, and may therefore be shaped as you please. If from imperfect drainage or any other cause the roots become diseased, examine carefully when you pot, cut away the dead, and give the living roots a fair chance.

The chief objection to the Azalea is its liability to die without much apparent cause. It often dies at the surface of the ground. Grafting the tender into the more hardy is no protection, as they die just above the stock. They are also very much attacked by the thrip; "the best remedy (for the latter) is, to prepare strong lather of soap and flower of sulphur, in a tub, and to immerse the plants two or three times in it, setting them again on their stages, and shutting up the house or pit close for two or three days." (McIntosh's Book of the Garden, p. 684.) At this season, water but little till they commence to grow.

The Oleander is another very fine conservatory and garden plant; it is a strong, free grower, may be got from seeds, or cuttings either of the new or old wood; the latter root freely when hung in bottles of water. The trouble with the Oleander is its shyness in blossoming. It should be planted in strong, rich loam, and when the flower buds appear should stand in pans constantly full of water. After it has blossomed it should have as much sun as possible, and little water, till the spring of the next year, when the watering and stimulating should be recommenced.

A glance at the Oleander shows that three shoots start from the growing points, which in large plants are the flower shoots. If you would have a plant or a part of a plant blossom freely, rub off the young shoots as soon as they appear at the base of the flower buds; all the sap will then be thrown first into the buds, and will consequently develope magnificent flowers, while three other buds or shoots will start lower down on the branch, which terminates in the flowers. By carefully attending to this you will not only get much better flowers, but will keep the plant in much better condition and shape, as without pruning it often becomes straggly and unmanageable.

Cut down the plants every spring, after flowering. Once in three years you must repot. If you cannot obtain pots large enough for the entire roots, pare the ball with a sharp knife, on the sides and bottom, till it fits the pot; after repotting set in a shaded place, and in a few weeks the roots will form anew.

By thus carefully watching and managing Oleanders you may obtain their full and great beauty. They are great ornaments to the garden in summer, whether in pots or tubs, above the surface or sunk in the open ground.

Rhododendrons are quite as impatient of heat as Camelias, and need more water while forming their flower buds. They may be freely grown from seed, cuttings, layers, or by budding. Daphnes are freely grown by cuttings, or by grafting on common sorts of the same species. In December hang up here, as in the greenhouse, the plants which you wish to have pendant from the roof and windows. Give Acacias, as they come into flower, abundant water.

Now is the time for persons who have no large estates or garden structures for keeping and growing plants, to do something in a small way, by which they may secure the delights of flowers and plants in winter.

Some persons have a knack at making all kinds of plants grow in the most unfavorable circumstances. I think this is partly owing to a magnetic attraction existing between such persons and their plants. The plants seem to know that they are loved, that they are household treasures, that every new leaf and flower is as welcome as the new words and expanding thoughts of a baby to its mother. Apparently conscious of this, they do their utmost, and in places the least adapted for successful house culture of plants, we often find stands or individuals equal to the best greenhouse specimens.

I was never more impressed with this than in the town of Beaufort, near Quebec. The road winds along beside the St. Lawrence, and through a village of French people, who have preserved the customs of their old French ancestors, and whose houses are reproductions of the picturesque cottages of Northern France. Their climate is very extreme, and the thermometer, for months together, is 10° or 15° below zero. The houses are some of stone, some of wood, plastered on the exterior, heated only by stoves, and yet in the early spring there may be seen, in almost every cottage by the road-side, large plants — Roses, Pelargoniums, Fuchsias, some five or six feet high, and not in blossom merely, but so filled with flowers that the leaves only served like the green in a bouquet, to show the flowers to better advantage.

Apart from the singularity of such successful culture under these unfavorable circumstances, how beautiful it is to see these, or any flowers, in the houses of the poor! it is a proof that there glows in the heart of the occupants a recognition of something in life more worthy of admiration than the merely practical and bread-earning. A few flowers in the window, a border neatly trimmed and kept in the front yard, a vine trailing over the door, along the eaves, or overhanging the architrave of the window, are the best possible proof that the dwellers in that house are, whether rich or poor, capable of rising above the troubles and cares of life, to the higher and better regions of Nature and God.

We talk often of natural and revealed religion which point us to the earth, to the universe with its wonderful mechanism, as a proof that there is a God, and that no such wonderful elaboration, where each part fits into its appropriate place, and where the whole machine, subtle, grand, and simple, works so calmly and perfectly, could have existed except by careful design. They tell us that the proof is overwhelming that one mind arranged every part and detail before the world was started on its career; and undoubtedly their argument is just and weighty; but it has not half the power that lies in the color and fragrance of the Rose, the twinkle of the dew-drop, the flashing, shifting ripple of the brook, the calm, holy, and indescribably beautiful reflection along the shores of some wooded pond or mountain lake. These are the visible manifestations of God. He is the Beautiful; and when we love and cultivate the beautiful, we love and cultivate his plain outward manifestation.

Every flower that blooms, every crystal or water-drop that glistens, is a proof positive of the presence and all-pervading influence of God; and every heart that is open to the love of a flower even, is open to the love of its Maker; though covered, concealed, unacknowledged, it is there, and sooner or later the simple flower will lead its lover to other higher loves. Teach children to love flowers, waters, trees, skies; open their hearts early to all the powerful and subtle influences of nature if you would have them noble and worthy men and women.

God might have made the whole earth green; might have spread no varied feast of form and color for the eye, without a change in the daily motions of the heavens or in the daily events of life; and yet how different a world would this have been! how dull and uninteresting! Take *color* from the forms of creation, and you take away a stimulus without which the mind would grow dull, listless, indifferent to some of the highest pursuits which now engage it. The constant presence of beauty is the strongest evidence for the immortality of the soul.

The annual death of the leaves and flowers, and their annual resurrection teach an unmistakable lesson. The dewy mornings, gentle verdure, and whitening blossoms of May and June, have appealed to the noblest and best in man since history's earliest record; the rich summer beauty and luxuriance of July, the brilliancy of October, have aroused and ennobled innumerable minds; and we, who in the enthusiasm of youth or maturity of manhood reverence and admire the beauty of nature, are worshipping the same outward revelations of God, which have appealed to mankind for many generations.

The simplest flower, a single bud, the crimson spider that flashes about in our ponds and rivers, the sea anemone achored to its rock, are all parts of, and necessary to, the whole wonderful beauty of nature. In beauty there is a law of gravitation; each atom attracts the whole in proportion as it is itself attracted. The simplest object in the natural world is as important, as well-recognized by God, as valuable to the discerning eye, as the greatest and most impressive. Therefore, cultivate a love of the beautiful; cherish every flower you may. Be sure that whoever truly loves a single flower, whether in the home of wealth or in the Five Points of New York, has in him some recognition of goodness and purity. Never sneer at the humblest stand of flowers; the poorest specimen. The Geranium growing in the broken tea-pot that stands on the dusty sill of a dusty window, in a fever-stricken town, may have a value in the eye of its owner and a power of good over his mind, not to be equalled by the rarest conservatory or the most beautiful garden of a rich man.

Do not think that this book is written for the rich, to promote their ease and luxury. It will be a greater satisfaction to me to awaken the class of day-laborers to the value and power of beauty; to show them how they may arouse in themselves and in those they love, an appreciation of Nature and Nature's gifts to her worshippers, than to show the rich how they may get a greater return in beauty or fruit for the money they expend on gardens and pleasure grounds. I would impress it on all classes, that loving ennobles and purifies the soul; loving is of value according to the nobleness of the thing we love; and he who in his little village-garden grows and loves his flowers for their own purity and nobleness, will receive a richer reward and get a better — because an inward — growth, than he who pours out his money like water to produce rich gardens and costly plants, that they may be external and evident proofs of his wealth and power.

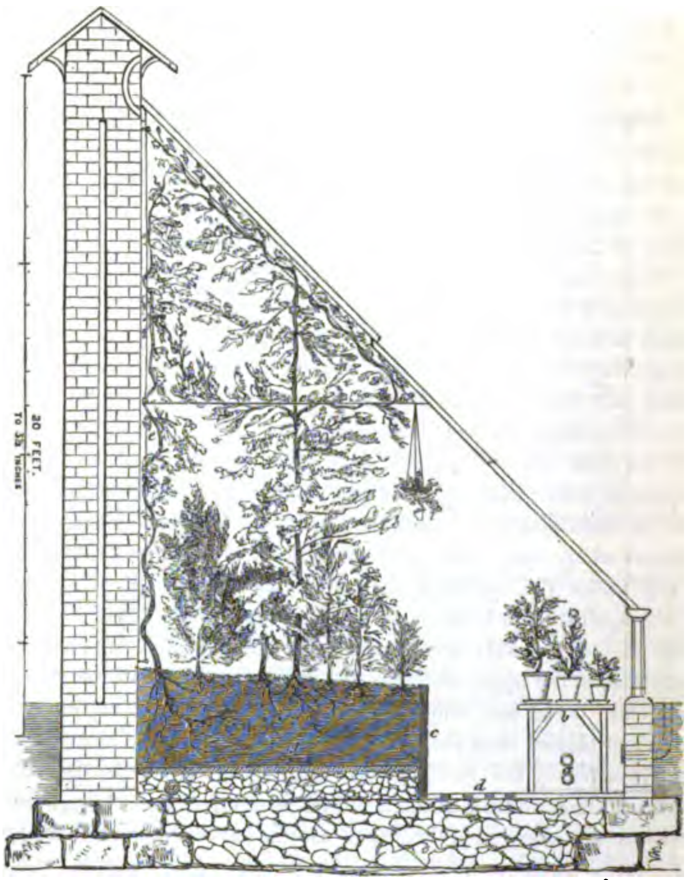
Before we leave these winter months, I hope to show both that this is true and that the love and pursuit of agriculture is the legitimate occupation of the best portion of our nature.

I have described planthouses fit for men of large means. I will now describe a

CONSERVATIVE PIT on a large scale, but not very costly to make or expensive to support, which will return an unlimited amount of satisfaction. Such a pit might be erected on the L roof of a city house, may be large or small, cheap or costly, according to the fancy of the builder. I shall describe it as standing on the ground.

Stake out a parallelogram 18 x 30 feet, and dig it out to the depth of 3 feet; along the front side and at both ends lay a solid stone or brick wall 3 feet high. At the back erect a solid brick or stone wall 3 feet high, and above this a hollow brick wall 24 inches thick and 20 feet high. In the base wall on the front and ends leave openings for ventilators as shown in the plan. In the top of the front side of the back wall leave tubular openings 4 feet apart, as shown in the plan for top-ventilation. All these openings in the walls must have tight covers on the inside, and wire gauze covers where they open into the outer air. The top-ventilators open under the coping of the top of the wall, which will protect them against high winds. In other respects the exterior is made like that of ordinary greenhouses; the glass roof is divided into two sashes, the upper sliding over the lower. Refer to the plan of the end. *e* is a door which slides to the right to give entrance; it is 3 feet higher than the floor of the house, being on a level with the surface of the ground, and steps which curve to the right descend from it to a path (*d* in the section), 3 feet wide, which leads to the other end of the house. On the left of this walk is the pit.

PIT. — Mark out a parallelogram 9 feet wide x the distance between the walk at the foot of the steps and the other end of the house; lay a tile drain and a pipe for heating the soil, through the length of this parallelogram; at each corner drive down firm posts, Red Cedar or Locust, or squared stone posts, not less than 3 inches square in the clear; to these posts, if of wood, spike closely matched 2-inch planks; if of stone, fasten by bolts and iron straps

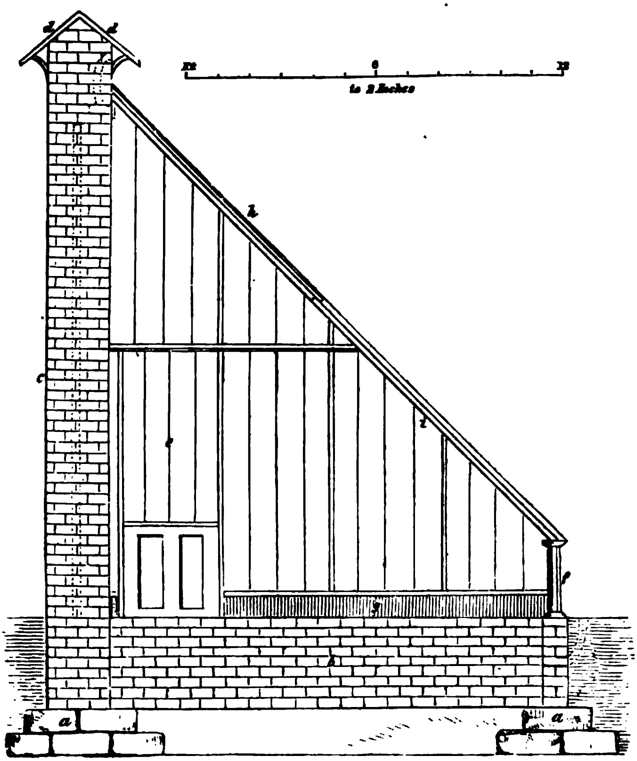


SECTION OF CONSERVATIVE PIT.

SCALE. — One-fourth inch to the foot.

***a, a,* hot-water pipes; *b*, table, 3 feet wide; *c*, plank or slate front to pit; *d*, floor of walk —strips of wood or slate; *e*, trellis for vines; *f*, gravel underdraining for pit; *g*, earth, etc., in pit, 2 feet deep in front, 3 feet behind.**

slabs of slate 1½ inches thick; carry up the planks or slabs 3 feet in front, 4 feet at the back of the ends, sloping gradually to the front. There is no need of planking against the back wall. Fill into the space thus enclosed.



END OF CONSERVATIVE PIT.

SCALE. — One-fourth inch to the foot.

a, foundation wall; *b*, brick foundation, 3 feet high; *c*, double wall, 2 foot thick; *d*, tiled slope for the top of the wall, protecting ventilation tube; *e*, door, 3 feet wide; *f*, sliding sash; *g*, wooden base; *h*, top sash sliding over; *i*, lower sash, fixed.

Over these stones lay 6 inches of tough sods, over the sods 3 inches bones and oyster shells, over these 3 inches best loam, over the loam 3 inches of bones etc., as before, and 6 inches well-trodden, unfermented horse-manure. Fill up to the edges and slope nicely with the best loam you can get. Leave all to settle for a fortnight or two; then fill up anew with loam. Into the top of the back wall drive a row of staples 4 feet apart; do the same at the bottom, and between the rows stretch coarse wires for a trellis; at the foot of each wire plant a choice running Rose (Safrano Tea, La Marque, Cloth of Gold, etc.); cut them down within two buds of the surface. Over the rest of the pit plant what you like: Lemon Verbenas, Bourbon, Tea, and China Roses, Heliotrope, Sage, Lantana, Verbena, China Orange, and other and smaller plants; among these Double English Violet, Daisy, Lysimachia, Lycopodium. Set the plants in August, and let them all be small, so that as they grow you may give them shapes as you prefer. *b* (in the section), on the right of the walk, is a table 3 feet wide and 3 feet high, to hold pot plants, cuttings, boxes of Cucumbers, Melons, or Strawberries, or any low-growing plants; under the table carry a double hot-water or steam pipe, with a coupling to connect at will with the pipe under the pit.

Do not put on the sashes till late in September, and only then if hard frosts threaten; after the sashes are on, leave them open and air the house as much as possible; get what heat is necessary from the sun and the use of the shutters and mats, and do not resort to fires while you can avoid it. Keep the temperature as low as 40° to 45°, till the last of December; gradually increase the heat if you cannot otherwise keep out frost, but rely principally on the increasing heat of the sun as the days lengthen.

The plants will begin a slow growth in October, and gradually throw out a few leaves and blossoms till January; in this interval water sparingly; as December grows old, give water lukewarm and in greater quantity; the plants will soon begin to grow vigorously. During the rest of the season, till warm weather, water and syringe as in other greenhouses; keep a moderate temperature during the night, and let the sun heat the house thoroughly during the day; the plants will soon begin to blossom freely. Train the vines on the wire trellises as fast as they grow: they will grow the better, and you can give them any shape.

Here, as in other houses, the plants need fumigating. Once a month give a copious watering of liquid manure, made as before directed.

During the coldest weather, connect the pipe which runs under the pit so as to warm the earth below, but only in a moderate degree; it is not desirable to stimulate growth by bottom heat to any great extent, but to give just enough to keep the roots warmed in proportion to the increased heat about the branches.

As the spring advances, use the front shelf to start cuttings for bedding out, and to grow plants for the kitchen-garden.

Later in spring withdraw fire-heat, and toward the last of April give less and less water. By the first of June take off all the movable sashes, and entirely cease watering, or in droughts water just enough to save the plants from being dried up. Under this treatment they will cease to grow, and will ripen their wood; when this is effected, cut them — vines and all — back as much as you judge sufficient to enable them to blossom and grow next season without crowding. If any of them do not suit you, this is the time to substitute others. Cover the top of the pit with a liberal dressing of well-rotted manure, and dig it in carefully with a foot or hand fork. After August, follow the directions already given; *i.e.*, begin the year again.

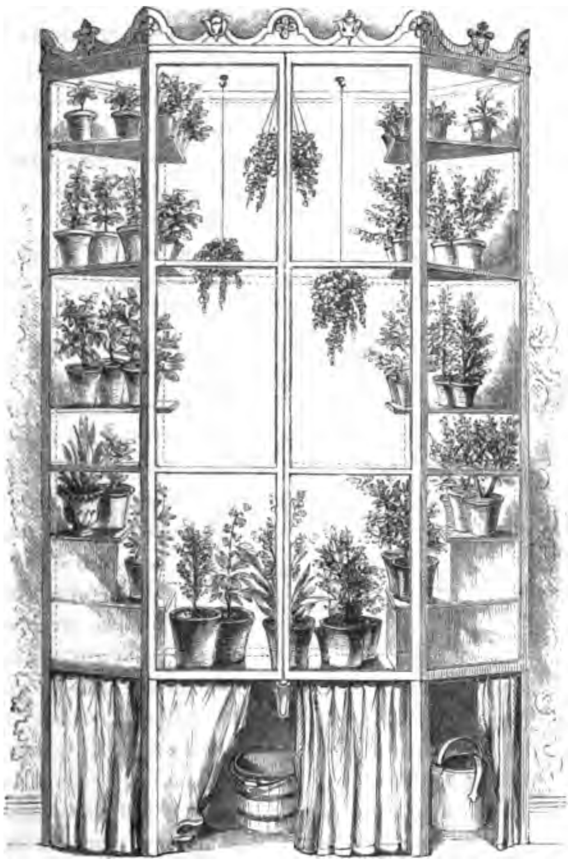
The fire and boiler-room is not shown here. If the dwelling-house is heated by hot water or steam, its pipes may connect with the pit; or a simple flue and fireplace may be built at one end and instead of hot pipes, a brick flue, through which all the fire and smoke must pass, may be carried along the ends and front of the house. Water may be caught from the roof, raised from a well, or supplied in whatever way is most convenient; the fire and cistern, are in a small shed at the back of the house. If the cistern is above the level of the floor, a pipe may be led from its bottom to the centre of the house, in order to lessen the labor of carrying water.

The cost of a house built on this plan may be greatly increased or reduced, at the fancy of the proprietor, and will depend on the amount of ornament and finish. When present cheapness is the grand desideratum, substitute for the brick walls double wooden ones, built like those of an icehouse, with a space of a foot, at least, between, into which sawdust is put, or which is back plastered. Clapboard on the outside, putting tarred paper under the clapboards; inside use tarred paper under sheathing or lath and plaster.

Such a wooden house, 18 × 30 feet, can be built now, and in the vicinity of Boston, for about \$600; a brick house, for \$800 to \$1000.

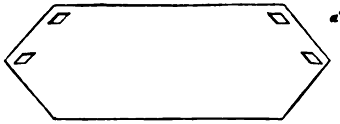
A person of small means may think I have hardly made good my promise to describe a cheap house, since \$1000 for such a purpose is scarcely more easily spared than \$2000. And, of course, only those who have some balance of money to their credit can afford any planthouse; such things are out of the question for men whose every moment is spent in struggling for freedom from debt. But for one who can afford it the first cost named is very small in proportion to the return which will surely follow, while the after cost of keeping the house will be very small. It is easily warmed, not requiring more than 3 tons of coal at the utmost, probably not more than 1½ or 2 tons. Most families could manage it without the help of a gardener, there being no necessity for potting or starting slips, no grape vines to be watched, pruned, and thinned. The work is simple, and if you choose, you may carry the plants with which you start through many years.

But beware of one error with regard to this house; viz., the calculation that it will pay a portion of its cost, or its running expenses, by sales of flowers and plants. Professed gardeners may do this, but the attempt will only bring to an amateur disappointment and annoyance. He will always *scrimp* himself in cutting flowers, lest he may not have enough for sale, and will never be satisfied if he does not succeed in making money out of his house; but if he undertakes it with no expectation of pecuniary return, he will get his pleasure without any disappointment, unless it be the pleasant one of an unexpected surplus, which may bring in a few dollars.



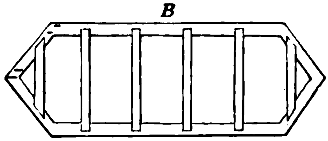
Window Gardening. — A few plants can be effectually cultivated on a still smaller scale, and so as to produce a very pleasant result. In any room where a fire is kept up throughout the winter put up a window-case. A bay window is the best for the purpose, as it projects and receives sun and light from several sides, but other windows will answer. The above engraving represents a three-sided bay window, projecting 3 feet beyond the room; if you can afford it, make a double window of this, with a pane

A



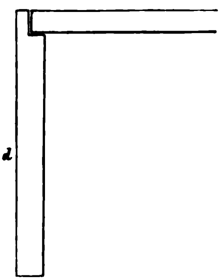
a′

B



c

d



in the top of each of the two outer side sashes, swinging on hinges, so that by lowering the inside top sash, and opening one or both of these swinging panes, cold air may be freely admitted to the case. Now cut a piece of $1\frac{1}{2}$ inch planed plank to just fit into the window on one side, and to project into the room as far as you please on the other, where it may be cut into any shape which suits you. In the cut it is of the same shape as the portion within the window, so that the whole is a hexagon. This plank, A, is to be the ceiling. Into its four front corners sink holes to receive the posts, which are to form the frame of the window. (See cut, *a′*, post rebated to hold sash.) The size of the posts is decided by the height of the window, and they are chamfered on the outside to meet the angle of the hexagon, which they are to occupy, and rebated on each side deep enough to hold the sash. Now construct a framework, B, of 2×3 planed joist, just the size of the plank ceiling, and with holes corresponding to those in the ceiling; countersink in opposite sides, grooves or cuts 1 inch deep and 2 inches wide, 1 foot apart; into these grooves fit planed slats. As the bay window does not reach the floor cut four 3×4 smoothed joists, to reach from the floor to the sill. Screw them against the four corners of the window. Cut two other posts, *c*, 3 inches longer than the first four, and halve their tops, so as to make a joint, on which the frame of the floor of the window-case may rest. Have a zinc pan made which will just fit the floor of the case, and make a tight joint all round; its edges must be turned up 2 inches to prevent any water spattering over upon the floor, with a one-half inch waste pipe in its centre, to discharge water into the pail below.

Paint the whole inside wood-work thoroughly, with at least two coats of best zinc paint; when this is dry, put the pan in its place. Make two small stagings which will fit into as much of the two opposite sides of the case as you please; they should not be nearer each other than 2 feet, and their shelves should be not less than 5 inches wide, with a rise of 4 inches for all; or the first 3 inches, and each other step two more than the last. The number of the shelves will depend of course on the area of the floor; they may be carried straight across or curved concavely; the latter being more pleasing though not quite so well for the plants. Against the sides of the window and case you may carry up shelves 1 foot to 18 inches apart, to the very top. Screw some hooks into the ceiling from which to hang drooping plants; they should be hung with cords of different lengths, so that when well grown they may form a kind of arch with the plants on the sides. Paint stagings and shelves before plants are set on them. From the bottom of the case hang a curtain to conceal the pail — which must stand under the pipe before mentioned — and the various utensils used in managing the case.

This case is a miniature greenhouse. It will be thoroughly heated by the sun which shines on it during some portion of the day, and if enough of this heat cannot be retained to warm it through the night, the doors should be thrown open to admit the warm air of the room.

It should be stocked with a variety of plants. Set near the posts pots of vines, as running Roses, Smilax, Tropeolum, Wax-plant, Solanum, etc.; on the stagings and in the pan set Geraniums, Verbenas, Heliotrope, Lantana, Cuphea, Fuchsia; in shaded places, Daisies and Violets; on the shelves, drooping Fuchsias, Mahernias, drooping Heliotrope, Lobelia, Nierembergia, Gilia, etc.; hang up any you please of these last.

Of course you are not confined to these plants, but they are enough to give a good variety; be careful not to get too many and crowd the case.

Suppose all this to have been done early in October; during the rest of the month, and the whole of the next, water sparingly and give plenty of air; do not induce the plants to grow more than is quite natural. The sun's warmth will be enough for day and night. In December set the bulbs in their glasses into the front of the case; water sparingly, and on very bright days syringe thoroughly. Still keep the temperature low, not higher by the sun's heat than 75° in the day, and at night let it fall as low as 40°. In January water more freely and with tepid water, syringe twice a week, and keep the temperature at night as high as 50°. The plants will now begin to grow. Once a fortnight give weak manure-water. Admit air as often as the outside temperature allows. During the day let the case get as hot as 75° to 80°, and at night fall to 55°; follow this treatment till spring. Your plants will be healthy, grow strongly, blossom freely. Whenever aphides appear, fumigate three times, allowing an interval of two days for the eggs to hatch; after each fumigation, syringe well to clear away the dead insects.

For your fumigations you may use a small brazier or an alcohol lamp with a wire netting supported over the flame, which should be as small as possible, that the tobacco laid on the netting may burn slowly, and the smoke not be too hot.

Any severely cold night frost may be kept out by shutting up the case, first setting inside a large, lighted solar lamp. Its heat will keep out frost.

In late spring take out all plants not trained to the wood-work; set them in a cool, shady place, and reduce their water till they stop growing. Do not withhold water entirely, or allow the earth to become dry in the centre of the pots. When they have thoroughly ripened their wood, cut them down to a convenient size.

In August, or at the proper time for each kind of plant, repot, shifting to larger pots if necessary; examine the roots, give fresh earth. Put them into the case again in October; but before doing this examine and scrub the paint and wood-work; stop all leaks; fumigate with sulphur and tobacco of such strength as will kill insects and eggs, but not affect the paint.

A very neat case of this kind can be made when the window is flush with the room, as in ordinary windows, especially if the window selected lies between the chimney-breast and the wall, so that three sides of the case are made by the chimney-breast, the opposite wall, and the intervening window. It is best to have all the sunlight possible; but sunlight is not indispensable, although abundant daylight is. For this reason, if not for beauty, it is well to have all sides of the case of glass, as the plants thus get more light and grow more symmetrically.

A very neat and pretty case of this kind can be built for $15, and stocked for $5 or $10, and once built and stocked it costs nothing more while it lasts. Its great advantage over plant-stands for rooms is, obviously, in the facility it offers for excluding dust, for watering, syringing, fumigating, and regulating heat. Such cases may be made on the outside of windows, but unless very carefully built it is impossible to keep them warm enough. The contrivance was suggested by the

WARDIAN CASE, — which is another simple and pretty method of growing a few plants in a room. In original theory, the Wardian case was air-tight, but in practice this is not necessary; indeed, it is found that by considering the case as a small greenhouse, and managing it on greenhouse principles, a more perfect result is secured; the advantage of the Wardian case being in equality of temperature and moisture, and in protection from dust, rather than in the exclusion of outside air; the latter being in fact nearly impossible, because air will find its way through the earth and pot.

It is from badly regulated supply of moisture that room plants mainly suffer. Out-door plants are supplied by rains, by winds, by local currents of air which bring moisture where it is needed; and the importance of this supply is shown by the stunted and withered appearance of vegetation during droughts, when a reduced quantity of water is furnished by the roots, while none can be obtained by the leaves from the air. In greenhouses this diffused moisture is artificially supplied.

Plants taken from the greenhouse into the room of a dwelling, are at once placed in a very dry air, always drier than that out of doors, and in cold weather made still more so by fire heat; and the most copious watering at the root will not remedy this evil, for the roots cannot do the work of the leaves as well as their own, and cannot give the moisture usually furnished by the breathing pores of the leaves.

It is clear then, that the dryness of the air is a cause of the common failure in cultivating plants in our rooms. There is, besides, a great deal of dust, ashes, and soot always floating in the air of our houses. This dust is very fine, and abundant enough to injure plants seriously. By shutting plants in close cases from which all currents and circulation of air are excluded, this evil of dust, etc., is removed.

Again, plants not only absorb moisture from the air, but also give out a great deal by perspiration, which, in the ordinary course of things, is carried off by the winds. The earth also evaporates freely under a warm sun or a dry wind. Set a glass jar over a pot plant, and this usually invisible process will be demonstrated to the eye. The glass is no hindrance to the sun's rays, which warm the earth and the plant in the pot and draw up moisture through the plant, and also evaporate it directly from the earth. To this moisture the glass *is* a hindrance ; it shuts it all in, and as the sun leaves, and the glass and the air within it cool, the vapor condenses, and runs down the glass to the earth again. This process is repeated day after day, with no sensible diminution of the moisture in the pot. Plants have been kept in this condition for many months without the addition of a drop of water to the original supply.

The evident drawback to such a case is the dimming of the glass by condensation of moisture,—on the inside, when the air without is cooler than that within—on the outside, when the relation is reversed. In either case it may be temporarily obviated by a small door in some part of the case, by opening which the temperature within becomes the same as that without.

A beautiful feature of this arrangement is the power the case has of regulating the heat within, by the process described under the glass jar: the condensation increasing in proportion as the temperature within rises above that without, and so shutting out the rays which would soon make the temperature within too high for the health of the plants. As the case cools by the loss of the rays so shut out by the veil of mist, the evaporation ceases to supply material for condensation,—the veil is withdrawn and the sun looks in again.

In such portable greenhouses the most tender and delicate exotics, — Ferns, Lycopodiums, etc., — have been grown successfully. Unfortunately, the cost of glass and the inconvenience of having very large cases in our rooms set a limit to our collection and the size of our plants.

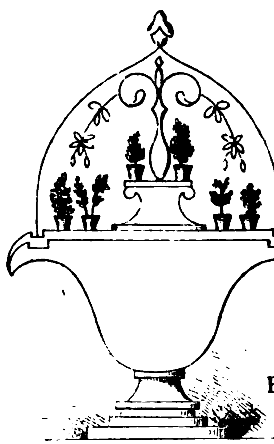
I have dwelt on the effect of the sun's rays on the case and its contents, in order to make the process plainer; but direct sunlight is not essential to a perfect case, and by keeping the case out of the sun during the greater part of the time, the condensation and consequent dimming of the glass may be avoided.

Wardian cases of every shape have been made to suit the taste of cultivators. Not only are plants preserved in the best condition by these means, but cut flowers may be kept under similar glasses for a much longer time than in the ordinary way. In the middle of a shallow glass dish set a bouquet in an appropriate glass; pour an inch or two of water into the dish, and cover the bouquet with a bell-glass, which will shut down into the water, and make the space within really air-tight. The flowers will preserve their freshness for a marvellously long time. The cut shows a Wardian case. "The stand is 22 inches high, and fitted with a groove all round, to hold the box; the glazed top or cover is 19 inches high; whole height of case, 4 feet 2 inches."

The sides are of mahogany, the bottom of pine, 1½ inches thick; the upper edge of the box is furnished with a groove, to receive the glass roof, and this groove is lined with brass to prevent the rotting of the wood. The roof frame is of brass, and is glazed with the very best flattened crown glass; the brass astragals are grooved for the reception of the glass — not rebated as in ordinary glazing. The case is 3½ feet long by 2 feet. Eyed studs are cast on the inside of the ridge astragal, about half an inch in length, to sustain small orchids or ferns from the roof; the box is lined with copper, and from one corner a copper tube, 2 inches long, and furnished with a cock, leads off all superfluous moisture."

"One of the panes in the roof is made to draw out, being less firmly set than the others in the groove of the astragal; this is necessary for the occasional arrangement of the plants, though the general arrangement is made by removing the entire top." This latter, however, is seldom necessary, as "plants, both in pots plunged in moss, and planted out in proper soil, and well drained below, have been kept in a healthy state for nine months without removal."

C



B

"B is a very elegant plant case, which might stand in a hall, or the centre or corner of a drawing-room. An iron or earthen pot. with a groove cast in the upper surface, which holds the glass cover; in the middle set an earthen stand, with an iron standard to hold small orchids or other hanging plants. It may drain through the bottom. C is a wire basket for holding flowers and plants, either with or without a cover; the stand and bottom of the basket are of iron or wood; the sides of wire outside, and zinc in; the bottom channeled, to allow the water to pass off by a small pipe. Such a movable case is very beautiful, and is easily arranged and cared for."

Another very delightful and instructive companion and ornament for the house or conservatory is the

AQUARIUM.—The very general interest in, and knowledge of, the aquarium renders it unnecessary for me to enter minutely into a discussion of the principles to be observed in making and managing it. It must not be supposed that because it is a means of growing aquatic plants it is therefore the complement of the Wardian case, where we grow land plants, and to be managed on the same principles; for not only is it necessary to introduce animals into an aquarium in order to make its plants thrive, but its great purpose is to make us familiar with aquatic animals, and they are its main attraction, the plants being secondary, though essential.

An aquarium can be made in any water-tight, open-mouthed vessel, but the habits of the plants and animals can be studied much better if the sides of the vessel are of glass.

Water in which aquatic plants are cultivated soon grows foul, and its surface is covered with green slime, and this was the great difficulty to be overcome in establishing the aquarium.

In 1842, Dr. Johnson, an English naturalist, mentioned, in a work on Sponges, that having placed in a jar of sea-water plants and branches of sea-weeds, to some of which minute shell fish were attached, he found that not only did the water remain clear, but the plants and animals throve perceptibly. In 1845, Mr. Ward, the inventor of the Wardian case, announced to the scientific world that he had succeeded in growing sea-weeds even in water artificially prepared. Since that time the attention of naturalists has been strongly directed to aquariums, and some of the earlier establishments were so successful and charming as to arouse an immediate and wide-spread enthusiasm on the subject, and recent periodical literature has abounded with articles about it.

The first step was the discovery that when the plants introduced into jars of fresh water had snails attached to them, or those in salt water, periwinkles, the water did not become foul or filled with confervæ. This attracted attention to these animals both in confinement and in their native waters, and then it appeared that they are the scavengers of the refuse of the waters; and a little reflection showed the observer that a sea, a lake, a pond is but a large aquarium, in which each animal and plant contributes something to the support of all, and that his aquarium, to be successful, must copy nature's. The plants in water supply by their exhalations oxygen to the animals, who in return furnish the plants with carbonic acid; the decaying vegetable refuse becomes food for snails and minute animalcules, which are eaten by small fish, and they, in their turn, by large. The whole life of the waters is like an endless chain, which, when broken into parts, is valueless for its original purpose.

The result of these observations is the rule that the plants are the first thing to be established in the aquarium; that as soon as they have fairly begun to grow, snails must be put in, then insects and fish. Then we can watch — as it were from beneath the waters — the whole miracle of life, death, and reproduction, which is perpetually wrought in the unseen depths of ocean and lake.

The beauty of the aquarium depends on the beauty of the vegetable and animal forms within, and as motion lends such an additional charm to all things, the fish and other animals are the most beautiful and bewitching portion of the stock, and every owner of an aquarium is eager to increase this portion. The number of plants is obviously limited; there can be but few species and varieties even in a large tank, and their beauty is injured by crowding; but it is hard to believe that animals may not be added at pleasure, as they occupy little room, and are constantly changing their quarters. But the laws of animal life are inflexible; they set a fixed limit to the number of animals which may be kept in good condition, as they do to the number of persons who can comfortably use a room; and by the same rule; viz., their proportion to the amount of oxygen supplied, whether in the tank or the room. Think of the air in a crowded lecture-room, and you will understand the condition of an aquarium overstocked with animal life. Within its narrow compass the limit is quickly reached, and the first mistake of all who start aquariums is in overstocking with animals. Their shapes, colors, and movements, are so fascinating, that it is hard to resist the inclination to put in every one we find.

I am not at all competent to define these limits, or even to name the many wonderful and beautiful things to be found in every collection of water. I shall content myself with giving some of the results of my experience, and shall leave the reader to elaborate these general directions for himself.

For several reasons, I urge every one who has a little spare time and money to make an aquarium for himself. It unlocks to the mind a new world, it takes us into the secrets of nature. A growing plant is a beautiful sight: its gradual increase, its healthy color, its stretching branches, budding leaves, opening flowers, are wonderful and lovely; and the repetition of this process over the whole face of the earth, or over a single acre even, is not less marvellous; but we cannot grasp and comprehend it as we can the process within our aquariums; we live in it, we are a part of it. We cannot form a miniature earth, which we may watch from without, and into which we may successively introduce plants, insects, beasts, birds, men, and watch and enjoy their growth and development; for we are ourselves members of the system, and cannot get outside to look at it from afar with observing and discriminating eye. But we can isolate a part of this whole, and make a miniature world of waters, which we may control and keep under constant observation. It is curious that we should possess this power over that portion of the system which ordinarily baffles our observation most completely.

We see the waters about us, sail over them, bathe in them, make constant use of them, admire their colors, motions, reflections; in our enthusiasm we call water the eye of Nature, because it in a peculiar way lights up her face and gives it expression. But our acquaintance is with the *surface* only. Of the rich beauty and wonders of the depths below we get no more than occasional glimpses; yet these, momentary as they are, show us plants and animals as delicate, as beautiful as any thing in the land life from which they so strangely differ. Our delighted and wondering imaginations are at once busy in peopling those unseen depths, and the vain-glorious theory that beauty was made for man's delight disappears in the face of the fact that in those waters where man can never go there is just as overflowing an abundance of beauty as on the land; a beauty, too, which seems rather intended to escape human eyes, for the fish or plant is no sooner raised from its native element than its life and beauty depart. The great fact is hardly modified by the few exceptions in the way of aquariums, which show us such mere fragments of the aquatic life.

Little as these contrivances show us in relation to the whole, that relative little is in itself immense, and is besides so perfect a reproduction of the system of that whole, that we are justified in saying that it unlocks to us the secrets of the world of waters.

Make your aquarium. Cover the bottom of your vessel — be it bathing tub, water pail, glass jar, or proper tank — with two or three inches of clean sand and pebbles, taken from brook or pond, or from the sea-shore, if your collection is to be marine; set in this such plants as you please. Suppose your collection to be of fresh water; get stones covered with graceful, exquisite lichens and algæ; from the river bring the Bladderwort, the Pond-weed, Duck-weed, Eel-grass; put in at the same time a few snails, and fill the vessel with water. You feel that you have nothing as yet; the plants are indeed beautiful, but there is nothing that seems to you like life. Leave the aquarium for a few hours, till the water has cleared; now examine it. There, swaying on the graceful top of that plant, is a group of Hydras, stretching their tentacles in every direction in search of food; from that folded leaf starts out the restless crimson spider Hydracula, or the water-boatman, which are to the water what swallows are to the air; on that stone is a bryazoöa, or a jelly fish; the snails are creeping up the glass with a smoothness of motion curiously fascinating; look closer and you will see their little tongues, like reaping-hooks, gathering up every particle of vegetable decay within their reach. You find that without having intentionally got a single fish or highly organized animal, you have before your wondering eyes a life and a variety which you may spend hours in watching. Now add a few silver perch, bream, or shiners, a stickle-back, an eel, or a leech, a gold or silver fish, a water newt; and the circle is complete.

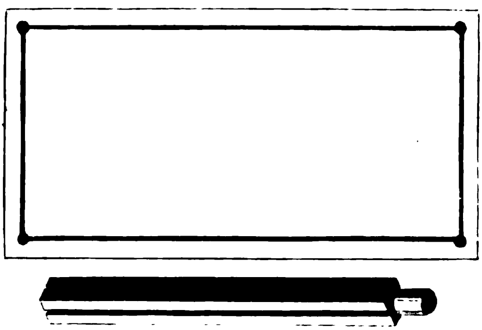
Add as you please. I cannot tell what is the proper number, but your observation may. When you see the fish come often to the surface, gasping, they are too many for your plants, and some of them must be removed. If any have died, draw off the water through a syphon, remove the fish, and supply fresh water, and repeat this process till the equilibrium of animal and vegetable life is established. If green slime collects on the glass, get more snails; they will soon dispose of it. But keep no worms or crustacea, however curious, which are always hiding under the stones or burrowing in the sand, for they only foul the water, without furnishing instruction or pleasure.

What an immense field of delight and research such a collection opens. Already the aquarium has given an impulse to the study of natural science, has drawn into these pursuits many who were previously repelled by the dry system of the books, the array of hard words, that brought up to the mind no distinct images. It is teaching us *observation*, training a faculty that has been sadly neglected in our modern systems of education; and were this its only use it would still be invaluable as a promoter of healthy science.

I know of no cheaper and better material for a tank than slate and glass. The slate is easily worked for bottom and posts, and the joints can be made tight with the best Roman or Portland cement, laid on with the smallest sized mason's trowel, or with a tin trowel, made to order; or they may be packed with Red Lead and oil, and over this a solution of rough Gutta Percha, in common Resin, thinned with Turpentine, may be painted. If the cement is not kept well moistened while it is setting it will crack.

The cut shows such an aquarium in elevation, a ground plan of the base, and an outline of one of the corner posts. When made of slate and glass they need not cost more than $3.

It will be seen that I by no means look on this as a mere amusement for an idle mind, or as a mere ornament; though it is among the best and most inexhaustible amusements, and the most elegant



ornaments, and as such is quite in place in the conservatory; the more so as aquatic plants form one of the marked features in it. These plants, curiously enough, are nowise particular about the quality of the soil in which they grow, but seem to flourish equally well in the richest mud and in the poorest sand; and whilst on land manure and stimulation are the watch-words of successful culture, in the water neither is of any consequence.

I hope I have succeeded, in the preceding pages, in making clear what are the obstacles to successful plant culture, and how they may be overcome; too much heat, too much water, too much meddling, is ruinous to house plants; yet constant and assiduous pains must be taken to ensure healthy and satisfactory specimens.

It will more often be found that plants thrive in the cold rooms of the poor, than in the heated houses of the rich, because during most of the winter, plants in a state of nature grow little or none, all that they need being protection from frost. The cool rooms of the poor, ill ventilated as they are, furnish more fresh air than can survive the furnace heat and constant dust of the better class of houses.

With a little judgment and care every one may have some kind of plant during the winter, as a link between the past and the future, to carry us hopefully over that desert season.

CHAPTER XXXIII.

GRAPERY.

UNTIE the vines in the forcing-house and cold-grapery from the trellises, and lay them down on the ground, covering with bass mats. In the cold-grapery keep the temperature up by fire and sun, night and day, but not much above freezing, say 40°.

In the forcing-house give more heat; let the mercury rise in the daytime as high as 55° or 60°, and do not let it fall at night below 40°.

The fruit is now ripe in the retarding-house, and must be preserved with care and watchfulness; some fire will be necessary to save it from frost.

These directions will be much the same for the next two months. The same temperature prescribed for grapes is suitable for the fruit trees in the graperies. They lost their leaves in October and November, and should have been pruned then; if this was neglected, do it now as soon as possible. The directions given for pruning espaliered out-of-door trees, are to be followed in the houses, and further directions will be given hereafter.

The out-of-door treatment of trained Peach-trees is nearly the same with that of Pears; any necessary variations will suggest themselves to the gardener in the course of practice. I will in another place describe the peculiarities of Peach culture more in detail. In many parts of New England, where the climate is too cold to permit the favorable growth of Peaches in the usual manner, they may be trained to espaliers with great success.

It is difficult, in this country, to obtain the best evidence as to the relative merits of different houses for the culture of Peaches, Apricots, and Nectarines.

Those persons who have such houses are either the few wealthy, who leave their arrangement and management to gardeners, who being generally men of no cultivation and acquainted with no method except that followed in the particular house where they worked before, have neither the observation to detect, nor the contrivance to remedy, the defects of that method, and can therefore conceive of no improvement on the kind of house they are familiar with; or they are poor men who grow fruit to sell, and must therefore content themselves with cheap houses, and refrain from any experiments, however likely to be improvements on ordinary fruit-houses or ordinary methods. In short, American enterprise and invention have not turned in this direction.

In England, on the other hand, the culture of fruit under glass has been carried to the highest point, and the houses and trees are *sans reproche* in all those establishments that pretend to take a high rank. We must, therefore, examine the English houses and systems of planting, pruning, and training, for our models, though different cultivators differ so much in their methods, that we shall find it difficult to select the best from the variety offered to our choice.

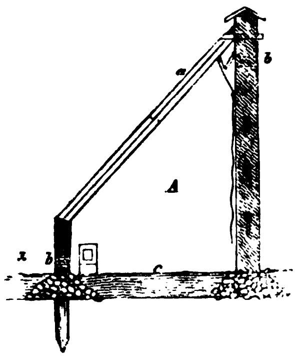
I shall describe several kinds of houses, either of which will prove successful.

Fruit trees may be cultivated either in tubs or in borders, and the treatment differs according to their position. I shall first describe those in borders.

FRUITHOUSES.—The oldest, simplest, and cheapest houses for this purpose have been found to be better than any others, if some modern improvements are added. These improvements are chiefly in the ventilation, which in the first houses was extremely defective.

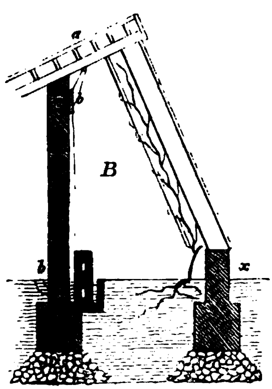
No plants subjected to hothouse culture are so imperious in their demands for sufficient pure air as fruit-trees. Some cultivators in Europe are accustomed to remove the sashes entirely at certain seasons, in order to admit the largest possible amount of air. Such a system is, however, rude, ill-judged, and unnecessary.

The accompanying figure, A, shows one of the earliest forms of peachhouse, and originated in Denmark; it is from 30 to 40 feet long, by 9 feet high, and 6 feet wide at the bottom. The top sash is short, and slides down over the lower; the back wall is brick, and chambered with flues for hot air; the front may be of wooden posts driven into the ground, in lieu of brick. In front is a hot air flue. The trees are planted in the soil *c*. A great difficulty with this house was entire want of good ventilation. The trees are planted within 12 inches of the back wall, and are warmed by the hot air in the chambers; thus the wall is warmed gently, and the house is kept as hot as you please, by the front flue. This house may be improved by adding a stone foundation, both as a security against frost, and an assistance in drainage; and by making openings through the wall, *b b;* one into the hot air flue below, to warm the air of the house, as before described; the other conveying the hot air away out of doors. If the back wall is carried up a little higher, and the ventilating tube turned upward, it will be still better. Such a house would give large crops of early fruit; or by omitting the fires, it could be used as a cold-house, which would ripen the fruit in July and August.

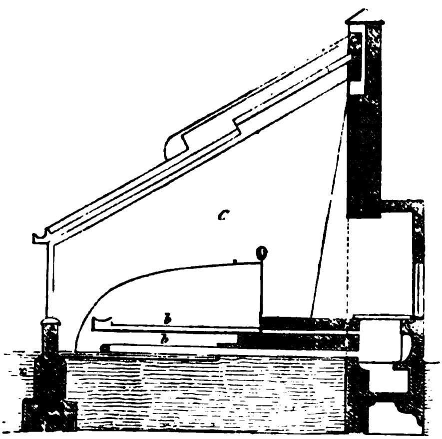


All plants, however, which are so far removed from the light, thrive slowly in comparison with those brought directly to the glass.

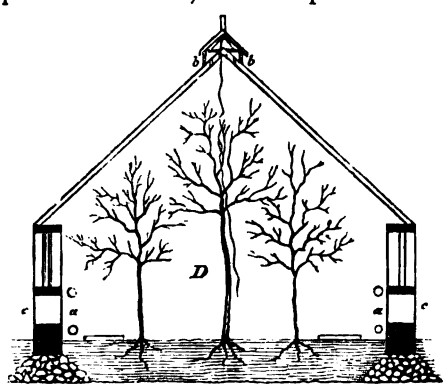
B is another cheap house, but better than the last. The trees are here trained within 1 foot of the glass. *a* is a slanting roof, either of wood, slated, or of glass. This gives the trees good head room. In this case, as in the last, the foundations and ventilators are added to the original plan, and the former may be of wood, supported by wooden posts instead of brick. This house is wider than the last, to allow the extra head room, and consequently higher at the same pitch. The pitch must vary in this latitude according to the season of the year when the greatest heat is desirable.



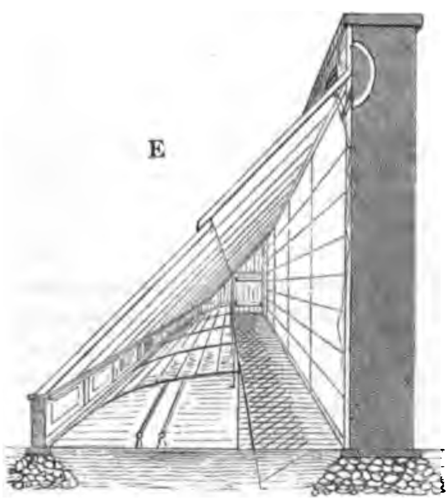
"C is a very good house, heated by hot water. It may be of any length; the pitch is 30°. The front sash and parapet wall are 3 feet 9 inches from the ground to the top of the spout or water-gutter. The spout serves both as a plate to support the rafters and also to convey the water which falls on the roof. The plates and rafters are metallic, but may be as well made of wood. The table trellising is supported by small stone or brick posts; the roots of the trees on the curved trellis extend out through the arches of the front wall to the border in front of the house. The hot-water pipes *b*, *b*, are supported on brick pillars, and run parallel to the front and end walk, 2 feet from the table-trellis. The boiler is in a niche in the back wall, and is managed from a shed. The back trellis springs from within 9 inches of the back wall, and slopes as shown in the drawing. The whole trellis is composed of iron rods, 6 inches apart."



"D is a very good span-roofed peach house; standards grown in the middle; dwarf varieties on the sides; heated by hot-water or steam pipes *a*, *a*; ventilated through the ridge *b*, *b*, also by sliding sashes in front, and by openings *c*, *c*, against the pipes. The sashes are entire, but may be made mov-



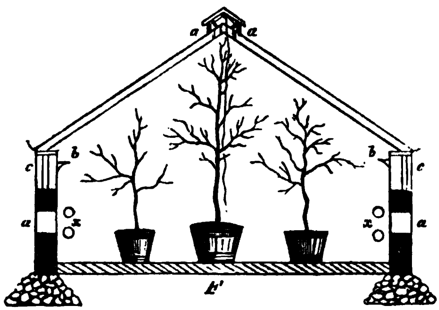
able. Such a house should have its length running north and south; the sides should be as high as the angle of pitch will allow, to give the lower branches abundant room; the ridge should therefore be from 12 to 14 feet from the ground." Span-roofed houses are unquestionably the best for fruit trees, and would be in general use, if it were not for the iron band of prejudice. In such houses Peaches could also be grown in boxes or pots, thus prolonging the season.



"E is an interior perspective view of a very successful range of houses at Everingham Hall, England. The trees are trained over the whole back wall, and over the curved trellis in front. Gable trellises might be set up at the ends, or the vines carried up the rafters; in these two ways a large addition to the training space would be secured, and the fruit in these positions would be better than the rest." The back part of the front trellis should be rather higher than given in the cut, although it would then shade the lower part of the trees on the back wall; this is of little consequence, as but little fruit grows on those branches.

Cherry, Plum, Fig, and Apricot houses are similar in character to those just described, and are to be built on the same principles. The trees in them should, however, be principally in tubs, as it is always rather difficult to get a perfectly satisfactory assortment, and if in the ground it is difficult to make changes and alterations. This may be done with ease when the plants are in pots. The plan F, is the only one I shall give for this kind of house. These fruits, except the Cherries, may be grown in lower houses than Peaches, and the houses should, if possible, be span roofed.

"House F is very much like D; *a, a, a, a*, are the ventilators; *b, b*, shelves for Strawberries, etc. The floor is of slate slabs, or strips of plank. Sashes may slide or not, as you please. The side ventilators are 1 × 3 feet, and should be opened



and shut all together. *c, c*, are side lights. If the top sashes are fixed, the openings in the ridge should be 10 inches wide. The details of construction, ventilation, etc., are the same as for the houses before described." In all cases I have introduced the improved ventilation into the proper place.

Having devoted as much space to this subject as this month will allow, I shall defer a detailed account of the proper treatment of the houses till the next months.

CHAPTER XXXIV.

KITCHEN-GARDEN.

THERE is no call upon the gardener's time in December, in the actual garden, if the directions for the last month were carefully followed.

During this month, air the spring Salads, Cabbages, etc., whenever opportunity offers. In the middle of mild days, open the ridges of vegetables and take out supplies for the family, or the market, and then close them immediately.

Continue to pile in heaps, for manure, dried leaves and haulm. Collect, if the cellar is over filled, a pile of manure in the garden for summer use.

Get the hotbeds in order for spring, and if there are any to be built, make the plans and get the materials. They may be made in the workshop, and not carried out till it is time to put them together for use.

For directions see January "Kitchen-Garden." Prune Gooseberries and Currants; mulch Strawberries; lay down and cover with earth Raspberries; remove to greenhouse or grapery Figs and Fruit trees in tubs.

At the close of the last month, I said I should describe the proper treatment of kitchen-gardens laid out on sloping and irregular surfaces, at some other time. I shall hardly find a more convenient time than the present.

Economy and convenience, considerations which are potent in the kitchen-garden, generally induce us to lay it out in squares and rectangles, but these very motives may lead us to arrange a particular garden in an entirely different manner. For instance, if it were on the side of a hill, it is plain that under the ordinary method some of the paths must ascend the steepest part of the hill, and consequently be very difficult to make, to keep in order, or use.

And here let me say, that however desirable it may be to have some sloping ground within the limits of the kitchen-garden, the whole area should never be of that character, except from necessity.

PATHS — THEIR CONSTRUCTION. — On the side of a hill, then, the paths must not be straight, but must follow the surface, and wind round the bases of the smaller elevations, across rather than up the hill, — must, in short, follow the easiest line of ascent. The greatest difficulty in making them — and very troublesome it is — is their liability to be washed by rains; for they become water courses to carry away the water from the beds, and the lighter bits of gravel are washed off, and they are left rough, stony, and unsightly. In England, they are often covered with a mixture of tar, asphaltum, and gravel, which of course cannot be washed away; but this is very costly, and, besides, the heat of our summer sun softens the tar and asphaltum, so that it runs and sticks to the foot in a most annoying way. Another method is to pave such paths, and if this is well done, it never needs repairing; but it is costly, and besides seems out of place among grass and green trees. Again, such paths have been made entirely of oyster shells, which do not wear into such small pieces as to be washed, and which allow water to percolate freely into the drainage below; but they, too, have their peculiar drawbacks.

No material is so satisfactory as gravel, could the washing be avoided. Much may be done by making the path higher in the middle than at the sides, so that water can run off laterally into small paved gutters. If the hill is very steep, raise bars a few inches high to cross the paths diagonally at intervals, and check the current as well as turn it to the gutters. Occasional openings may be made from the side gutters into the grass land, where the soil is clayey, boggy, or peaty, for its texture will be improved by the gravel washed on.

Nobody can afford to make such paths poorly. Dig them out deep, and fill in principally with stones; cover with rather coarse, and finish with the finest and hardest gravel. Then roll often, watering freely from the rose of the watering-pot. If the material is good, and the work well done, there will be but little wash.

These directions apply to ornamental grounds as well as to kitchen-gardens.

Having made the paths, put in the slate edgings for the beds, that the loam may not wash out of them into the paths.

For the rest, the arrangement of the garden should be much the same as on level ground, with the exception that all rows should, when possible, be carried across the slope, in order to check the wash, and collect and save the lighter particles of earth. With the same view, strips of grass may be left transversely to the line of slope.

A kitchen-garden is especially for use, must be watched and worked over constantly, and, except on very small estates, is to be looked at with a purely practical eye, so located and laid out that without regard to beauty or variety it may answer best its practical purpose. But on a piece of land too small to admit of one portion's being devoted to practical, and another to ornamental purposes, beauty and profit must both be got from the same land. So there arises another kind of kitchen-garden, where economy and convenience are no longer the sole considerations that govern, but where the arrangement is made with an eye to beauty, the three harmonizing like pedestal, shaft, and capital, in a column, or like stem, leaves, and flowers, on a plant. This garden cannot by means of hotbeds, espaliers, and the other appliances which wealth commands, produce fruit and vegetables in long succession, and most perfect in kind and quality. It cannot show beds rich both in foreign and native shrubs and flowers, but must be content with few varieties; and perhaps their bloom will be brief, instead of extending through every month of the growing year. Its trees are of the commonest kinds, and can soon be counted, but every tree, shrub, and flower, is loved and watched with an interest unknown on a large estate, and out of this familiar acquaintance will come blessed influences over the owner, his family, and his friends. A very small piece of ground may do much toward furnishing the table, still more toward furnishing the mind, if it be used for but one purpose. But both may be combined, and while the appetite for food is supplied, the equally instinctive hunger for beauty need not go unsatisfied.

I recommend to any person,—however humble his means, however narrow his land,—if he must choose between beauty and profit, between flowers and shrubs on the one hand, and vegetables and fruit on the other, to have beauty. If your garden plot is not large enough for both flowers and vegetables, devote it solely to the flowers.

I know that this advice is directly opposed to the common opinion, which holds that all the land in the possession of a man not really rich, should be made "to pay," to feed, or in some way support the bodily life of his family. But I hope I have already clearly stated that which I shall urge more and more, that the chief consideration in managing any piece of land should be how it may give the largest amount of beauty consistent with necessary convenience and economy. Potatoes and Apples you may buy about as cheap as you can grow them, and you will buy them if you do not grow them, to keep body and soul together. Beauty can only be bought at the most extravagant prices, and if it is not cultivated at your home, will hardly be bought; there is no physical appetite to clamor for it, and common economy begins by dispensing with it.

I have something more to say about this which you may find under "Ornamental Grounds."

CHAPTER XXXV.

ORCHARD AND FARM.

CONTINUE to prune, as directed last month, unless the weather is severely cold. Not that the cold would injure the trees in pruning, but that the work would be so disagreeable that it would probably be imperfectly done. Be careful to cover the stumps of any large branches with the mixture of shellac and alcohol, as it will keep out the cold and rain, and prevent any tendency to canker. As the mixture is fluid, it is easily applied, even in the coldest weather.

You will remember that I closed my last month's farming directions by saying that I should devote the winter months to the general subject of farming.

First, let us dispose of the work in hand. The cold will soon become severe, therefore take advantage of the sunny days to turn the young and dry stock out into the yard, and throw to them, on the snow (or if there is no snow, enclose in racks), a supply of Corn fodder, or coarse Hay. Cattle will eat up in this way a great deal of material that would otherwise be valueless, except as bedding or manure. The appetite is whetted by the cold, and, besides, all animals like to have occupation. Nothing is more agreeable to neat cattle, in warm weather, than when standing in the shade, or up to their bellies in water, to chew the cud whilst they thrash off the flies. But the most romantic heifer could find but little pleasure in lying down in the snow to chew its cud; they will, therefore, browse round, and pick off the leaves from the Corn stalks, chew old buts too hard to be even smelled of in the barns, and hunt out the sweet stalks among the driest meadow hay. Let them remain out only during the warmest part of the day. Do not turn the milch cows out at all, if the weather is sharp; and when, on sunny days, they go out, do not let them stay long enough to get chilled. The economy of farming is now to be practised; you have harvested the crops, now how can you use them to the best advantage?

Cut every thing you feed out; Hay, of course, as it is more economical, and more digestible. Stalks, by all means, as they will be more readily eaten, and the refuse, when turned to the pigs, will, as we have seen, decay more readily. Occasionally throw a handful of Corn into the manure heap. The pigs will scent it, and root for it, and thus work the manure and loam over much more thoroughly than when, without any such object, they merely root for *practice*. Shut off the water of irrigation as soon as the fields are fairly covered with ice.

The weather is now both cold and steady, and promises us ample time to kill and cure pork and beef; if this is done in cold weather they will be sweeter, and keep better than when stored at any other time.

For home use, do not let your pigs get over fat; kill them when they are between one year and eighteen months old. If they have been well fed, and have grown rapidly, they will be in the best condition for use. Too fat pork, or indeed too fat meat of any kind, is most unwholesome food; and although the annual premium offered at the county show may stimulate the farmer to get his creatures as fat as possible, and the irrational practice on the part of the butchers, who pay the best prices for the fattest cattle, may tempt him to gain this profit, yet the practice of over-fattening is barbarous, and unwholesome, and my advice to you is, by all means, if you must fatten, to sell the animals to such as like them, and keep for your own consumption the more healthily developed specimens. I will not here enter into an argument to prove this point; it has been again and again settled beyond dispute, and on purely scientific principles, in treatises devoted to the subject.

As the fowls get fat dispose of them; there will be no profit in winter fattening. Keep them warm, and well fed, and they will lay regularly through the winter. Vary the food of the sheep and cattle you are fattening, occasionally; it keeps the appetite better and ensures quicker development.

Occasionally look into the fruit room; keep out the frost, and be sure that the barrels are always closed at once, after being opened to take out fruit. Any admission of air is likely to hasten decay. It is very common to open a barrel of apples and keep it open till its contents are all gone. The rotting process is so rapid that the owner often blames the packer for it, when the fault is really in the careless keeping which has produced just the effect that might have been anticipated. The barrelled fruit having been artificially preserved for a season, is subjected, when least able to resist it, to the very worst influence. Buy sheep and oxen to eat up the crops of Hay and Roots accumulated, and sell all poor, dry cows, to be replaced by better.

Watch the market carefully, and sell fruit and vegetables whenever they command a fair price; do not be deluded into waiting for a possible increase of price, when you can sell so as to be remunerated for your labor and expense. It is a species of gambling in which, your articles being perishable, the chances are all against you. Pay off all the laborers except one man at the stables, a gardener, and a boy.

Continue the overhauling and repairing of all tools, etc., and bring your farming account up square, so as to see the probable profit or loss, for a guide for the next year's operations.

The next year's work should always be the result of careful deliberation; and if each day's work is not indeed accurately forseen and provided for, yet each must take its place as it comes, as part of a methodical whole; a whole which would not be systematic, but only irregular and annoying, if any of the cogs of the great wheel of life should not fit into its proper groove as the wheel revolves.

"Farming is a dog's life, and is unprofitable in New England at any rate." This is the text of all village gossip; of farmers at the stores and in their barns, and too often in their clubs, and at the county meetings. It is hinted at directly or indirectly in half our agricultural periodicals, and openly asserted in the rest of our current literature.

Farming not Drudgery. — Farming is looked upon as a necessary occupation, and well enough as a substratum to society, and farmers are considered as the raw material for the production of mechanics, merchants, men of letters, soldiers, sailors, and loafers. In their position as farmers they are deserving of pity, and they must each and all struggle with all their might to better their condition, by escaping from their present life. This may be a strong expression of the prevailing opinion, but it is in the main a correct one. And this opinion I pronounce to be false and unworthy, though I must acknowledge that the practice of the agricultural community gives too much ground for it.

It is true that we have a very difficult soil to cultivate — sometimes stony, sometimes sterile, — a soil that needs a great deal of artificial stimulus in the way of manure, but with the proper culture the crops are on an average larger than on the more favored lands of the south and west; it is a common thing for our farmers to get from 60 to 80 bushels of Indian Corn, 20 of Wheat, 30 or 40 of Rye, to the acre. And when this crop is harvested it is at its market; so that the cost of transportation is very light, and the difference between outlay at the farm and the market-price is nearly clear profit.

We have to work hard for these crops and to harvest three tons of hay to the acre is no child's play. It must be done under a hot sun, and often hurried almost beyond human endurance, to avoid the threatening showers. But when harvested it is worth money enough to pay well for the trouble, and when sold, in the form of beef or milk, will return an ample profit to the farmer.

It would be foolish to deny that the chief consideration that determines a young man in the choice of a profession, apart from special taste, is a pecuniary one, and most men will turn from one in which the daily gain is small or uncertain. But the daily gain is not always a just criterion. Let us look into this matter for a few moments.

A farmer hires his farm servant at a cost of from 75 cents to $1.25 per day, while he pays the mechanic who comes to mend his barn from $2 to $2.50 for his day's work, which is shorter than the farmer's. So far the advantage seems to be on the side of the mechanic. But the mechanic's work is one of great uncertainty, employed as he is only for a few days at a time, now here, now there, now nowhere. The farm servant, on the other hand, is employed without variation in price for many months, knows what to rely upon, and what will be the *wear and tear.* His net earnings may be laid aside with a feeling of certainty that he will get renewed and steady employment the next year; business may be dull, mechanics idle, but farms must be cultivated. Then his work is, taking the year through, no harder than that of the journeyman mechanic, though it may seem so at first sight. The length of the summer's day is compensated by the shortness of the winter's one.

He gets up at 4 in summer, and goes in the clear, cool morning to milk the cows and clean the stables; no hard work, surely. With a hearty appetite he eats a substantial breakfast, and then goes out to plough or dig, sow or reap. Mowing and reaping are very hard work; but they are the hardest in farming, and after all are no worse than running a saw or pushing a plane all day. Take all the working days together, the ten hours of mechanics' work is more fatiguing and wearing upon the mind and body than the farmers' longer day. You will find it so, farmers, if you change and try it. If the farm servants would work for 10 hours with the diligence and perseverance with which good mechanics labor in order to receive the best wages, they would do more in that time than is ordinarily accomplished in twelve or sixteen.

I will not pursue this train of thought; any one may carry it on for himself, and however contrary to the general theory, I think any person who carefully compares all classes of labor, will find that the farm servant's work is no more severe than that of any other journeyman. Having decided then on the equality in hard labor between farming and other occupations, and having seen that the greater wages of the mechanic are balanced by the steadier employment of the farmer, we now find on further examination that in every other respect the farmer's life is to be preferred. His work is healthful, being out of doors in the fresh air, and is agreeable, from the pleasant objects it constantly brings before him, and from its variety.

And this superiority is still more apparent when we look at the comparative success of different occupations. An examination of the careers of those who begin life as journeymen in any trade, will show us that the percentage of those who ever rise above that condition into one of pecuniary ease is extremely small. Sufficient means at the outset to give a good education, and a small capital, will increase the chances of success, but even with this advantage the per centage continues small. The risks in any kind of business are so great, and the outlay required so disproportioned to any immediate return, that young men without large capital or peculiar opportunities stand a poor chance of doing any thing more than gaining a bare livelihood.

Moreover, when having laid up a small sum he ceases to be a journeyman and sets up for himself, his little earnings will be much better invested in hiring or buying a small piece of land, and will give a much surer prospect of a good return, than if spent in tools for a mechanic's work, or laid out in stock for any kind of business. A little calculation will show that there can be no better investment for a steady and enterprising young man, than to buy a few acres of land, paying what ready money he can, and giving a mortgage for the rest. He pays no rent or interest to another, but to himself; and instead of putting his savings into some outside investment, which must always be more or less insecure, he puts them into his land, which is *sure* to give a good return. I recommend this course to any young man who is prudent and earnest in his work, and am certain of his success; for not only is he more sure of his interest, but it may be made compound as it were, nay, even greater in its rate of increase, when put into high farming. Rich manure, good drains, thrifty young orchards, etc., pay each year an increasing percentage on the money invested in them.

To make the previous statement more definite, let us enter into a calculation. Whether he engages a farm near a city or in the country, he will easily get one for six per cent on its value, per annum. Let the farm be worth $3,000, the rent will be $180. The size will vary from 10 to 100 acres, according to the locality. Were he a mechanic or a day laborer he must pay at least $50 rent, which reduces the excess of rent for the cultivated farm to $130 per annum. He had $500 which he invests in stock and tools,— interest $30,—or whole interest more than a journeyman mechanic would pay, $160.

This farm ought to net over cost of cultivation $500, besides the milk and vegetables consumed by the family; — less rent of cultivated land gives $340 for his year's wages, — earned for himself, subject to no master, and in the fresh air. If he had worked as a mechanic, he would not have received for wages more than $400, with the best of luck; — $340 less $50 rent of house, gives $290, — this goes for household expenses. He will lay up a little of this, which invested in his farm will pay tenfold. If he buys his farm upon mortgage he will pay off the cost of the farm as he saves, or he will make improvements in culture, drainage, and stock, that will give him every year a much larger balance; the first year is the smallest earning; and in an ordinary life time, if he be expeditious, careful, and energetic, he will accumulate $10,000 to $15,000 in money or improvements, besides educating his family and living well. Any prudent, industrious, and willing Yankee can do this in New England if he farms as he ought to; and but very few merchants, professional men, or mechanics do more; and the average not as well.

I have considered the question only from a pecuniary point of view; and this is the least important. In the next month, I will speak of the higher benefits and advantages of a farmer's life.

CHAPTER XXXVI.

ORNAMENTAL GROUNDS.

In the "Kitchen-Garden" I said that beauty should be the distinguishing feature of every homestead, its aim and spirit, its warp, into which may be filled the woof of sundry conveniences and comforts. But this is not the practice of the world in general, and it is by dispensing with beauty that economy begins. Economy being necessary as well as commendable, it is much practised; and too often it is used as a catch-word by heads of families, as an excuse for denying their families something which is not attractive to themselves, while they substitute something more to their taste.

That economy which feeds the body well at the expense of starving the mind is wretchedly short-sighted. The Bible expressly teaches that what can be put on the back, into the purse, or into the stomach is valueless in comparison with that which clothes and feeds the soul; — that perishing wordly treasures are not to be counted with those everlasting possessions, which instead of being left for our heirs to quarrel over, are ours forever when once they are acquired, are in fact the stock in trade with which we are to begin the next world. Yet the mass of those who profess to believe in the Bible, hurry on to get a little more money and neglect to provide for the soul.

All of which may be very true, but what has it to do with growing flowers and other ornamental things instead of vegetables and fruit on a bit of land too small for both?

Let me tell you how the two things are connected in my mind. I have often seen a small house in a dusty street with a bit of a garden in front; over its windows and door, pretty vines climbed; bright Roses, Marigolds, and Hollyhocks lighted up the dark, sad cloud of poverty that hung about the place; though they were of no economical value as food, drink, or clothing, they gladdened the minds of the laborers who passed to and from their work morning and night. These men and women too closely pressed by want to do more than scrape together the wherewithal to keep body and soul together, yet find a moment to stop and enjoy the color and fragrance, which are to them the best proof of a God who watches over all his creatures. Seeing the beautiful things, they sigh for time and space to cultivate the same, and thus a spot is kept warm and green in the corner of their hearts, ready at the proper time to give liberal foothold and nourishment to any seeds of goodness and nobleness which may be dropped there. The tendency of the life of the poor is to materialism; it is hard to persuade them that there is any object more important than providing for the body. Tied down in the din of machinery; unable to go out into the God-made country where the truth might come freely to them, seeing their employers and companions seeking those things only which bring money, — how can they believe what they hear at Bible-readings, that these things so greedily sought are of no real value? But when they see time and labor spent to grow flowers, merely because they are beautiful, they perceive dimly that there is something precious beside money and the things it buys; and the throb of pleasure in their own hearts as they stand in the beautiful presence testifies yet more strongly to the truth.

Millions of dollars are spent in this country for education, not only because it is a help in getting bread, but because it is right that men should be educated. This education is directed to the development of other qualities than shrewdness merely, — truth, reverence, taste; and to this end no plan is better than to show children that their teachers value all things for their intrinsic worth, for the power they have over the mind for good. What the child sees its teachers and parents love and cultivate, he will cherish and love. The presence of purity and nobleness in the soul drives out impurity and meanness, as water rejects oil.

Think of this tax-payers and fathers! If you wish your taxes to give the greatest return, surround your children when at home with objects and influences which will make their minds best able to enjoy and expand, under the teachings of the public instructor.

If they see you surround the home with beautiful things, because you love them, they will do so too. If they see your garden arranged for beauty as well as utility, while all over the homestead stern economy occasionally yields to a reverential love of nature, and to a sense that the gratification of the eye and the mind is quite as important as the gratification of the appetite, they will grow up with liberal, generous feelings and opinions, they will be men and women who have the best interests of the age at heart.

When discussing the laying out of the kitchen-garden, I directed that some paths should be straight and some curved; these directions were not purely arbitrary, but are the result of certain principles. How to make a road or path is settled in a few words; how to lay it out depends upon many considerations.

RESIDENCE OF R. S. FIELDS, ESQ., PRINCETON, N. J.

CHAPTER XXXVII.

LOCATING ROADS AND PATHS.

STARTING with the fact that the road or path is to be a means of going from one point to another, most men will say that it must plainly be as straight as possible, must be the shortest distance between the two points, if such a line of travel is practicable. But I cannot think this reasoning correct. I am sure much evil has grown out of it. Of course the purpose of a road is to connect two places for travel, and of course it does not answer its purpose if it is not pretty direct; but it is possible to sacrifice too much to this directness, and the sacrifice is so often made that I consider it important to inquire into the matter at some length.

Though the inquiry is made particularly to determine what rules should guide us in laying down roads and paths on private estates, I shall first speak of public roads, believing that we may thus arrive at conclusions which will apply to private roads with even greater force than to highways.

Suppose yourself travelling a road carried as straight as a railroad, but not travelling by steam power; you are walking or driving in no more than ordinary haste. For miles ahead you see your road; if your journey is not to be long the end is in sight from the beginning, and you measure off the distance, step by step, thinking in spite of yourself how slowly you get on, till you grow impatient, hurried, fretful. Get what glimpses you may on either hand, that provoking vista robs them of genuine variety, and with its stupidly familiar face takes away all chance of a pleasant surprise. It will not let you tarry to enjoy a pleasant side view in peace, but is always reminding you of your purpose, and upbraiding you with neglecting it. If good fortune has put a hill in the way too thick or hard to cut through, you are relieved for a moment only to see with a more annoying distinctness from its top your whole road marked out. Across marshes and prairies such roads are necessary and proper; there is no excuse for their curving, and any deviation from the straight line would be an insult to public good sense, as well as robbery of the public purse; but they are never favorite roads to pedestrian or equestrian, unless he belong to the cultivated class, who think trotting horses the great delight of life. With what relief we turn from them to a road which winds to avoid water, or to cross mountains by an easier ascent! how we enjoy the unexpected views which burst upon us at the sharp turns, the alternation between the woods or glens that shut in about us, and the valleys that open before us, or the heights that give us a glimpse of our destination, without revealing all the road by which we are to reach it! We can linger when we like without a guilty feeling that we are wasting time, and at last are surprised at some curve to find that it is the last, and has brought us unawares to our journey's end. Variety is a great delight and a great aid to the traveller; it refreshes not only his mind, but his body; for variety of surface calls into *play* a different set of muscles.

Another disadvantage in straight roads in a hilly country (meaning roads which doggedly hold to their original direction and curve, — when curve they must, — up and down, not right and left), is that they lead over the hills in the line of most difficult ascent, and so try man and beast to the utmost; they call a new set of muscles into *work*. We need not dwell on this point. Every one knows how much more easily he gets round than over a hill, and how difficult and expensive it is to keep steep roads in repair.

A rigidly straight road, then, must be disagreeable, wearisome, expensive. There is another objection to it, great though not very obvious; it stultifies the minds of those who travel it; not utterly, but surely, the more completely as they travel it more frequently, and have less internal resources.

The fact of its monotony implies this, for we all need the stimulus of variety to keep our minds active; we grow stupid, and "whistle for lack of thought," when we are shut in by outward sameness, and deprived at the same time of books and companions. We should return in very different moods from a walk through

Holland, and from one through Switzerland. Men may sneer at the idea that scenery modifies character, may instance Swiss Cretins, and ask where are the Swiss poets; but the exception does not disprove the rule, and poetry speaks in other ways than in verse. Though there be boors among mountains, and wits and philosophers on prairies and marshes, the mass of mankind have been, are, and will forever be, refined by quiet beauty, quickened by the picturesque, made deeper and stronger by the sublime. They are susceptible to these natural influences, though in different degrees. The blood colors the cheek and brightens the eye of one man quicker than that of another, when they stand together in sight of Mount Blanc, or on the seashore, but depend upon it the blood flows quicker in every man's veins when he looks on such sights. We are all barometers beneath these influences, and you are not foolish but wise to judge of these influences by the more susceptible instruments. The folly lies in thinking there is no quicksilver in those veins which are more sluggish, or that their sluggishness proves the absence of heavenly influences.

I have gone into this inquiry about the advantages and disadvantages of straight town and county roads thus at length, because here is the very stronghold of narrow-minded prejudice; here is the public error which so vitiates private taste.

No vandalism is so common in New England as that which obtains among road surveyors, county commissioners, "selectmen," and well-to-do farmers. Possessed with the idea that directness is the only virtue in a road, they straighten curves, cut down hills, fill up valleys, and rather than swerve from some fixed line, cut down noble trees, the growth of centuries, and whose beauty and majesty typifies Divinity itself. Trees are sacrificed every year that were the very ideals of perfection of their species, and were the pride of the whole country round. The absurdity becomes painful when a tree, produced by the concentrated energies of the earth, air, and sun, for years, the noblest of its race, as beautiful as Venus or Apollo, worthy of daily love and worship, is removed, because some headlong milkman or hurried stage driver can thereby save a few feet. Generations of milkmen and stage drivers may have sprung up and died since it was a sapling, and other generations would pass away before its natural decay, and yet some astute road-maker or officious village dignitary orders its removal, and the green head is brought low. Such outrages are barbarous, and their perpetrators ought to be known, and their names written in the annals of the rogues and scapegraces of the neighborhood, and handed down to the contempt of posterity.

This public mistake is so prevalent that it influences private opinion, and the multitude, who are too ignorant to have any mind of their own, or too timid to carry it out, follow the public fashion, and accordingly we find in private grounds straight avenues, straight walks, straight rows of trees, rectangular enclosures. All the variety and grace of nature is ruled and straightened out of them.

Ill advised as this treatment is at any time or place, in the public road and kitchen-garden, it seems somewhat excused by the plea of business and necessity, but in ornamental grounds even that is removed; there every argument and fancy should favor the introduction of whatever may tend to refine the mind, banish thoughts of business and money, and awaken emotions of taste, and so far from following the leader, every one should be careful to measure his improvements before he makes them, not by "What will they say?" or "What do they do?" but by what seems most akin to the graceful, beautiful, and refined. If he cannot study some acknowledged canon of good taste, has neither time, money, nor opportunity to visit places improved with taste, and which are truly ornaments to nature, let him make the best attempt he can, assured that he will be ridiculed by those who are safe because they do not infringe upon public opinion, and conscious that his discernment will be improved by the effort made, and that if he tries faithfully, he will get right in time.

CHAPTER XXXVIII.

GREENHOUSE.

JANUARY. The greenhouse will demand more attention during the rest of the winter than it has hitherto done. After the year turns there seems a disposition in plants to increased growth; the days are longer, there is more light and heat to stimulate the tissues, and and the sunlight is more magnetic. Be careful, in your impatience for flowers, not to increase the heat of the houses too rapidly; we shall have colder weather yet, and we must not get up our greatest heat too soon. Water all plants a little more freely, and syringe as often as a clear, bright day promises sun enough to evaporate the moisture on the surface. From this time till spring warm water may be used in watering with great advantage. The small holes in the rose of the syringe are the best to use; and although after fumigations it is well to syringe forcibly over and under the plants, to wash off dead insects, it is generally better in syringing the house to throw the shower up into the air, so that it may fall perpendicularly, and with only the velocity it receives from its own weight, upon the plants.

This manual being for the guidance of amateurs and learners, I shall now give the general treatment of a large and important class of plants, to which much of the beauty of well-kept greenhouses, conservatories and parterres is due. Geraniums (Pelargoniums), are as familiar as household words to all lovers of plants; to all who wish a few plants in the house, and in some of their many varieties are easily cultivated, and sure to give satisfaction. In England and our Southern States they will pass the winter out of doors, and unprotected, or with a slight covering. There are different degrees of hardihood among Geraniums, and this difference must be understood to render their culture certain. Some kinds, like the Common Scarlet, Tom Thumb, and Horse Shoe, are so tenacious of life that they may be removed from the garden into pots, be cut down near the ground, and left in any outhouse or cellar where the temperature is above freezing, and they will live, and may be set out in the flower beds the next year, to renew their growth and beauty. Geraniums vary in their power of withstanding the sun; some varieties will not bear our hot sun in summer, they neither grow nor blossom well in it. I have said in a preceding month that as a general rule succulent plants are tender, and need more heat than the woody varieties; but Geraniums are succulent or woody, according to the rapidity of growth; they may be exposed to a very low temperature; when in the flower-garden they often stand several severe frosts without injury. On the other hand, to ensure that they grow and flower well a degree of heat is desirable that would ruin Heaths, and many other hard-wooded plants.

Our limited means forbidding us to give the peculiar culture, which makes each plant thrive best, we must be content with so managing our small house as to give all a fair chance.

The soil in which Pelargoniums especially delight is old sods, cut and stacked for a few months, and then chopped, with a spade, moderately fine. The cuttings and young plants need rather finer material of the same kind. In the growing and flowering season keep the plants near the glass, and give each room enough to expand well on all sides. A span-roofed house or pit is best for them; when they get the sun only on one side, turn them often, that they may be symmetrical. Some Pelargoniums bloom but once a year, others nearly all the time; the latter are the only ones which should be cultivated in the ground, with the exception of the Rose Geranium, whose fragrant leaves are more desirable than its flowers. After blossoming, or when to be removed to the house from the garden, cut them back to within a few eyes of the old wood. Such as are in pots should be taken out, their roots pruned, and cut out if dead, and they repotted in pots one or two sizes smaller. This "underpotting" is a very common expedient of gardeners to throw plants into flower. Most plants flower from their new growth, and a new growth can be stimulated only by new roots, and underpotting induces new roots. As they grow, shift into larger pots. Shifting is transferring the plant to a larger pot whenever the present pot is crowded, and each increase of size, giving new material, stimulates the plant to renewed efforts. The sizes of pots increase slowly, so that the next size affords just the room wanted. After potting, set them into a cold pit or other cool place, where light is abundant, and the thermometer does not fall below 40°. When the roots have fairly begun to grow into the new soil give much air, to harden the plants; as soon as the new growth is pretty well hardened set on the staging. They may be put into larger pots for flowering, as soon as wanted. The ever-blooming varieties may be kept in a constant state of growth, or remain quiet until the time comes for setting them anew in the garden, at the pleasure of the gardener.

Small new plants generally do better in the garden than old stocks, although the latter commence blossoming sooner. If you set out old stocks, cut them down just before setting out, much as for repotting in the fall; this will ensure a more vigorous and healthy growth.

Pelargoniums may be propagated by cuttings, seeds, roots, and layers. The latter is the surest method for nearly all plants, but is slower, and only resorted to from necessity. Plants which strike easily from cuttings are more often increased in this way.

To make the best cutting of a Geranium (see p. 285) cut off a small branch of new wood which has not blossomed, together with a bit of the old wood on which it grew; the old wood at the joint is called a heel; it is full of invisible though active eyes or buds, which readily make roots. But good cuttings which grow readily, may be got by cutting with a sharp knife directly across young and unblossomed shoots, below a bud; remove all the lower leaves as high on the cutting as it is to be set deep into the sand or earth; but do not remove any leaves above this point; do not bruise them or allow them to wilt — with one exception to be made hereafter —

and on this account plant your cutting as soon as possible after it is made. This is very important.

The general soil for all cuttings is white, clean river sand, an inch or more in depth, as free as possible from iron and other impurities, laid over such soil as best suits the variety of plant from which the cutting is made, so that when they strike and emit their roots into the sand, they may work slowly through to the earth below, where they will grow in proportion to their strength.

Many experiments have shown that with some plants, charcoal dust, brick dust, charred turf, bone dust, and other materials are excellent for cuttings; — almost every gardener has a specific preparation for the purpose.

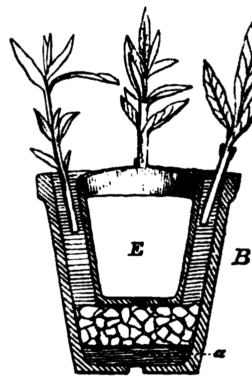
To insure that they shall do well, it is best to make a bed like a common hotbed, in which there may be some bottom heat. To support its leaves the cutting must emit roots, and to this end all the collateral circumstances must be favorable. The first act of a healthy cutting is to form a callus, already described in speaking of transplanting; to the formation of this callus, warmth and moisture at the cut end are essential; and by setting the cuttings in a hotbed, or by placing the pots and pans containing them on or over hot-air or hot-water pipes, a moderate bottom heat is obtained.

Beside being supplied with warmth and moisture, cuttings must be protected against too rapid evaporation by bell glasses, or by being set in comparatively dark places. The more tender and shy plants should have air in only a moderate degree, until roots have started; the hardier need less care. Constant watchfulness is indispensable with cuttings of succulent plants, when set in warm, damp, and shaded places, lest they damp off; this is a mysterious but common cause of disappointment; the cutting rots near the surface of the earth.

Before making your cuttings, prepare the vessel in which they are to be set; fill the pot to within 3 inches of its top with broken crocks; over these put 1½ inches of such soil as the plant likes best; over this 1½ inches of sand or such other material as you prefer; set the cuttings round the edge at a slight angle from the inside outwards. Those cuttings always strike most readily which are nearest the pot; experiments have proved conclusively that cuttings need air as well as moisture, and this seems to be supplied to a sufficient degree, through or along the sides of the pot.

Better than pots are shallow pans made for the purpose, and easily drained.

The facts about air and moisture led to the following invention,* which has proved excellent for its purpose: a 48 sized pot (B) is rendered water-tight by plugging up the hole in its bottom with a handful of clay *(a)*; over this are laid enough broken crocks to raise the top of a small sized pot (E) level with the top of B; the hole in E is plugged with a cork. Over the crocks and around E is filled in soil fit for the plant after it begins to grow; over this to the top of B, pure sand, in which the cutting is set, as in all other cases, 1 to 1½ inches deep, and inclined toward the side of the inner pot. Set the whole apparatus in a warm, shaded place.



Some plants form calluses slowly; by partly severing the cuttings some time before using, the cut part will callus like a layer before it is removed, and when made into a cutting, will strike more readily. The best time for making cuttings of plants under glass, in order that they may get well established before the next winter, is the late winter and early spring. This rule, however, is not without exceptions; some plants, as Ericas, must be stimulated to grow before cuttings are taken from them, as it is their young shoots, with or without a heel or bit of the old wood, which are needed; and all plants have especially appropriate seasons for taking cuttings, which will be noticed in the proper place. You may decide whether a cutting has struck, *i.e.*, has sent out roots, by

* McIntosh, p. 349.

gently touching one of the old leaves; if the roots have formed, the leaf will drop at touch, as a new growth has begun; if no roots have formed, the leaf will not come away without twisting.

Cuttings, as I have said, are the easiest means of increasing a stock of plants, and they are so easily grown from most plants that the ordinary methods seem good enough; but however easily they grow, the operation is much more rapid and sure when they are exposed to bottom heat. A leading authority in such matters, lays it down as a rule that "it is not the temperature of the atmosphere, but of the soil that requires to be raised; we must first obtain roots, the leaves will follow." "As soon as the cuttings begin to grow, more light and air may be admitted to them, and such as begin to push up weakly should be topped, and when fairly rooted, transplanted from sand into pots in their proper soil." As many plants which will root freely in sand, refuse to grow in it, all cuttings should for safety be removed as soon as they have fairly begun to grow. Where large quantities of Scarlet Geranium are wanted for bedding, they should be planted in a dung bed in March, where they will grow rapidly.

I have said there is an exception to the rule that the leaves left on a cutting must not be allowed to wilt before it is set; it is in the case of strong, fleshy plants, full of sap, which may with advantage be allowed to lie on the table a few hours to evaporate some of their superfluous sap.

"When the object is to get new and improved varieties," seeds are sown, which is a simple process, but care must be taken in selecting seeds.

The shape of the flower, the substance, size, and color of the petals are the points to be preserved and improved, and this is to be sought by careful hybridizing or intermixing the pollen of different plants.

For the benefit of some of my readers, who may not understand this common term, I will give a short description of a process by which varieties of plants are obtained. Every perfect flower has a calyx or cup; this is the green outside, seen to the best advantage in the bud when the calyx folds around and encloses the rest of the flower, as the green outside of a Rosebud. The corolla is next the calyx, and is what is usually called the flower, and is either whole or divided into many parts. These parts are called petals, as the red or white leaves of the Rose. Next to the petals are the stamens, which more or less in number, are arranged next the petals or corolla in all flowers; they have two parts, the filament and anther; the filament is the long and narrow stem of the stamen, and the anther is the generally round or oblong body attached to the top of the filament, and of a slightly different color, as the crowd of yellowish, slender bodies inside the colored petals of the Rose. Next to the stamens, and within them, is the ovary and pistil, or pistils, the central part of the whole flower; the ovary contains the object for which the whole flower grew and blossomed; viz., the seeds or ovules.

Careful experiments have shown that these various parts of the flower are all formed from the some original material, the leaf, which is the source and type of all. The calyx is often at first, and sometimes throughout the life of the flower, a rude leaf, and many instances will occur to every student, where the transformation is in process; the petals are in very many cases interchangable with the sepals or divisions of the calyx, and in many plants it is difficult to distinguish between them. Stamens constantly change to petals, as every one knows who has examined a Pond Lily. The ovary, when simple, is merely a leaf folded upon itself, whence it derives its Latin name *carpel*, and a compound ovary is only several simple ovaries combined.

To return, I said the ovary and its pistils are in the centre of the flower; the pistils surmount or surround the ovary, and have some secret communication with its interior and its contents the ovules. A plant without a pistil and ovary is barren, seedless. These organs alone, however, do not produce seed, except when fertilized by the pollen of the stamen. This pollen is a yellowish powder of changing character, contained in the anther, which you remember I said is attached to the filament of the stamen. At the proper time in the development of the flower, the anther of the stamen opens and ejects some of its pollen on to the pistil of the ovary. What the precise action is, physiologists do not know ; it is sufficient to say that this pollen fertilizes the pistil, and through it gives life to the seeds contained in the ovary.

It was for this the flower blossomed ; soon after the pistil is fertilized the flower droops, decays, and leaves the ovary to ripen its seed.

Hybridizing is removing the stamens from a flower before they have fertilized the pistil, and then carrying the pollen of another variety of the same species to the flower operated on. This foreign pollen fertilizes the pistil, as that of the stamens which have been cut off would have done; the flower dies, the ovary grows and produces seeds, the flowers from which will neither be like the flower which was artificially fertilized, nor that from which the pollen was brought, exactly like neither parent, and yet resembling both. In this way all the best varieties of flowers and fruits have been obtained, the hybridizing having been sometimes the work of man, sometimes of nature.

By this method you see you can change your Pelargoniums at will and in any direction. Let the seed to be propagated ripen fully and freely ; gather, dry, and keep it in a cool, dry place till March ; then sow it in a rich, light soil in a well-drained pan, which is then to be set in a warm place where it will have a moderate bottom heat. When the seedlings have two leaves, and are an inch high, remove them to some place as near as possible to the glass ; water but moderately, lest the plants damp off. After a week's exposure pot into 60-sized pots, in a compost of rich loam, leaf mould, and one-eighth sand ; replace under the glass after potting ; as they grow, shift from time to time. During the first summer set in a warm, well-ventilated place out of doors, on boards or other dry substance ; the next winter keep close to the glass ; do not top or manure them. So soon as they blossom select the desirable plants, and throw away the rest. The plants retained are to be cut down, the tops used for cuttings, and the plants stimulated to grow, and give more cuttings and finer flowers.

"Tuberous-rooted Geraniums, and some others, may be propagated by dividing the roots. Remove all the soil from the roots, and cut them into short pieces with some fibres annexed to each; plant the pieces in small pots, which are to be plunged into pits with a mild bottom heat, and watered; as the young shoots appear, give air. If many shoots come up, remove all but the strongest, never keep more than three; when these are 3 inches high stop their growth by pinching off the end, to induce side shoots."

The process here described answers for most hard and soft-wooded plants.

Some plants have the power of growing from their leaves alone. When the leaf is placed under favorable circumstances, buds appear on the edges or along the mid rib, which grow and produce perfect plants. The leaf is pegged down upon clean sand, or is kept in place by a small stone, then set in a warm and moist place, and treated like a cutting when the buds appear.

The principal plants which grow thus are Achimenes, Gloxinia, Gesneria, Begonia, Bryophyllum, Malaxis, Aspidium bulbiferum, Nimphea micrantha, Dionea, Mentha piperita; occasionally Drosera, Portulaca, Cardamine pratensis, Nepeta glehcoma; also sometimes Crassula, Aloe, Eucomis regia, Lilium candidum, Hyacinth, Squill, Ornothagulum thyrsoides, the Ficus elastica, Hoya, Camosa, Citrus, Aucuba, and Theophrastus.

Pinks, Carnations, and other flowers having jointed tubular stems, are propagated by pips or pipings: "They are taken from young shoots of the current year's growth; the lower leaves in case of the Pink, are stripped off within two or three joints of the top of the cutting; the lower part is cut off close under the joint with a clean sharp knife; never cut off or mutilate the remaining leaves; the pips ready, press them down into the sand three-fourths of an inch, and the same distance apart." If they are too limp to set well, lay them in cold water for a few minutes to stiffen. They may be covered with bell glasses, or left exposed; they strike root readily; after they have rooted, transplant to pots, frames, or the open ground.

Some plants can be increased with certainty only by cuttings of the flowering stems made like pips, just before flowering; such are Double Scarlet Lychnis, Double Rocket, and some other border plants.

Cuttings of the root are often successful when other means fail.

I do not pretend to give full lists of names, but content myself with these general directions, and leave my readers to experiment for themselves. All common greenhouse plants may be propagated in the ways described, or by layers, by grafting, or budding. The following common stock greenhouse plants may be increased as first described.

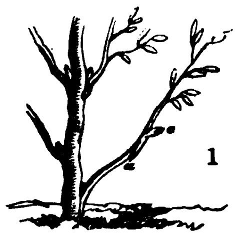
Pelargonium, Roses, Erica, Salvia, Lechenaultia, Heliotrope, Verbena, Diosma, Fuchsia, Daphne, Deutzia, Calycanthus, Clethra, Bryonia, Azalea, Cleanthus, Cytisus, Coronilla, Gardenia, Weigelia, Myrtus, Sedum, Polygala, Steevia, Lantana, Mahernia, and many others.

I give the foregoing only to show how to commence increasing a collection; a few trials will enable you to grow all varieties in their proper way. Oleanders, as we have seen, thrive best in bottles of water, whence they are to be transplanted into small pots, as soon as well rooted.

"Cuttings of hardy fruit trees should be taken off any time between the shedding of the leaves in autumn, and the first coming out in the spring;" the earlier after the ripening of the wood, they are cut, the better; keep them moist till spring, then plant on the north side of a wall, where they will be shaded till they have rooted. Evergreens may be propagated by cuttings, taking off the new growth with a heel of the old wood. Cuttings of partially ripened wood of hardy Evergreens, shrubs, and Roses, are found to grow best."

"It is very easy to send cuttings to great distances without destroying their vitality, if placed loosely in a tin case, with half a table spoonful of water, — more or less according to the size of the case, — which should be hermetically sealed."

Layering is done after the following manner: Lay bare the stem by removing the soil from about the roots of the plant which is to be propagated; select the shoots to be layered; bend them down to the ground to find the point that can be most easily induced to touch the earth without breaking the shoot; in cases of succulent and soft-wooded plants, this must be done with great care, as their shoots and branches are often broken by being bent. The point sought being found, begin to cut with a sharp knife on the under side of the shoot, upward and toward the middle of the shoot, for about 1 inch, thus *a*, 1, : the cut should always be begun just below a bud, so that the bud may be separated from the parent, except so far as it is attached to the upper part of the tongue of wood thus made. The cut made, bend the shoot to the ground as in Fig. 2. Set a forked stick over the branch at *b* (Fig. 3), this will hold the whole branch firmly to the earth; now carefully remove the earth under the cut part of the shoot, at *a* (Fig. 3); the hole being made, take hold of the end of the shoot and bend it up as in Fig. 4, leaving a tongue at *a*, projecting into the hole just made. With the hand press earth carefully into the space now left at *a*, between the tongue and the old wood, also pack earth all round the bent portion of the shoot and the forked stick, so that the shoot shall be kept in its bent position, and the tongue remain open. The shoot will receive sufficient nutriment through its uncut portion, whilst the tongue will callus and send roots into the earth. After these roots have grown considerably, which may be told by examination, cut the shoot off at *b*, and the severed portion will be a perfect plant.



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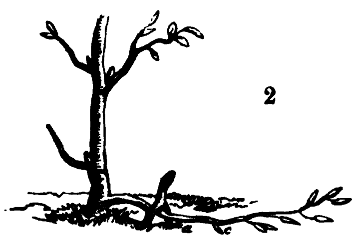

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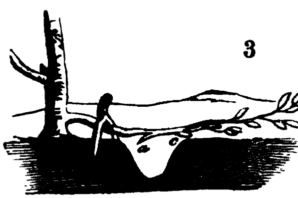

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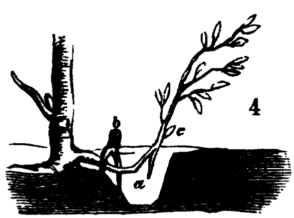

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The season for performing this operation extends over nearly the whole year, on an estate where there is a greenhouse, as the plants in the house may be layered while vegetation is suspended out of doors. Many plants root so easily from layers, that it is not necessary to tongue their shoots, but merely to twist them enough to break the bark and the close connection of the woody fibres. Others, again, only need to be laid down and covered with earth. A shoot is in the best condition for this operation when its upper part is still growing, while the lower has ripened. Still shoots and branches of last year's growth may be layered with success.

Some rare and shy plants are layered by bending a shoot into the hole in the bottom of a pot which is suspended near by; the shoot is thus brought through the pot to the air above, and earth is filled in about it in the pot. All layers must be watered and kept rather warm, but they need no shading.

Many herbaceous plants like Pinks, Sweet Williams, etc., are layered in some of these ways instead of making cuttings. Layering is much the most certain practice, but is slower and affords fewer plants.

You remember my saying that cuttings of the Grape may be made where only a single eye or bud is taken. The theory seems to be that each bud is as complete in itself as a seed, and has stored in its immediate neighborhood all the food it needs in the early stages of its growth, if the surrounding circumstances are made favorable. Consequently, in making a cutting it is enough to put into the earth just so much wood as seems to belong especially to the bud, giving the latter a reasonable access to light, air, heat, and moisture.

Buds are the only perfectly reliable source for the propagation of any particular variety. Seeds as I have shown may be quite altered from their original intention by hybridizing, and easy as this operation is to man, it is still more easy to nature. Bees, wasps, flies are all means used by her for intermingling the pollens of different plants; they dive into the flower in search of honey, get showered with the pollen of the stamens through which they brush, and then fly to another plant; if this is a different species, the pollen they bring will produce no effect on the pistil, but if it is the same species, but a variety differing in shape, color, or otherwise, the imported pollen when brushed against the pistil, will attach itself and fertilize it. Such natural hybridization is the yearly annoyance of those who cultivate plants of the Squash and Cucumber family. Melons being the most delicate members of this family, their flowers are constantly overcome by the stronger pollen of Squashes, Cucumbers, etc. The fact is so well established that no good gardener will plant these different members of the same family near together. The hybridizing of a season does not appreciably effect the fruit of that year, but the seed contains the future fruit which will prove disagreeable next year. It sometimes becomes necessary for cultivators of rare varieties of plants, whose color, shape, etc., they wish to perpetuate, to cover the flowers they select for seeds with bellglasses, or lace bags, to prevent insects from performing this hybridizing.

Propagation by cuttings of single buds is a valuable means of increasing those plants whose seed is scanty, or which from some cause cannot be budded or grafted, as Hollyhocks and other herbaceous plants, Grapes and some other woody plants. Grapes may be grafted, budded, or grown from long cuttings, but cannot be multiplied by either process so fast as by cuttings of a single bud. The best kinds of Hollyhock, Double Lychnis, and other herbaceous plants, should have their cuttings made after this manner:

So soon as the plant has blossomed enough to satisfy the grower that it is a desirable variety, cut down the flowering shoot; new shoots will start up around it; when these are 18 inches to 2 feet long, cut them into pieces, each containing one eye, — much like cuttings of the Grape. Instead of using the secondary small shoots, the main stem may be divided longitudinally, aud then cut into pieces 2 or 3 inches long, taking care not to injure the buds. Place these cuttings under light, rich soil, and cover them just leaving the bud open to air and *moisture ;* soon roots will be sent out from the cut ends and edges ; when these are pretty well grown, transplant to a seed bed of light, rich loam, well sheltered, but with more direct light; treat carefully with air, moisture and warmth, and you will soon have fine plants.

Growing the Vine from single eyes is much the same practice as that just described. The eyes should be prominent, well developed, and on the last year's wood; cut an inch above and an inch below the eye; select a pot of 4 or 5 inches in diameter; put in good drainage, fill with rich, light loam, and set the cuttings so that the eye shall be covered by at least an inch of the loam. Give the pot if possible, a bottom heat of 70° to 80°, and keep the air at 60°. In a short time a shoot will appear. Before this, little care will be required; keep the earth in the pot just moist; as soon as the shoot is above the surface, water occasionally and watch well that no worms get into the pot, which they cannot do if the pots are set into a few inches of coal ashes. In a month they will be nice plants six or eight inches high, and may be repotted for the last time. Subsequent treatment depends on the use to which they are to be put.

There are several other methods of propagating the Vine, but this is the best and allows of the speediest increase.

Pelargoniums will be coming into blossom, — should have a last shift of pots, and have abundant light and moisture.

Repot Achimenes, Gloxinia, Cineraria, and all climbing plants not yet repotted, Verbenas, Japan Lilies, Fuchsias for spring show; if the Carnations need it, give a larger pot. Dielytra spectabalis, and Pansies may be introduced into the house for the spring bloom.

Water Camelias abundantly whilst in blossom, and as the Azaleas start to grow, give them more water.

CHAPTER XXXIX.

CONSERVATORY.

The conservatory should be, at this season, truly a winter garden. The climbers on posts and trellises are now in bud and blossom; the Camelias, Daphnes, etc., are blooming, and the Roses, Heliotropes, and numberless other smaller plants lend their colors and fragrance to complete the beautiful whole. Under all is the delicate green moss, the Polypodiums, the Stone Crops, etc. Lysimachia nummularia, with their green leaves, make a carpet of verdure. The cold weather without enhances the delight of this in-door garden, and no owner will regret the labor and expense that has brought about such a result.

There is generally more mild weather in January than in the other winter months; on many days fire-heat may be dispensed with altogether. Be careful, however, lest sudden cold take you unawares, and never be without fire at night. The work is light now — admitting air, regulating heat, and supplying moisture. In fine weather syringe often, letting the showers fall perpendicularly, as before directed. On warm days change the plants, removing to the greenhouse those out of blossom, and replacing them with others just coming into bud.

CHAPTER XL.

GRAPERY.

CONTINUE the treatment laid down for last month in the grapery. We shall not begin to force till next month, but in the interval must keep the forcing-house rather warmer than hitherto, but not higher than 40° or 50° in the daytime. The cold grapery must be just above freezing; the retarding-house, as last month, cold and dry, but above frost. All this needs but little fire. Peach-trees, Fig-trees, etc., which were housed in the cellar or sheds, should now be brought into the houses.

The mushroom bed, which I described as under the table, in the forcing-house, and of which no further mention has been made, is yielding an abundance of mushrooms; other beds may be made in the other houses, if you please.

In the last month's grapery I gave drawings, and some descriptions, of houses for Peaches and other fruits, with the promise of entering more fully into the method of growing and managing such fruit under glass. It is obvious that trees to be grown under glass must be of smaller stature than when grown in the open air, and that means must be found to dwarf them. Beside this, they should be under different degrees of excitement at different seasons, to accomplish which many schemes have been devised. It is usual to plant such trees in the ground like vines, and in this way large crops may easily be got; but a better way in many respects is to grow them in tubs. If trained on dome or curved espaliers of course they must occupy the same place for years, and in that case they should be planted in the earth; but you will remember my saying that span-roofed houses are the best for all such culture, and there the trees assume the shapes natural to them when grown out-of-doors. To ensure perfect crops, and to keep them entirely under control, the trees should be allowed a period of entire rest;

and if they could be removed, after bearing their crop, from the house where they have been excited, to a cooler and shadier place, they would be carried through an artificial winter, and so have the needed rest, and be prepared for profitable forcing another year, and if continuous crops of fruit were wanted it would be easy to secure them, by having two houses, with different exposures, and removing the trees from one to the other, as heat and stimulus were desired, or shunned. Evidently this is out of the question with trees planted in the earth, for their roots must be undisturbed to secure growth and fruit, but by cultivating in tubs of size sufficient to give the roots full room, the change can be made with ease.

I will give directions for cultivating the tree fruits in the ground before I speak of them in tubs. And I shall give English rather than American experience, for, as I have said before, these fruits are but little grown under glass here in comparison with what is done in England, nor do general cultivators carry their practice to as great perfection here as there. We need not cultivate these fruits under glass unless we wish to have them out of season. The English, on the contrary, must grow most of them under glass to have them at all, their climate being too damp and cold, and their hours of sunshine too few to bring Peaches, in particular, to perfection. Some of our cultivators, however, are very successful in growing fruit out of season, for instance, Allen, of Salem; Holbrook, of Braintree; Stetson, of Bridgewater, and others, who yearly exhibit the successful results of their labors on the tables of the Boston Horticultural Society.

In gardens Peach-trees are generally grown on their own stock, the buds of improved varieties being transferred to ordinary stocks got from planting the stones of any kind of Peach. When Peaches were a new fruit, and not common, we had, in whatever part of country they were cultivated, perfect trees and perfect fruit, but the demand increasing with unusual rapidity, it was difficult for nurserymen to supply it, and in their eager efforts to do so they neglected the precautions, without which perfect trees and fruit cannot be secured; viz., to select stones of the best fruit from the healthiest trees, which show no taint in their constitution, and to plant these for stocks. Stocks thus grown are healthy, and if budded from equally healthy trees, will make healthy and satisfactory trees. But the nurserymen, in their haste, planted all stones indiscriminately; they were so careless about the kind and quality of the tree which bore these stones, as to pay boys by the quart for stones collected in city streets during the Peach season, many of which were, of course, from poor trees, and perpetuated, when planted for stocks, their own defects. The stocks thus produced were budded with choice varieties; the bud governs the kind of fruit produced where it is inserted, but the *health* of the tree is governed principally by the stock.

And the nurserymen were not content with violating nature in this way. The careful cultivator knows that every plant grown for a number of years on the same spot, exhausts in that ground the food which it particularly needs, and that to secure good crops from such ground a different plant must be grown on it, which will need few or none of the constituents necessary for the preceding crop, but wants just those that are left in abundance in the soil. But the Peach growers were not only careless about the seed which supplied their new orchards, but they planted these orchards on the ground before occupied by Peaches, and thus deprived the young trees from the first of their vital necessities, and compelled them to feed on vitiated and exhausted earth.

Still another rule of agriculture was neglected; viz., that each year's crop must be carefully cultivated, manured, ploughed, hoed. What should we think of the prospective Corn crops of a farmer, between whose rows the ground was thickly sown with Grass or Rye? Why, that he would lose more from his Corn than he could possibly make good by the additional crop. But Peach growers sowed Grass between their rows of trees, or allowed it to grow there. This double demand on the ground results either in impoverishing both trees and fruit, or in shortening the life of the tree.

When speaking of Pear-culture, I said that its success depends on plenty of moisture, plenty of manure, and on thinning the fruit. This last process has an important influence on the quality of all fruit crops, and is indispensable to success in Grape growing, as the merest tyro knows; but this, too, was neglected by the Peach growers, who, in their greediness for large crops allowed the trees to bear all the fruit they set, and consequently got no fruit equal to that grown on properly thinned trees.

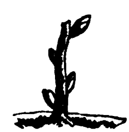
What wonder that our trees with such a pedigree have "the yellows," are uncertain bearers, and in many parts of the country complete failures? Whoever wishes to get perfect fruit and long-lived trees, must go back to first principles, must select his seed, grow his stocks, and be particular about the source, especially in growing trees under glass, where the process is expensive and tedious, and where one diseased tree may be the cause of a large loss.

Remember, too, the discovery made in Pear culture: that large growing varieties worked upon the stocks of small growing plants, preserve their superiority of fruit, while the tree continues of small size. This is of great consequence under glass, where room is all-important; small tops and roots are desirable both in the trees planted in the ground, and in those in tubs; and this is the case even in span-roofed houses, where the middle trees may and should be larger than the side rows.

Supposing our peachhouse to be built, or the trees grown as in our graperies, the proper soil is the first consideration.

Perfect drainage and a light soil are necessities. It has been supposed that the Peach does not need rich soil, because in the open air it thrives better in light and sandy, than in rich alluvial soil. Not so. The things to be especially avoided are over-dampness and over-richness near the roots; the former is particularly bad, and causes rot, the latter, canker. To insure drainage, the soil must be sandy and porous, but it should be highly and constantly fertilized with *well-rotted*, not with rank, manures. If the situation of your house is wet, drain well, and under the border lay a foundation of rubble stones. Through this rubble it will be well to carry, as in Grape borders, a pipe from the boiler; because to insure success in forcing, we must keep the roots warmed in proportion to the top. By covering the outside border every fall with a good coat of leaves and horse manure, as early as October, the summer heat may be retained enough to enable you to dispense with heat through the rubble in winter. Upon this lay two or three feet of rich maiden loam; in this loam the trees will thrive so long as its fertility remains unexhausted, To avoid exhaustion, water at the proper season with liquid manures, and also every fall, after the wood is ripened and the leaves have fallen, remove the two or three upper inches of loam, and replace with old pasture mould, or well-chopped turf; before laying this on, fork in lightly a dressing of well-rotted manure, or give several copious waterings of liquid manure.

The border prepared, select, whether for walls or trellises, healthy trees, one year from the bud, of those varieties you prefer; set them out, all trees of the same size and habit of growth for the trellises; but for the back have dwarfs and standards alternately. The stock on which to work Peaches in order to dwarf them, is Plum or Bitter Almond. Choose trees budded near the ground; set them so as to just cover the base of the bud, and plant in fall or spring; the fall is the best time if the house can be ready then. Cut the stem back to four eyes from the bud; through the winter keep the house just above freezing; do not let it get much higher than 40° in the daytime, and rely upon the sun's heat kept in at night by shutters and mats, unless the weather should be so severe as to render it impossible to keep the temperature above freezing without fires. As the spring comes on the sun will get more power, and the house, even if constantly ventilated, will warm in the daytime above the growing point, and soon the buds will swell and start to grow. Before they do this, cover the tree with the following wash, which is to be applied by a brush drawn up along the stem, so as not to disturb the buds, and is the same which is to be used for grape vines; 2 oz. flour of sulphur; 2 oz. soft soap; 4 oz. quicklime, mixed in a gallon of rain-water. This is to be applied at least two weeks before you begin to syringe. As the buds swell, increase the humidity of the house by syringing morning and evening when the day is bright, and once during the day in cloudy weather. The four buds will produce four shoots; bend them into such shapes as suit you, but keep them low down; let them grow at will till midsummer, and then pinch off their ends. This will check growth



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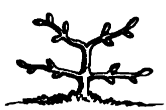
and the wood will ripen. As soon as the leaves fall, cut back the four shoots to within four eyes each of the old wood. Cover the border as before directed, with litter and manure. Keep the house this winter as the last, cool, till spring excites the trees; during the winter fumigate with sulphur; whitewash the house to kill red spiders and other destructive insects; examine the stock near the ground to detect any borers that may have got in (though they should never get into a house well cared for); should there be any sign of them, run a wire into the hole till you touch the worm; kill and pull it out. Before the young shoots begin to start in the second spring, wash the stem and roots with the mixture just directed. The cut shows the present appearance of the tree.



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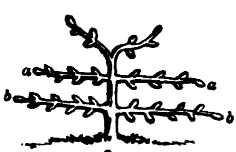

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Allow the four present branches to grow in the same direction as hitherto, and allow two buds, new shoots, to grow up the wall at a sharper angle than the others. Treat the house this year as the last; allow no fruit to grow. During the second fall of growth or the third since planting, cut *a a*, *b b*, back one-third of their length, and the new shoots to 4 eyes. The diagram shows the tree during the third winter and spring. Give it more heat this year after February than before, and induce it to grow earlier; this may easily be done without fire heat. During the third summer allow no fruit to grow unless as a specimen, for if the trees bear so young, they will lose in permanency and strength. Let the new shoots grow up the wall so as to perfect the fan shape; let the other branches grow at will till midsummer, when they must be pinched as before; in the fall prune all back one-third of their length; cover the border deeply with manure and leaves. The fourth winter you may begin to force — not earlier however than the middle or last of February. Go over all the young wood with the lime and soap mixture. During January keep the temperature higher than before, but not over 50° in the day, and let it fall at night to 35° or 40°. Give plenty of air. Before beginning to increase the heat, ascertain whether the earth in the borders has retained heat enough to render forcing well-balanced, and if not, be ready as you heat the house more, to throw some heat into the pipe which traverses the rubble foundation. The proper heat of the border cannot well be prescribed, as it will depend on circumstances not to be forseen; but if the gardener remembers the analogy of Nature, he will easily be guided into the right course. When out-of-door vegetation begins in the spring, the earth is quite cold, but lately unlocked from frost, with a temperature from 35° to 40°; and it gradually warms as the season advances. If then the borders are at about 35°, we may safely begin to heat and slightly increase the heat in them month by month.

During January give the inside borders two or three copious waterings of warmed liquid manure, which will warm them about enough.

It is found at this stage that the trees seem to receive great benefit from ammoniacal vapors, and in old times gardeners heaped stable manure under them; the vapor may be obtained as well from pans of urine set over the flues and pipes to evaporate, and the unsightly manure be avoided.

When we begin forcing after the application of the wash to the young wood, we must dispense with the syringe for a time, as it would remove the wash; the proper humidity must be kept up by watering the floors and flues, and by setting evaporating pans of water about.

During pleasant days early in this winter, all the heat which is necessary, may be got by shutting the house up; the temperature in the day may range from 45° to 50°, and must not fall below 40° at night; and to maintain this night-temperature, fires must be made. "About 12 or 15 days after increasing the heat, the blossoms will begin to expand; at this period the humidity of the house hitherto caused by steaming and syringing, should be lessened, and a slight increase of temperature afforded; the increase should not be over 5°, for to hurry the expansion of the blossoms and the setting of the fruit, might endanger the whole crop. The more slowly the buds swell and go through the stage of forming the parts of fructification, and the important offices dependent on it, so much the more certain will success be."

"When the flowers are fully expanded, and the pollen fit for dispersion, a more abundant ventilation will be necessary, and this must not be withheld, even although it becomes necessary to increase the heat every morning and continue it through the day, to make up for the air admitted."

"At this time the greatest care must be taken that ventilation be properly administered, and that no draughts of cold, frosty air be allowed to blow in directly upon the trees."

You will now observe the great advantage of the kind of ventilation or aeration advocated in the plans of houses I have proposed. "The temperature, although well aerated, may now range from 50° to 60° in the day, and must not fall at night below 45°." Increase heat and moisture with the expansion of the fruit.

"As soon as the flowers begin to decay, the young fruit will be seen seated between the fragments of the petals. If the embryo fruit is many days struggling to get free of the decaying blossoms, it is a sure symptom of a sluggish action of the root.

On the contrary, fine fresh trees in their prime, will soon enable their progeny to escape." "This is an important fact, and should constantly be borne in mind by cultivators, as it indicates more surely than the after state of the foliage whether the roots are healthy or not." "When the fruit has arrived at this state, less ventilation and consequently less heat must be given; but the changes must be effected slowly, as all sudden changes of temperature with stone fruits are particularly dangerous. The artificial heat may remain at 50°—60°. The sun-heat may raise the temperature to 75° without danger, for there is a great difference in the connection of vegetable life with artificial or sun-heat. In proportion as the sun heats the house more, ventilate more." "At this period of the fruit's existence moisture must be increased by syringing, to refresh and nourish them, and to keep down the appearance of thrips and red spiders, the existence of which may be often traced to too high and dry a temperature."

After the fruit has fairly set, the trying season is over, and all that follows is judicious thinning the fruit and stimulating its growth.

"To insure growth close attention must be paid to pruning the new wood, which may at this season be effected principally by disbudding," *i.e.*, by rubbing off all those buds which have not commenced growing, but which would overcrowd the tree if allowed to grow. "By timely disbudding much after-pruning and overcrowding the tree is avoided." "Disbudding should commence as soon as the young shoots are 2 inches long, and should be carried on progressively until the tree is disburdened of its superfluous wood, and left in condition to perfect what is left; the work should be followed for four or five weeks, and the trees be gone over often."

"During the process of disbudding two kind of shoots will be observed, the one strong and robust, emerging from the centre of a group of buds, and proceeding in an outward instead of a lateral direction, which if laid into the espalier would be broken; these strong and *watery* shoots are to be removed, reserving only such as may be necessary for filling up the centre of the tree; the other wood is often of slender growth, but it is the wood destined to produce the flower-buds of the next season. This should be moderate in growth, not drawn to great length, and very short jointed, and thickly set with buds. Too high temperature, want of ventilation, and inattention to disbudding all cause this unnecessary elongation. A contrary course tends to the formation of short, stout, well-formed shoots, abounding with bold and well-swelled buds."

"The period of stoning is considered a precarious time with all stone fruits; if all be not right at the roots, if sudden changes of temperature or inefficient ventilation be allowed to exist, then many of the fruits will fall off." During the whole culture of fruits, remember that the aim should not be to violently force nature, but to accelerate her progress, and all attempts to drive vegetation rapidly by heat will produce sickly, drawn, and unfruitful results.

Syringing over the leaves as a preventive to red spiders, must be constantly persevered in, but care must also be taken that the border is neither too wet nor too dry, either state being injurious to the fruit. Throughout the season every leaf and fruit which falls must be carefully picked up, as they produce and harbor vermin, if left to decay on the ground.

Fruits ripened under glass have not usually the color or the high flavor attained by fruits grown in the open air; they may be better protected from insects, and may also have more certain and regular temperature.

Just as soon as the fruit is gathered remove all movable sashes, and let the air have free access to the house; the more rapidly the wood ripens the better it will be for the trees; this ripening may be hastened by pinching off the ends of the shoots. When the wood is ripened, prune off at least a third of all new growth, and keep the houses as cool as is possible, until the approach of winter renders it necessary to renew heat in the houses, and prepare for next year's forcing. I omitted to say that as the season advances, and artificial heat is no longer necessary, you may let the house get as hot as the sun will make it, only creating all the ventilation that is possible. By subjecting the house during autumn to the lowest possible temperature, and keeping it so a long time, the trees "break" better, and produce better wood and fruit the next year; and in fact the thorough ripening of the wood in the fall is the most important part of the year's work, as upon it, in a great measure, depends the success of the next year's crop.

So far I have described the peachhouse as if all the trees were dwarfs, and yet I gave directions that every other tree on the walls, or the high trellises, should be a standard. The standards should be grown up to a single stem, until they are above the wide part of the fan-shaped dwarfs; they may then be encouraged to throw out side shoots like the dwarfs, and may be treated in the same way. Sometimes fruit-growers plant in this way, intending in time to remove the dwarfs, and give all the room to the standards. I doubt the wisdom of this course with short-lived trees like the Peach, as the standards would live no longer than the dwarfs. It is well enough to plant Cherries and Peaches alternately with this view, as the Cherry outlives the Peach.

Cherries, Nectarines, Apricots, and Plums are to be treated in most respects like the Peach.

I have mentioned that the Peach-trees in tubs are to be treated differently from those planted in the borders. They can be forced earlier, with a good chance of success, as the tubs are above the floor of the greenhouse, and it is easy to give them bottom heat, and so stimulate all parts of the. tree. Trees in tubs should be grown in span-roofed houses, and in three rows, the middle being standards, the two outer rows dwarfs; thus the light may be fairly distributed among all. Pruning and training should be much the same as with espaliered trees and dwarfs, out of doors. The pyramidal shape will be found best.

As trees in tubs are very heavy, I recommend laying three railroad tracks, made of bar iron, set on edge in cuts made in sleepers. These tracks should all converge at the door, and pass through it to the reserve or supply-house, whither the trees, out of bearing, may be removed, to be replaced by others, which are fit to be forced. The rails may be near together, and each tub may stand on a little truck, with wheels, or one truck may be used for all, the tubs being lifted on to it when they are to be moved.

Peaches may be ripened in pot culture as early as April and May, but only with a large expenditure for heat, and with the loss of the perfection which characterizes fruit grown later. A signal advantage in pot and tub culture is, the ease with which decayed, diseased, or worthless trees may be removed, and replaced by others.

I have given the whole treatment of Peaches thus at once, in order that a more clear and connected idea may be gained by those who wish to grow them. To succeed perfectly they should be cultivated in houses especially adapted to them; in which, however, early crops of strawberries, and various vegetables, may be started and forced. Grapes are often grown in the same house, and the arrangement scarcely interferes with the perfection of some varieties, and *must* be made by persons like ourselves, who are restricted in room; but the danger is, that one kind of fruit may at any time need more heat or more air than agrees with the other.

The advice of a distinguished cultivator of Peaches is, to take trees of a year's growth, cut them back to four buds, and plant in a 12 inch pot, shifting them yearly, till their roots fill an 18 inch pot, which, he believes, is the largest size required. The soil he uses is a good turfy loam, mixed with decayed bits of wood from the bottom of the wood-pile. When the trees are established to his mind he brings them into the house, in mild weather, during November. Do not start all at once, but take in the tubs at different times. Begin forcing with heat at 55° during the night, falling to 50° by morning; but in mild weather never falling below 55°; during the day the sun's heat may be allowed to raise the temperature even to 90°, until the fruit is stoned, then keep it at 95° to 105°; of course a great deal of moisture is required with this high temperature; syringe over head twice a day, or oftener if necessary, to prevent green fly and red spider. Very little water is needed at the root till the trees are covered with leaves; after that give an abundance. As the fruit approaches maturity the water must gradually be withdrawn, to heighten the flavor. In all cases — in pots or in the ground — the slower Peaches are ripened the finer and higher flavored will be the fruit; and those who think to increase the size and appearance of their fruit by a close course of treatment, will make a miserable mistake.

Much advantage has resulted, in early forcing, from assisting the early impregnation of the flowers, particularly where the trees are young, and of robust habit, and are deprived of the natural agents in this process, as plenty of air and the aid of bees and other insects. The pollen may be transferred from the stamens to the pistil, by a camel's-hair pencil.

In cases of some very fruitful trees there is a great abundance of fruit buds, but no leaf buds, except the terminal ones, which would be cut off in pruning; these trees, even if they set their fruit, lose it immediately after for want of the terminating buds to draw up sap; this may be remedied by inarching leaf branches of other trees into these too fruitful branches; — the former have grown and supplied the fruit with all needful sap, and have ripened it well. It is sometimes a successful practice to transfer fruit buds into barren branches, and thus get fruit from otherwise useless wood.

The tendency to buds or fruit is easily seen and directed during the different prunings; the best branches are three-budded, and of a rich brown color; two of these buds are blossom, the middle is a leaf bud; branches which have only single buds are leaf branches, and those with double buds only have no leaves.

I have, throughout these directions, dwelt especially on the importance of frequent syringings, to remove insects, or rather to prevent their collecting. If, in spite of all efforts, they attack the trees, you must fumigate.

The red spider is prevented and removed by syringing, or killed by gentle fumigations of sulphur, of which small quantities may be strewed on the flues or hot-water pipes; it may also be showered over diseased trees out of sulphuraters, or applied with water. To subdue or destroy the insect these applications must be carefully made, and perseveringly followed up — having been commenced in season.

Thrips of two species are destroyed by the same means, but both insects must be taken young, and before the trees leave out, as the old animals can bear more of these applications than the young foliage. Fumigate after the trees are pruned, painting, white-washing, and washing all the old wood with spirits of tar and other preventives.

The earwig is very injurious to flowers and young fruit; it harbors in decayed and hollow branches, under bricks, wood, etc. It may be easily trapped by laying over the ground the hollow stalks of Beans, Artichokes, etc., the sweet pith of which entices it in, where it may be destroyed in great quantities. A mixture of powdered sugar, arsenic, and wheaten bread, in equal parts, also attracts and kills it.

The Peach and Poplar saw fly are very injurious to trees on walls and espaliers, particularly out of doors. They hatch in immense numbers in April or May, cover the leaves with minute cobwebs, eat them, and then form pupæ. They may be destroyed by removing a few inches of earth about the roots in the fall, and charring it, which should be done as soon as the leaves have fallen.

There are several varieties of aphides, which may be destroyed by fumigation, but their eggs can only be removed by friction. The wash recommended for application just before forcing is begun, kills the insects as soon as they are hatched.

Fumigate when the leaves are dry; when wet they afford secure hiding-places to many of the insects. Choose a still evening, and stop every hole through which smoke can escape; by mixing damp hay, pot herbs, etc., with the tobacco, the smoke may be made more dense. The best way to fumigate trees is by a tunnel-shaped tin, with its nose bent at right angles; in its throat put some glowing

wood embers, and lay the tobacco, etc., on them, with a fine wire gauze over it to prevent the flames escaping with the smoke; fit the nose of a bellows to the tube. You can now blow as dense a smoke as you please into the parts of the tree most in need of it, and may easily kill all insects. Be careful not to blow so fiercely as to heat the leaves or fruit, lest you shrivel or destroy them.

The turtle scale is sometimes very troublesome. They are readily seen, as they are white, and collect in masses; their eggs are killed by washing the old wood with spirits of tar, but this is too strong for the young wood.

There are several weevils, the curculio, etc., which trouble Plums and Nectarines, less, however, in the house, than in the open ground. They are easily prevented by care. Remove all the fruit that falls and contains eggs, and during the season when the fly is active, frequently dust the tree with flour of sulphur; it may be yet further excluded from trees on walls and in the open air, by covering them with musquito netting.

As before said, the Apricot is to be treated much like the Peach. In pruning, be very sure to cut at a wood bud, or a triple bud, that there may be something to grow and draw up sap. If any branch has nothing but fruit buds, do not shorten it at all, unless there is a necessity for wood in that place. If possible, train some leaf branch over the place, and remove the fruit branch after it has borne. Strong growing varieties may be pruned back one-third, medium one-fourth, weak still less. Apricots often bear on spurs of two or three years old; carefully watch and prune accordingly. When the fruit has set, and is as large as a small marble, thin each group to two or three; later, after they have stoned, thin again down to the quantity the tree can bear; the green fruit makes a good sauce or pie. Apricots are apt to ripen one side, whilst the other is hard; gather and lay in a tray, with the hard side uppermost; set in a sunny place, and in a few days the hard side will have ripened. It is well to gather all Apricots before they are ripe, as they are more juicy when ripened off the tree. If any of these trees — in-doors or out — grow too rank, prune the roots as hereafter described.

The Cherry under glass is to be managed like the foregoing, only with less pruning; it needs no shortening back, except for overgrowth. The same is true of the Plum, and their growth is best checked by root-pruning. These trees being natives of a cold country, make and ripen wood even in short seasons, while natives of warm countries, like the Peach, Nectarine, and Apricot, grow through the whole season, never ripening their wood well in our climate, even under glass.

Root pruning is performed in many ways, and is quite as often serviceable to trees out-of-doors as under glass. The rudest method is to lay bare all the tops of the roots of trees which have grown too luxuriantly, and leave them thus exposed for a long time; when the earth is removed to kill the eggs of insects, which is sometimes done, the roots must be left bare all winter; but this is a very imperfect method. To prune the roots properly, dig a trench all round the tree, at the distance of 3 to 6 feet from the stem, according to its size; dig deep enough to cut all the roots across; leave it open a day or two, then fill back fresh earth. The operation may be performed in spring, summer, or fall, the latter being perhaps the best time for most trees. It is a very severe check to trees which have a large stock of leaves, and may sometimes cause them all to wilt.

The evident effect of such pruning is to reduce very much the number of roots, and consequently the supply of sap; when sap is supplied less liberally, the next growth is much less free, and the tree sets more fruit and less leaf-buds. Many trees, particularly standard Pears, which grow nothing but leaves, may in this way be thrown into full bearing.

The reason for this change in the character of the buds is, that the sap flows more slowly, and being carried through a greater number of leaves in proportion to its amount than before, is better elaborated and ripened, made richer, and when it settles into the buds it carries the elements of fruit rather than leaves, which demand a more rank and raw sap. For the same reason, branches which are bent down — whether the stem stands or is trained on an espalier — produce more fruit-buds; the sap in them is retarded, ripened, and the buds show its quality by tending to fruit rather than to leaves.

Grapes in Pots. — A few pages back I said that some vines could be grown in the peachhouse, and in a former month (October), I gave a short notice of Grape-vines grown in pots. I there mentioned that, as in the case of Peaches in tubs, the fruit can be forced in pots earlier than in the open ground, because the roots can receive a larger amount of heat and stimulus.

I left those vines in their fall sleep previous to the commencement of the winter forcing. Let us now return to them. They sank to rest in the early autumn and may be kept in a perfectly quiet and cool condition till you decide to commence forcing, which may be as early as you please, since both tops and roots are entirely under your control. Vines started and well managed in December, will ripen their berries in May. Before giving any heat, cover the vines with the wash recommended for Peach-trees; remove the pots soon after to some place where they may receive plenty of bottom heat; if fires are not needed in any of the houses, plunge the pots in hot manure; the roots may receive a heat of 75° to 80°. Before the buds break, remove a little of the powdery soil from the surface of the pot, and replace with rich, turfy loam. In order to make the buds break early, bend the canes into a circle. As soon as the young shoots show the bunches of Grapes, a selection must be made, and no more bunches retained than the pot can well maintain; a 15 inch pot may be allowed six bunches, and for every variation of an inch either way a bunch may be added or subtracted. The after treatment is like that of ordinary vines; the shoots are stopped an eye beyond the bunch; when the berries begin to swell for the last time, stop the shoots again. During growth water freely, and so train the shoots that they may have the most abundant light, as this, more than any thing else, adds to the strength of the vine, and the perfection of the fruit. Use manure-water till the fruit begins to ripen, when pure water only should be given and that in reduced quantity. Bottom heat may be kept during forcing as high as 80°; atmospheric heat may begin at 45° and increase to 75°, or higher if the increase comes from the sun's heat; night heat should fall at starting as low as 45°, and never rise higher than 60°. In cold, dark days let the temperature stand at about the night heat. I repeat, that if you would succeed you must strictly observe the practice of nature. Remember that however hot the days may be in summer, the nights are, with very few exceptions, cool; and that in cloudy weather, the days are but little warmer than the nights. Plants understand this better than we, and grow accordingly; and a little observation will show that at such times there is almost no growth, and what there is seems unhealthy unless ripened by a sun soon after.

When the berries ripen, set the vines into a cool and light room, with a north exposure; the fruit keeps better in the dark, as I have said, but the vines suffer, though this matters little if you do not intend to force them again.

Vines well laden with fruit may be used very effectively with other plants or fruit, to ornament a dinner table.

If you intend to force the vines again, when the fruit is cut, encourage the ripening of the wood in every way; prune it as soon as ripened, and treat as in the years before. It will often be found better not to force them two years in succession, but to lay them aside for a year and treat like young vines, that they may recruit and gain strength for future bearing.

An improvement, as some think, on simple pot culture is trough culture.

"The plants are from buds planted in pots, which are plunged into a heat of 80° to 90°; when they have grown 2 or 3 inches they are repotted into 60s, in loam, leaf mould, sand, and a little decomposed manure; they are replaced in bottom heat, the air kept sweet and pure. As soon as the roots have filled the pots, transfer them to 32's, using more manure in the compost. Set the pots as near the glass as possible, in a temperature of 70° to 80°.

"When the pots are full of roots, shift to 8's, using a stronger compost, and draining thoroughly; set them at least 5 inches from the glass, and raise the temperature 5° to 10°. When the vines have grown 8 or 10 feet, stop them, and if they are healthy they will at once throw out laterals from the buds at the extreme ends. It is to be hoped no other buds will break; pinch these top laterals when 6 or 8 inches long. But all laterals emitted from the base, if fruit buds, should be stopped at first joint; — allowing the end laterals to grow freely is the best means of preventing the starting of the other buds. Water freely during the whole time, and occasionally with liquid manure. When the wood is ripened, set the plants against a south wall, and protecting the roots from the frost let them remain as long as is prudent."

"As the leaves fall off, shorten the canes to the required length, which will be regulated by their strength. The time for taking them into the house again will depend upon the time the fruit is to be ripened. Take the vines into the house in December; they will then ripen in May. Begin the temperature at 55°, and gradually increase it to 70°. Keep the atmosphere moist by syringing, and if dry at the root give weak manure-water. To prevent the roots getting too damp, set the pots on pieces of brick, which also improve the circulation of air in the house: when the buds have well broken, transfer them into a trough of this kind: plank (or slate) troughs are carried the length of the house, about half way between the floor and the glass roof. The bottom of the troughs is made of crossed strips; upon these lay pieces of turf 3 inches thick, to keep fine loam from sifting through; upon the turf 3 inches of compost, made of equal parts turfy loam and rotted manure, with a little sand; remove the vines by turning the pot upside down and lifting it off the ball; examine the ball and take out worms and pieces of crocks, but do not break the roots or loosen the earth. Now set the balls into the loam in the trough, and 3 inches apart. Fill between the balls with the same compost; cover the roots 1½ inches deep. The plants are now as well off as if planted in an open border. Tie the canes of the front and back troughs to the rafters, and of the middle to the posts of the house, or to wires carried up to the roof. Syringe well, water occasionally, and pour the water on the ball and not upon the remaining earth, as the roots have not yet spread. When the shoots have fairly commenced to grow, stop them as in all other cases, leaving but one bunch to each, or 8 to 12 to every vine; a heavier crop would injure both the color and the flavor of the fruit. Water abundantly; the superfluous water will run off through the open bottom of the trough. In this way the grower may produce Muscats as readily as any other Grape, and a constant succession of fruit may be kept up without forcing the permanently planted vines too early. After the fruit is cut, remove the vines carefully from the trough, and set them out of doors where the roots may be protected from the sun; they may be replaced by another set of vines for a late crop."

"When the vine borders are vaulted or well warmed by hot air, water, or steam, the vines growing in them may be forced as much as you please, but it is not judicious to do it, as the strength and long life of the vine is sure to be injured. Pot or trough culture is equally favorable for retarding or for forcing grapes."*

J. F. ALLEN'S LIST OF GRAPES.

Cold-grapery.		Forcing-house.
Black Hamburgh,	10	Black Hamburghs, variety.
Wilmot's New Hamburgh,	10	Red and Rose Chasselas.
Wilmot's No. 16,	10	Chasselas de Bar Sur Aube.
Victoria Hamburgh,	10	White Frontignan.
White Frontignan,	2	Black and Grizzly Frontignan.
Grizzly do.,	2	Golden Chasselas.
Pitmaston, white Cluster,	1	White Gascoigne.
Golden Chasselas,	2	Royal Muscadine.
Chasselas de Bar Sur Aube,	1	Muscat of Alexandria.
Rose Chasselas,	1	Tottenham Park.
Red do.,	1	Zinfindal.
Royal Muscadine,	1	Cannon Hall Muscat.
Red Traminer,	1	Red Traminer.
White Rissling,	1	Macready's Early White.
Macready's Early White,	1	Early Black July for extra early.

General Planting.—"Black Hamburgh for greatest number; Grizzly, Black and White Frontignan are all admired by those

* Reduced from McIntosh.

persons who like the Muscat flavor; they are liable to shrivel, and are more delicate than other grapes, and do not keep well when ripe; the Grizzly is the earliest of these. Tottenham Park Muscat is very like the above, but not so high-flavored: sets its berries better. Portuguese Muscat, Chasselas de Bar Sur Aube, Pitmaston, White Cluster, Syrian, white, has very large bunches, sometimes weighing 20 lbs."

CHAPTER XL.

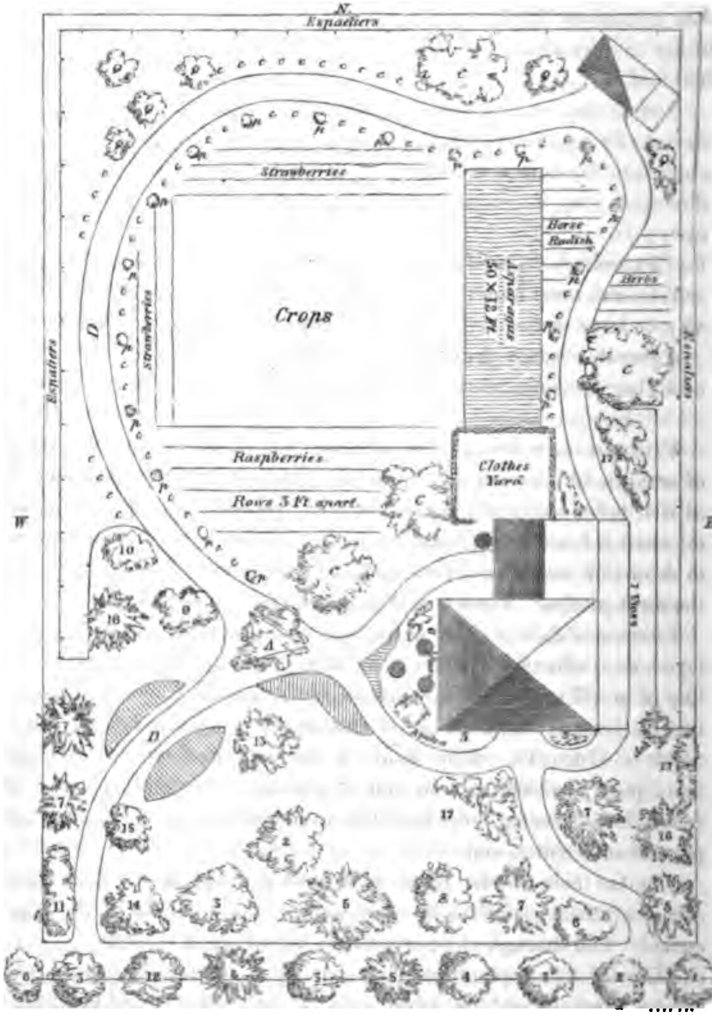
KITCHEN-GARDEN.

THE cold beds containing various plants for spring culture and winter use, must be examined as often as the weather permits, and if we have the usual January thaw, they may be uncovered and receive light and air in abundance.

In my last month's description of the treatment of hill-sides used as kitchen-gardens, I omitted one point of considerable importance; viz., that a close board fence or close stone wall should be erected across the hill toward the top of the garden, if you propose to cultivate either early or late crops there. Beside the protection given by such a fence or wall against high winds, it is very important as a means of retarding frost; and the lower down the hill it is, the better it works. You know that as air cools it condenses, becomes heavier, and falls to the earth, and when there, it runs like water over an inclined surface to the lowest level. Let the air on the top of a hill grow cool, it will run down the sides, if not so fast as water, yet in obedience to the same laws; and as it runs lower down it becomes colder, until at the bottom of the hill it is cold enough to produce frost, though at the top it was merely cool. A close fence coming down to the ground will stop this current of air as it would water, and either the air must find an outlet by running along the side of the fence, or it must pile up against it as water against a dam; so that, in time, the air at the bottom of the fence will be cold enough to freeze, while higher up it is mild.

This is not mere theory; it has been practically proved, and plants growing on the lower side of such a fence, and opposite a hole in it next the ground, have been found frost-bitten at that part of the stem which was no higher than the top of the hole, but untouched higher up.

Here, then, is a means of increasing the value of your garden.



For Index of Village-Garden, see p. 314.

STREET

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An evergreen hedge will have the same effect; so will a close hedge of any kind that spreads evènly over the ground when in full leaf.

Now is the time to prepare the hotbeds for extra early forcing, though for ordinary forcing February is early enough. I shall enter into the details of managing hotbeds next month, and those directions may be applied to January, if you choose to begin so early; but in general I advise against beginning such culture before February. The earliest forcing of Lettuce, Salads, Endive, and Cauliflower, and the development of Cardoons, Chicory, etc., may be carried forward in the forcing-house and cold-grapery.

Agreeably to my promise in last month's kitchen-garden, I shall now give drawings, details, and description, of the

VILLAGE-GARDEN. — This garden may belong either to a man of wealth, or to one who lives by daily labor. I shall describe it as if it belonged to the latter. A richer person may devote more to ornament, and make more expensive improvements; but I wish to show how one whose time and means are both limited may get the most pleasure, beauty, and profit, out of his little garden.

I assume that this place is half an acre in size, situated on a village street, and that a house is to be built on it. I have made it, like most village lots, a parallelogram, with no great difference between its sides. The front on the street measures 125 feet, the depth is 174. The main house is 35 x 25 feet; the L 15 x 20 feet; piazza on the eastern side 6 x 30 feet. This makes quite a roomy house, larger, perhaps, than would be generally wanted by persons of small means.

I make the entrance to the front within 8 feet of the south-east corner of the lot, and carry the path to the house with an easy curve. The distance is not thereby made much greater, yet by curving thus, and planting the swells of the curves with trees or shrubs, the house not only appears to stand farther back from the street, but its front may be somewhat concealed and rendered less public, and the occupations and amusements of its occupants made more private. My object in placing the house thus far back from the street, 40 feet, is to give an opportunity for both these effects.

The house might as well be on the west as on the east side of the lot, but near one side it should be, in order to leave the land more in a body for economical or for ornamental purposes, and the side selected should generally be the one which is farthest from any neighboring house. Where the house is in the centre, the whole lot is cut up, and the place cramped. Not so with a house placed as in this plan, for we see at once that the little strip on one side is but a small portion of the place, whilst the other is of an undetermined size, and if the trees, etc., are well grouped, seems much larger than it really is; the breadth thus secured enables us to vary the direction of our paths, so that they seem to traverse a large area, and we can make our flower-beds and plantations in good sized masses. The object in a small place is to avoid all standards for comparison, which may enable a critical visitor to compute readily its size. By judiciously varying the direction of the paths, concealing their terminations, filling their bends with trees and shrubs, so that standing on one part we may not see the rest, we practically increase the size of the place. Straight lines and right angles reduce the area to its smallest possible size. They provoke a calculation, as follows: This path must be about so long to the first angle, and to the next thus much longer. There are 20 Pear-trees standing on it, 10 feet apart—200 feet one way, 10 on the other—20,000 feet in the place! I do not mean to say that every visitor would thus reduce your place to figures, but that is the tendency.

Again, if the space on the sides of your house is narrow, you can plant but a few trees, shrubs, etc.; you can make no masses, or even tolerably sized groups; you cannot hide your neighbor's house or boundaries; they are constantly thrust in upon you.

But by putting the house at one side, you increase the available area, and can make those groups and combinations which will be both ornamental and useful, and will serve to divert attention from the narrowness of your estate, to the great variety and beauty of the things which you grow on it.

You will see as you follow this description through, that the place, small as it is, is really capable of producing a great quantity of material both for beauty and use; and if this is so arranged as to be presented to the visitor's eye at different times and unexpectedly, it will seem much more, and be more surprising.

But the good effect is not for strangers alone. Gossiping and curiosity are the prevalent vices in our towns and villages, which it is the duty of each of us to check so far as he is concerned. If the grounds on each side of our house are so narrow as to bring our neighbor's affairs constantly under our eyes, it is difficult not to be too interested in them; but if we have quite a large space on that side of our house which we most use, large enough both to conceal our neighbors and to give us something beautiful of our own to look at, we remove from ourselves much of this temptation to meddlesomeness, and every time we look out of the window, our eyes rest on natural and peaceful beauties of our own, which soothe and interest us, and divert our attention from the business of other people to those objects which in themselves suggest instructive and pleasing trains of thought. Having started with the rule that we ought to make our homes as beautiful as possible, for the sake of ourselves and our families, we must in carrying out the rule make due allowance for human nature.

Perhaps our education has been purely practical, and we have been taught to value a piece of land with a house, solely for its productive capacity. We may admit the force of the arguments for cultivating beauty, and yet find great difficulty in bringing ourselves to act accordingly; and this difficulty will be increased, if the land on both sides of your house is equally narrow, for, as I have said, it is too narrow to admit of pleasing effects, without much contrivance and somewhat unnatural arrangement; it will be much easier to arrange it with an eye to the practical, and we shall be more inclined to yield to our mistaken inclination. Now our duty is to strengthen ourselves against our meaner selves. Look at the plan, and see how, by placing the house as I have done, there is room on one side for nothing but the piazza, — covered with vines, both for beauty and to act as a screen, — and an espalier for Pears, with the necessary borders for them to grow in. But on the other, are first vines covering the house and embowering the windows, next, little beds of bulbs and Verbenas in the turf, next, a larger flower-bed; — then an ample path, then a fine, large Apple-tree, then more grass; — trees and flowering shrubs, grass and espaliered fruit. The area is not great, — 75 feet wide, — yet by judiciously breaking it up and grouping pleasant things together, we secure a very great amount of diversity and beauty, a pleasant feast for the eyes at all seasons of the year. Now look at the space in front of the house, where are shrubs, flowers, grass, and trees, and yet but little space devoted to them.

Whoever passes such a place, when the trees have attained their full beauty, will stop to enjoy the pleasant sight, and will say to himself that the children he sees playing about cannot fail to do well in the world, if the influences within doors correspond to those without.

Follow the path from the front door to the kitchen-garden! You begin your walk through flowers and grass, shrubs, and trees; as you proceed you come to stout and thrifty Pear-trees, well loaded with flowers or fruit; among them are Currants, crimson with their beautiful fruit, or behind them, Strawberries; beyond the waving tassels of Corn, most beautiful of grain crops, and at their feet yellow Squashes, golden Pumpkins, or ruddy Tomatoes As you round the curve, Peach and Cherry-trees greet you, and only as you turn a bend in the path do you come upon the henhouse and pigsty, where, well secured, are those animals which, if kept close, may be made to contribute to the economy and pleasure of the family; but which, if allowed to stroll about, are entirely destructive to the garden, a trouble to their owner, and a pest and nuisance to his neighbors. The fowls lay their eggs everywhere but on your own premises, and scratch up and deface every part of the garden, while the pigs destroy every vestige of fruit, flower, and vegetable, and reduce the whole place to the appearance of an Irish hovel.

So plain is this to every one, that my reference to it may seem superfluous, but it is lamentably true that even in thrifty New England towns and cities, people who would feel grossly insulted if their neighbors did not consider them respectable, allow their pigs to run at large, and the most common sight in every village is platoons of hens rummaging, scratching, and destroying the gardens of their owners, and of all the neighbors. Now you may lay it down as a fact, that it is hens versus garden. If the hens are not closely shut up throughout the growing season, your garden is good for nothing; a few hours' investigation by a set of hens of active minds and legs, will reduce your best hopes in horticulture and floriculture to despair. And certainly one-half the ill-feeling between country neighbors is due to the ravages of the domestic animals, of one or the other. I have a garden, and sacrifice my hens; soon my neighbor, who has no garden, but has hens, receives a notice from me, polite, perhaps, but sarcastic, that his hens are my nuisance, and must be abated. He promises well, but does nothing; it is too much trouble or expense to him to shut them up, and any time will do. I send more and more messages. At last he shuts them up for a few days. I breathe more freely, and my terrified flowers, plundered Currant-bushes, and pecked Melons start anew to grow. But that henhouse was a temporary structure; its door falls off the hinges, or is left open by some one of the family, who goes to get eggs, carelessly or designedly, because I "needn't make such a plaguey fuss about a few old Currant-bushes or green Tomatoes," and I see the hens again in my garden. Now I am enraged; perhaps I swear; at any rate I stone the hens, and knock one in the head, but don't kill her, and in my wrath toss her over the fence after the others, where she performs sundry drunken evolutions, as running round in a circle a vast number of times, with her head between her legs, or straight into the barn door, each foot stepping on the other as she goes; she screeches, and all the other sympathizing fowls do the same. There is music. My neighbor rushes out, sees the whole story at a glance, comes to the fence, looks over, and calls me "a nasty, mean feller, to be so cruel as to hurt a poor hen, that never hurt me." At such times hen proprietors are very chicken-hearted, and have an unwonted supply of the milk of human kindness. To his abuse over the fence I perhaps say nothing; perhaps I return it. In either case we are enemies; we talk each other down at all village meetings, and my neighbor particularly pronounces me the meanest and most unneighborly of men.

This is a common experience. My neighbor doesn't consider he has done any thing mean to try my patience and ruin my garden; the meanness is all on my side.

Now I recommend all my readers to keep a gun, if it be not against the law to fire a gun within the limits of your town; where it is, poisoned meal may take the place of the gun; and after fair notice, to kill every trespassing hen. Do it early in the season. If you must have the quarrel, save your garden; don't lose the garden and have the quarrel to boot.

The house located, the general arrangement of the place is next to be determined, and that this may be intelligent and satisfactory, make a plan of it, as you would like it when completed to your mind. If your land is perfectly level you may represent it accurately on paper, and however uneven its surface may be, a plan is an important aid in laying it out. My directions for making this plan will be general, and the plan in the book may be taken as an illustration; I shall return to my description of that plan presently. Measure off, upon a piece of drawing paper, the dimensions of your land — be it parallelogram or other shape — according to some scale: supposing your land to measure, on one side, 120 feet, allow on paper each inch of a foot-rule to measure 30 feet, each half-inch to measure 15 feet, and so on; then one side of your plan will be 4 inches long. Go out and measure the distance from each front corner of the lot to the middle of the front of the house, also the distance from these corners to each corner of the house. Then measure the outside of the house all round, noting down the measurements as made. Return to the house and find that point on your plan which corresponds to the middle of the front of the house. To do this set the legs of a pair of dividers by your scale of 30 feet to the inch, so as to measure the distance from one corner of the lot to the middle of the front of the house, as you have noted it down. Set one leg of the dividers on that corner in the plan, and with the other leg make as much of a circle on the paper as will reach from the front line back into the plan farther than you think the front of the house will be; do the same thing with the corresponding measurement from the other corner, and where these two curves cross each other, will be the middle of the front of the house on the plan. In the same way find the corners of the house on the plan; connect these by a line drawn straight through the middle point, and you have the front line of the plan of your house. From this line measure out in accordance with your notes all the sides of the house, and be sure that all the angles correspond to the real ones. Having put the house upon paper, go out again and decide where you will put the gates, which will give admission to the front and kitchen doors, bearing in mind what I have already said about them; also select the position for the henhouse. These points settled, ascertain the relative positions on the boundary lines, and returning with these measurements, apply them to the plan. Now draw your path to the front door, then that to the kitchen, and to the piazza. If the local circumstances make straight paths the most desirable and pleasant, make them straight; but otherwise curve them. If the surface is uneven keep the paths to the hollows as much as possible, and when you ascend a slope follow the easiest line of ascent. Curve the paths whenever this will enable you to produce a pleasant effect, by planting a group of trees or shrubs in the bend, or to give a good view of the house and garden, or for any good reason. Make them 5 feet wide at least. This will seem to you too wide to look well, a waste of ground, and involving expense in construction. In fact it will look better than any less width, and 6 feet is better than 5; for proof refer to any of the plans which accompany this book, where all the paths are 5 to 6 feet wide, and see that were they narrower the plans would look pinched and meagre. And as to waste of land and money, it is not wasting to make a thing satisfactory, which you must have in some form or other, as you must paths; and surely a path, which forces friends to walk in "Indian file," and talk to each other over their shoulders, is not satisfactory, but very annoying, and if it be over a small place, it forces us to notice and regret the narrow limits which lead to such scrimping. If on such a place the paths were wide enough for three or four persons to walk abreast, they would seem wasteful, for their breadth would be unnecessary and incongruous. If our path allows two persons to walk abreast easily, it is wide enough; I do not mean so that they can just squeeze along without treading on the border, but so that they may walk, easily, side by side. And this brings us to a *principle* in path-making.

Most persons think that paths are the most important features on a plan, and that how they look, and into what pretty shapes they divide a surface, are the important questions. But if paths are rightly placed, and of proper width, they are the least important features in a place; if badly placed, the most important. For a path should never attract notice to itself, any more than a coat or the frame of a picture to themselves. It is merely a means of access to something, and should be so managed as to afford this access in the pleasantest way, and to do nothing more. If wide enough, its width attracts no attention; we walk along it, talking with our friends, and looking at the landscapes or the flowers.

Draw your paths then 5 feet wide; wherever two of them meet, round the corners so as to allow a wheelbarrow or a child's carriage to be drawn round them easily; this, too, being no waste of room. Next fix the place for your well, if that is to be out of doors, and turn a path to it. Next assign a place for the clothesyard, which should be large enough for use, and no larger; mark on your plan that this is to be surrounded by a hedge of evergreen, which, when grown, will effectually screen the yard from cold winds and from observation, so that washing-day may come and go unknown to any person outside the house.

The next thing is to draw such a path as will traverse the whole garden, giving access to the henhouse on the way. Avoid sharp turns and corners, and it will seem to lead on without reference to the boundaries, whether near or distant, crooked or straight. Curve it to avoid inequalities in the surface, and for the sake of grace and beauty, but make all its curves as long and easy, and gently-changing as possible. A comparison between a straight and a *crooked* line, is almost always in favor of the straight; its simplicity and directness fills us with disgust for crooks, and sharp, unnecessary turns. The same principle will guide our choice between well and ill-curved lines; the best curve, like the line of beauty, possesses the good qualities of the straight line, and seems appropriate; the bad curve, like the wriggle of a wounded snake, is like the crooked line, meaningless. Do not think that because a line is not straight

it is beautiful. For instance, let *a*, *a*, and *b*, *b*, be paths over the same surface. If that surface were very uneven, and *b*, *b*, followed its undulations, or was lost among copses of trees and opened at every turn on some pleasant sight, it would be appropriate; but if short, and over a level surface as in our garden, the worst possible path. The changing path should beguile us along unconscious of any change, except as new objects are brought into view.

A gentleman once objected to a change made in his grounds, which would alter some straight paths to curved, that he should never like it, could never get along with it, for he was accustomed to walk much lost in reverie, or in thought, and should be constantly running into the borders if his paths were curved. This was a perfectly natural feeling; his idea of a curve was a crooked, hump-backed line. The change was made in accordance with the principles just laid down, and to this day he walks lost in his meditations, and has never yet been wrecked on the dreaded borders.

Our garden path was to give access to the henhouse, but should not quite touch it. Such a building should stand as far back from the line of direct walking as convenience will allow, for although it is useful and desirable, it is generally ugly and noisome. The former objection may be removed by vines well trained; the latter by sprinkling the pigpen occasionally with diluted sulphuric acid, and covering the floor of the house with plaster of Paris, chloride of lime, or charcoal, all of which answer the same purpose, being absorbants of ammoniacal, and other gases valuable for manure but disagreeable to smell.

You will now make, agreeably to directions before given, as many espaliers and of such kinds as you please. In the plan, to which we now return, there are 365 feet of espaliers, giving 45 trees 8 feet apart; of these 2 are Figs (sometimes they will bear, and sometimes not, — but as curiosities have them), 4 Nectarines, 6 Apricots, 12 Peaches, 3 Plums, 3 Cherries, 15 Pears. Had you no other fruit these would be enough, but I shall let you have more. Where the paths A and B cross, you may turn back a short path, which will render access from one to the other easier; in the little triangle thus left, you may put an Apple-tree; it will do less mischief there than anywhere else. In so small a place plant no Apples in the borders, unless they are dwarfs; for when Apples are plentiful they are very cheap, and when scarce, your trees are not likely to do better than your neighbors; and no tree is so unprofitable in a small place as the Apple. It covers a large surface, shading it so that no smaller tree can grow, and gives no compensating return.

Dwarf Apples are not so bad, but I should never plant any. Cherries are about as bad, but occupy less room, so that I have put in a few in those swells of the path where there is room enough, also in places where you want a screen. Set dwarf Pears around the inside of the paths, 10 to 12 feet apart, as before described; our place will accommodate 18. We shall thus have 33 Pear-trees, the annual value of whose fruit will be not less than $2 per tree, when well established, and more if you use them yourself. For directions about planting, etc., refer back. Set currants between the Pears, each bush 3 feet from a tree, their centres 4 feet apart; there may be 50 Currants; in the place of some of these you can substitute Gooseberries if you choose.

From the clothesyard, measure back a strip of land 50 feet long and 5½ wide, which will be large enough for the smallest sized Asparagus bed described under the directions for the culture of that vegetable. I have made it 12 feet wide to insure a sufficient supply. At right angles to the lower or north end of the Asparagus bed, are rows of Horseradish; cultivate this as I have directed, and short as the rows are, they will furnish enough for any family. At the west of the clothesyard is the Raspberry bed, 6 rows allowing 125 plants at 3 feet apart, and 2 feet in the row. Perpendicular to the Raspberry and Asparagus beds, are 7 rows of Strawberries of different lengths, quite enough to give a good supply through the season. Enclosed by these different beds is an area, not large certainly, but enough to give, under good management, an abundant supply of summer vegetables.

By planting only so many vegetables as will suffice for your family, you may have an abundance and variety for that purpose; but if you are possessed with the usual spring mania for planting every thing in large quantities, you will be cramped for room. Twenty

Tomato plants will give all the Tomatoes any common family needs, and allow some for preserving and pickling, and they need not occupy more than 400 square feet of land. Let other things be in like proportion. You should no more think of growing Potatoes on such a small place, than of planting Apple-trees; all such large-growing crops are too unwieldy for a small garden.

You observe on both east and west sides of the place, the espaliers are carried past the house and into the grass land. You must allow a border here at least 12 feet wide (taking both sides of the espaliers) for the roots of the trees; this must not be cropped with any thing, but must be well manured.

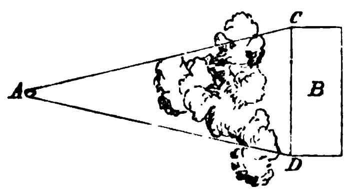
Pears, as I have said, need plenty of manure and moisture, whilst Peaches and similar fruit are injured by strong manure; and by manuring around those trees upon a pretence of taking a crop, the trees are injured, although you may get good crops of other things.

You will see on the left of path A on a bend, 4 Quince-trees 8 to 10 feet apart, and 2 by the henhouse; these 6 trees are enough for your family.

Return now to the front and ornamental part of the place. On each half of the eastern side of the house are vines; 2 Woodbines at each corner; next, 2 monthly Honeysuckles; next, 2 Roses (Queen of Prairie and Rosa-ruga); in the middle a Virgin's Bower, or Clematis Virginiana, and Clematis Azurea, Grandiflora, and Flammula (white and fragrant). On the front of the house, on either corner, a Monthly Honeysuckle; on each side of the door, Woodbine; between door and either corner, Boursault Rose, and Mrs. Hovey (Prairie). On west side 8 vines; at north-west corner, Monthly Honeysuckle; at south-west, Wisteria; next to each of these a variety of Clematis; next, Trumpet-creeper and Woodbine; in the middle, Sweetbrier, and annual vines. In each hole may be planted some tubers of the Apios, the wild Ground-nut, and of the Madeira vine; and in the proper places where it will show to advantage, the Ipomea Learii and others. The two latter should be taken up in the fall, as the frost destroys them. On the west and north L of the house, Grape-vines are put, and if the varieties are well selected, and carefully pruned and trained, you will be able to ripen the

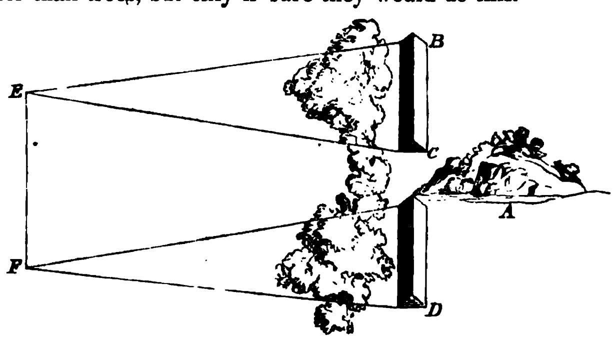
Grapes on the north exposure, though the east and south are better of course. Either the Concord, Hartford, or Diana Grape will ripen there; the Isabella and Catawba must have more sun; and the Catawba does not ripen with certainty anywhere in our latitude. The east side of the house may be devoted to Grape instead of ornamental vines if you choose. I prefer the ornamental. The henhouse may be covered with grapevines; over the well, too, which you see just where the kitchen path B reaches the house, a little well-house may be erected and covered with vines. Hop-vines thrive in such a place, and although this is not the best way to cultivate the Hop for a crop, it will give shade and some hops.

Ascertain what objects in the neighborhood should be screened from sight, and what are agreeable; fix these points on paper (to a scale). Let A be a window in the house, from which the object B is to be concealed; draw the lines A C, A D, which shall embrace between them the whole of the disagreeable object; plant in the triangle thus formed trees as gracefully grouped as possible, and unless by expanding the group you would shut out something you wish to see, spread them out beyond both lines enough to make a pleasing group. Carefully compare the size and shape of the different trees with which you might make the screen; to determine which you will need draw imaginary lines in the air, which will enclose the top and bottom of the object, and by them judge how high your leafy screen must be. When the trees and shrubs are selected, mark their names down on paper, and put the points which show the stems at least 10 feet apart, and as much more as the future size of the tree will allow consistently with its purpose of a screen.



Here let me notice a pestilent theory which has taken possession of the minds of some planters, who getting a theory apply it at all times and places, regardless of the principle which is its life. This notion is that in planting groups of trees they should be placed as far apart as they ought to stand 20 or 30 years later in order to have their perfect development. No theory could be better where a group is made for its beauty alone, with ample room and free choice of material, for in no other way can the greatest amount of beauty be obtained; but where trees are planted to screen an unsightly object, this theory has no place. What you want is a screen, and to get this you might put up a high, close fence, were it not ugly, expensive, and perishable; you prefer trees because they have neither of these defects, and form in time a perfect screen; but you defeat your purpose unless you plant thickly, so thickly that in a few years the object of your planting will be secured. If you must wait ten or twenty years for this, you will either become so accustomed to the nuisance as to be careless whether it is hidden or not, or you will cease to wait for earthly things. Again, it is foolish when planting for a screen to use such trees only as will have the greatest individual beauty when full grown, for they may be slow growers or short-lived. You may secure the result at which the theory aims and yet have your screen, not by mixing slow-growing or distant trees with shrubs, the latter to spring up and make the screen without crowding the trees; but by adding to these, trees of a rapid growth and short life, which will serve as nurses to the slower-growing trees, and will soon make a screen which can be cut down as soon as the permanent trees are large enough to take their place.

I would use permanent trees and shrubs when and where the latter are high enough to cover the object, and should like them better than trees, but only if sure they would do this.



In case that whilst there are some objects like roads, unsightly buildings, windows of inquisitive neighbors, which you wish to "plant out," and others which you wish to retain in view, reverse the practice just described. B, C, and D to be shut out, and A to be seen if possible from the whole line E F, either because it connects windows of your house, or because it is a favorite promenade. Draw on the plan, or beyond its edge, on the same paper, the location of the three objects; then draw the lines E A and F A, and E B and F D; make the most varied plantations you can between E B A and F A D, and connect if possible these groups of trees with shrubs, thus. You will get a varied outline, beside concealing and showing respectively the given objects.

Where a group is planted for other purposes, the guiding principles are very different, as I have said, and for them I refer you to the month of September, where the subject is more fully discussed, and to future months.

If circumstances do not permit you to study and imitate any particular group of trees, if there is none in your neighborhood which you care to study, you must be guided by this consideration: in selecting and planting your trees, both the beauty of the individuals or their appearance in combination must be considered, in your estimate of the pleasure to be derived from them. As I have repeatedly said, variety is an important constituent of the beautiful, and its presence is a powerful inducement to the mind to consider new things, while the enjoyment of familiar things is prolonged. However beautiful any one object is, — supremely so if you please, — it will pall on the mind at times; you may be an enthusiast (though not a monomaniac), may sell all you have to obtain some work of art, may enshrine it in the most appropriate manner, may visit or live with it, may show it with a torrent of enthusiasm to your friends; yet there will be times when it loses its control over your mind and eye; you will go to other things less beautiful. Leave it then for other things — inferior things; freshen your soul and eye with them, and when you return the old love will re-assert its control with new power.

This undeniable fact controverts a theory, which from the time of Gilpin and other authorities in landscape gardening to the present day, has had many advocates; viz., that any spot to be improved should be planted with trees entirely or mainly of one kind, as in no other way can great effects be produced, and the full beauty of the trees be ascertained. This is not true even on the large scale of mountain and forest, as each man's experience will testify. Recall the scene you admire and love most, count over in memory, or on the spot, the varieties of trees which are blended together to produce the effect; there are not only trees, but vines mounting the trunks, and throwing their wreaths over the branches and top, and by changing form and color, giving new and unwonted life to the whole. Lower down at their roots are shrubs of many kinds, and their feet again are fringed with flowers. I admit that in a case like the 27 Oaks at Waverly, Mass., the pleasure is in the individual trees, whose perfection and magnificence is not surpassed in the United States, nor could they be improved by planting other trees amongst them, but there is no oak effect; it is the beauty of old and individual trees, which have been growing *only* 600 years, and are not likely to be reproduced in much less time. All of us know of some dark, solemn Pine wood, in a deep glen, where no other trees seem to exist; but the peculiar beauty of those Pines is seen and felt only when we are within the wood, not when we look at it from a distance; its depths have a variety not to be found on its skirts; it is the dim-colored light, the whispering winds, the contrast of the columnar stems with top and foliage, the intermixture of shrubs, etc.; while the spot in the wood most loved is where a break in the trees has opened a bit of water, or a prospect, or where has sprung up a ruddy Maple or a golden Hickory.

To try the theory by a smaller scale, and on our plan; southeast of the house is a group of 9 trees, 5 of which are in a row, that worst of all positions for good effects. Red Maple in front will relieve its red blossoms in early spring against 3 White Pines, and contrast its light budding spray, and irregular shape with the more stubbed branches and elliptical outline of the Sugar Maples, and the fastigiate Elm and Tulip-tree. In the fall its gold and red will be heightened by the dark green of the background; before its color is gone it will be taken up, as is a song that was gradually hushing away by stronger voices, and the brilliant Sugar

Maples will bring back the fading glory, and carry it up to a yet higher resplendence, always intensified by the deep green of the Pines on one side, and the English Elm on the other. Can anybody maintain that this group would be better all Pines, all Maples, all Elms? And as I have just hinted, color is not the only gain by this arrangement; the shape and variety of spray are equally beautiful, and in their turn contribute fully as much to the beauty of the whole. Variety is an element of beauty in virtue of the contrast it affords. What is more bewitching than the tracery of the Elm against a winter evening sky? Words cannot describe its beauty, its magical effect, no hand can trace it or reproduce it; the interlacing of the branches overhead, the arches and beams of this member of a cathedral that would have delighted medieval builders. And in the spring, when the tree feels down in its vitals the moving power of the early sun, and long before other trees have swelled their buds, expands its own, how — just as they burst into flower — the same tree which we so much admired for the purity, distinctness, and variety of its spray, and its crossing branches in fall and winter, seems now, in the light of the setting sun, to have entangled in its network one of those rare purple mists of autumn! and to have woven it into a garment as beautiful in color as the Tyrian purple of old, which none but kings might wear, and as delicate in texture as those fabrics of the Eastern loom, which may be passed through a ring, and are yet ample enough to clothe an Eastern beauty, whose form and limbs are not more lovely than those of that same noble American Elm.

Look now at our grouping in the south-east corner, where such an Elm stands surrounded by stiff Maples, Ashes, and Pine trees, and heralded by Norway Spruces, whose picturesque grace is a good preparation for a true appreciation of the Elm.

If then you are making a group on your plan, remember that you are to introduce a variety of trees in a variety of positions, and so placed that each will be seen to the best advantage, and combine into the most graceful whole. Around and among these trees, plant those shrubs which will grow in the shade, and on the edges of the group, others needing more light; and the group may be rendered yet more beautiful by fringing these edges with Asters and Golden-rods. In another place will be given a list of suitable trees and shrubs.

Our flower-beds are placed according to previous advice; the round ones directly under the windows are for bulbs, and later for bedding plants, or such annuals as you prefer. Fill the other beds with a choice selection of perennials, with spaces for other varieties of plants.

CHAPTER XLI.

ORCHARD AND FARM.

In the orchard continue to prune; remove and burn the brush. It is well to hurry this work a little, as there will soon be more demands on the limited labor of the farmer; take scions the last of the month.

Throughout this book I assume that the balance sheet of profit and loss in dollars is not the only test of rural improvements or the sole inducement to agricultural labors. Burns has said: —

> "The rank is but the guinea stamp,
> The man's the gowd for a' that,"

and it needs very little reflection to see that in those two lines the history of the world is written. Success in a worldly point of view is desirable, and its evidence speaks to all men, in better clothes, better houses, better equipage, — in the "guinea stamp." And this is worth some effort to gain; it is natural and proper that men should strive for those things which contribute to their own comfort and pleasure and consequence, which elevate them in the opinion of the world. But good as it is to be current coin in this way, how worthless it is in comparison with being the gold of true manhood.

Education is the watchword of New England. Now how would you educate your children; by sending them among coarse, sensual, semi-barbarous people, or by associating them with the refined and noble? The latter, of course! If you, as a farmer, have a creature to fatten, you put it in the most favorable circumstances, you give it the best pasture, the most abundant supply of water, the mildest temperature, you do not allow it to be worried by dogs or boys; you give it shade from the fierce sun, and shelter from the biting wind. This is right; this is good farming.

So if you have a child to educate, and wish to make him a noble man, true gold, surround him with the most favorable influences.

Assuming, then, that the aim of every man is, whilst he gets his "living," to develope himself fully, he cannot place himself more favorably than by following some occupation which will constantly carry him into the fields and woods, and bring him into close communion with nature, where every influence will be for good. Look how these influences surround the farmer! he works for his daily bread. It is hard work, but he does it thankfully, because it assures him that the blessings of home and love will be continued to him, without fear of famine and ruin. As he goes out to his early work, he sees sights that would well repay any man for severe toil: the colors of the sky at sunrise, the glistening of the dew-drop, the general wakening of nature. The songs of birds come to his ears, the flower under his foot speaks of beauty and wisdom, the fields have a voice that is pouring out praise to God.

As he turns the mould with the ploughshare, a bit of quartz or spar catches his eye, attracts his curiosity, and leads him through pleasant thoughts of geology, how these crystals were formed, of the structure of the globe, the stratification of rocks, the formation of soils. The tree he is cutting bends, and as it falls shows him the rings which have marked its growth, and starts his thoughts afresh — upon the wonderful structure of trees, the phenomena of growth, the wonders of reproduction. Every graft or bud he puts in, teaches him vegetable history. As he goes to the barn at night, the cry of a calf new born from a cow of a favorite breed, which promises to be the most perfect of his stock, arouses a thousand thoughts of the providential wisdom which not only secures the perpetuation of races, but provides man with the means of improving each race of animals to ultimate perfection.

His labor over, he returns to his house, lying warm and glowing in the rays of that setting sun, whose rising was so beautiful and so delighted him. The rich, yellow light gilds the tops of tree and chimney, is lost in the deep shadows of the pond shore, or sparkles in the spray of the waterfall. With a painter's eye and a poet's soul, he drinks in these sights, and involuntarily thanks God for his lot, and pities the poor inhabitants of cities, condemned to pass their lives within brick walls, and shut out except for a few brief days in the stated summer vacation from the feast daily spread before him.

You will say, "How absurd a picture is this! to find a farmer earnest and enthusiastic, poet, artist, and naturalist, is as rare, as impossible, as to invent perpetual motion." I grant it is rare; but by no means impossible.

We have several senses, sources of pleasure or pain; of these, sight and hearing are the two most valued, and productive of most pleasure. Suppose a man possessed of all these senses to put out his eyes. In horror you ask his reason for the act. "Oh," he says, "the dust gets into them, the sun dazzles them; and besides I was near-sighted, and could not see half so much as you, and I never thought half a loaf better than no bread."

Or suppose him for the same reason to tie a bandage over his eyes, and keep it there the greater part of the time; his eyes would soon grow weak; he would lose his sense of color, and his discrimination of form. You meet him at a time when the bandage is removed, and congratulate him on the enjoyment he must receive from the beauties of nature. He peevishly asks, What beauties? for his part all things are alike, the annoying sun makes such a dazzle, 'tis hard work to keep his eyes open; every thing is green, and one thing so like another that there is no variety worth looking for. You reason and remonstrate, point out the difference between things as he sees them and as they really are, perhaps tell him it is because his eyes are weakened that he does not see as you see. He listens with a tired patience, and says in conclusion, It is very well for you to say so, but he can't see it as you do, and if a man isn't to believe his own eyes, what can he believe? You would leave such a man in disgust; and perhaps you are now thinking me tedious and foolish for putting the absurd case, — and yet it is possible that you are that blindfolded man.

You read these accounts of what farmers may see, hear, and know, and you call it all twaddle and nonsense. You "know better;" you've farmed it all your life, and know 'tis hard work and lots of it, and little profit in it, and a dog's life, and kills the women folks, and makes all hands too glad to go to bed at dark to stay up and admire Venus, and the comet or the moon, or to read and think. City people and rich folks may go about the country and see what they call beauty, but for your part you don't believe in it. Trees are sort of pretty, and you don't know but 'tis well enough for the women folks to have a few flowers in the front yard, but you've something else to do. You don't see any beauty in having to get up early and milk,—maybe it is as I say, but you don't see it,—and as for geology and botany, and all that, and structure of the earth, that's book learning, and not for poor folks like you. Chopping wood is hard work; you can't stop to count rings, and if you should, how would you know that they really did show how old the tree was? But I won't go on quoting from you. You know it is all true as well as I, and you are blind and won't see; you not only have put a bandage over your eyes, but you won't let any one take it off. You know best, and if you can't believe your own eyes, what can you believe?

Do you suppose that a nice sense of the beautiful is the common property of man, and that you would have it as much as another, if you were to have had it at all? The appreciation of the beautiful is the result of much self-culture added to natural quickness of sight. My mind may be naturally more apt to learn some things than is yours, but you can cultivate yours as I mine. The eyes of all are not alike, and yet education brings every eye to see those things it wishes to see. Turn a city laborer into the woods, where he must get his living by hunting, and defend himself against savage men and beasts, and his eye, hitherto ignorant of woods and woodcraft, will become in time so acute that he will follow a trail for miles through the primeval forest, and know whether it was made by man or beast, how many have travelled it, and whether fast or slow. Early education makes a great difference in this, and some men are more acute and will learn these signs more easily than others, but all can and will learn them under necessity. So the sailor sees objects barely visible on the distant horizon, and discriminates between the spouting of a whale and the sail of a vessel, knows a ship from a barque, a schooner from a brig, will tell you whether a ship under bare poles is a merchantman or a man-of-war, — all at a distance where you and I, landsmen, can scarcely see any thing without a glass. Yet if we wish to learn this, we shall.

Those who are most remarkable for their love and appreciation of beautiful things, make them their constant study, seek them out whether near or distant, compare one with another, note their excellencies, and use each new object as an aid toward understanding and enjoying others.

When you commenced farming you knew but little about cows, horses, stock of any kind; you went to cattle-shows, examined your neighbor's stock, looked for points of excellence; and have finally educated your eye so that you are a better judge of stock than your neighbors, and thus make your stock more profitable than theirs. Precisely in the same way can you educate and refine your mind. By studying the beautiful, and inquiring into the mysteries of nature, you will render yourself as much more tasteful than your still slumbering neighbors, as your stock is more improved than theirs; and the gain in this kind of development is immense.

Money at interest doubles in a fixed number of years, but the wealth invested in the mind often doubles in days, and each day opens new stores of pleasure and instruction. You are no mere dweller on the earth's surface, but a confidant of Nature's mysteries, a growing man.

You and I see at the railroad station a wonder-working and queer looking machine of enormous power; we understand that by fire, and water, and iron, its marvels are wrought, but we are uninitiated, not at all acquainted with the life and workings of the machine; its boiler and steam chest, valves, pumps, etc., are all "unknown terms" to us, and while we admire the engine and its results, we regret our ignorance of its mysteries. If some kind engineer explains the wonderful machine, is patient with our ignorance of principles and details, until we become fully possessed of its theory and construction, what a revelation seems to be made! It is no longer a strange and terrible beast of burden, but an acquaintance. When it passes us, dragging its long train of cars, we no more feel inclined to do homage in blind reverence, but would salute with the same earnest God-speed as though it were a great, powerful, honest fellow, bravely laboring up the hill of life with his load. We have learned something — principally a lesson about our own ignorance; — a ray of light has gleamed into a hitherto closed chamber of our minds, not only making us aware, with its pleasant light and warmth, that we have such a chamber, but showing us how empty and hung with cobwebs our mind is. We feel that an unexplored field of discovery is opened to us, that we may go on with the enthusiasm and promise of explorers; for it is the privilege of learners not to stop with any one lesson, not to be dependent on any instructor, however able, not to cease when the limits of present knowledge are reached, but to go on and add to that knowledge.

We cut down a tree to burn, a common thing, and of no great consequence. What if the tree has been growing many years, and is the result of vast natural processes? It is but a tree. The sap begins to stir beneath a spring sun; we see the buds swell, the flowers and leaves expand, the fruit mature: an every-day thing, the natural result of the change of the seasons. Study the anatomy and physiology of the tree; humble your conceit a little; do not think it beneath the dignity of a man, earning money and carrying on a household, to be as a little child. Look first at the little seed, swelling with heat and moisture; before you are aware, noiselessly, and yet exerting a prodigious force, the tender little radicle, or first root, and the still more delicate plumule or first stem and leaf have burst the coats, which the whole mechanism of the plant was a year in forming for them. The rootlet goes down into the ground, and the plumule up into the air. Cut such a little plant into delicate slices, and place a bit under a magnifying glass; you now see that it is full of living cells, end to end, hardly stronger than water, and seeming the most fragile of things. You are told this is vegetable tissue. the principal constituent of all vegetation. A few weeks later cut a section of another little plant, which has opened a few leaves; on examining the section as before, you see mixed with the cells small bundles of harder fibres; these you learn are woody fibres, which, when compacted enough, make the solid trunks of trees. A section taken still later in the season shows its centre full of what you have long known as pith, surrounded by a minute ring of cells, woody fibre, and cells again; these outer cells, on examination, look different in shape and closer together than the inner ones; you do not yet know why, and — forgetting the shame-faced unwillingness of the man to learn like a little child — you get a section of a plant of two years' growth, and find in it two distinct rings around the inner pith, and two distinct rings of outer cells, or what you call bark. The cells of the outer rings differ as before from the inner, and resemble each other, only the outer of all has its cells most closely bound together. A three year's old plant shows you three rings of woody fibre, but two of outer cells; the two of last year have become one, while there is still a young bark within. The next spring you make a cut across the stem of one of these plants, and find three layers of woody fibre as before, with another layer almost woody, and nearly three layers of bark. In the fall the same plant has four layers of wood, and only two of bark; you now see that what was nearly woody in the spring is quite so now, and what was nearly bark then is now quite bark, whilst the second ring of the spring is lost in last year's bark. Now you believe that ring of wood shows a year's growth, and you are excited to know more.

Reading or investigation teaches you that in the early spring the sap is taken up by the roots, sent up through the woody fibres into the twigs, and thence into the leaves, where it is spread out to ripen; and when ripened, is sent down to feed the growth of new twigs, and nourish the cambium layer which makes new bark and new wood. Farther study tells you that the wood and the new roots alone contribute to the life of the tree, and that so far as this is concerned, every ring but that of last year, might be removed without affecting the vitality of the tree. Thus you get insight into nature's operations; you see the life of the tree, — are taken behind the veil. You can almost hear the trickling of the water in the spring to the roots, — its gurgling as the sap runs up the stem and down again into the wood and bark. You really believe now that the leaves are the lungs of the tree, and that it is of no use to manure your trees near the stem, but the manure must be put out where the new roots are forming. The tree is no longer merely a thing to bear fruit, give shade, or fuel; it is an organized being, with the most wonderful and delicate mechanism, and as much the object of the bounties and cares of Providence as are animals and men. Insensibly you are led on to new researches; you no longer plant your crops mechanically; you think how the buds and leaves of one will differ from those of another; buds, tubers, seeds, all have a new meaning for you. You no longer look on the rain and sunshine as sent for the crops of yourself and other men, but comprehend that God kindly allows you to understand and take advantage of his mysteries, and that the real work of the season is done by the wind, the rain, the sunshine, and the organs of the plants; that all your powers and efforts are weak and useless, compared to these; and you begin to go about your work more reverently.

You read how stones decay, form soils, and feed plants, and you wonder that rough, hard stones, can be taken up into the delicate cells you have seen under the microscope; so you are led to consider the different stones, how some are more easily dissolved than others, and to wonder if these are not the ones used by plants. Inquiry shows that they are; then you wonder whether the supply is equal to the possible future demand. You begin to read about the rocks, and are led on into their history, and into that of the formation of the earth's crust, into accounts of the kinds of stones, the way they lie as respects each other. Your mind is rapidly growing. When next you plough, you put the share in deep, to bring up more of these stony particles to the roots of the crops; you hoe with some understanding, and it is no longer dusty, dirty work, but an aid to nature's laboratory process; you are stirring the soil to break up stones and clods, and set free their particles, to open them to the dissolving power of rain and the life developing influence of the sun.

Perhaps you meet some day a man with a curious stone in his hand; you look at it, and say, "Oh! yes, shells!" he looks at you with surprise, and asks if you know about them; half ashamed, you say, "Well, no; but then, I've always seen them." He tells you, pointing with his finger, these are shells, those ferns, those corals; he shows you a Trilobite, and explains that it was the earliest animal of its kind ever introduced into the world. He points you to the river bed with its bold sides, where the waters have cut their way through the solid rock, a hundred feet deep, two hundred wide, and carries you, half against your will, to the stream. You know well the Hemlocks and Arbor Vitæs, which fringe the bank from its top to the water's edge; you have hunted and fished among them many a time in your boyhood;—he lifts a layer of moss, and shows you the bare rock as full of shells, ferns, and corals, as the piece which first attracted you in his hands. With a few words he carries you back through the long path of ages, and shows you the earth as a sea, full of creeping and swimming things, that died, and were buried under sand or clay, and turned at last, into stone, and so have been kept imperishable till to-day, for you and him to study and decipher. Thus another page of the book of nature is opened to you, and you grow excited. He finds you a willing listener, and tells you how in that world of waters, convulsions of the globe formed dry land, on which grew trees of gigantic size, and of species now unknown, or only represented by dwarfed vegetation; how they were buried in the earth; and, as they grew by absorbing sunshine, so now they are dug up as coal, to return in the fires of wintry climates, the condensed sunbeams of ages so long passed away, that the interval can hardly be numbered in years. He leaves you delighted, astonished, eager for more such knowledge.

Now you believe that you have had a bandage over your eyes, that you had at best but half your eyesight, and you no longer answer to one who tells you of nature's wonders and beauties, that you can't see them, and therefore don't believe in their existence. Remembering how blind you were, you are cautious. Still you say,—openly or to yourself,—This is all true and wonderful, and a good thing to know, because it enables one to get his living more easily and understandingly; and besides, such knowledge does expand the mind, and make one more of a man, and thus place him higher in the esteem of his neighbors; it is practical and useful; but the time spent over beauty and art, and looking at the landscape, is wasted; such employment can only be justifiable in men of great wealth and ample leisure. In fact you feel fortified in this position by your recent discovery of the things to be learned. They are so many that you want for the farther study of them every moment of that time, which you have discovered since you cared to look for it can be given even by the hard-worked farmer, during which you can manage to keep awake, though you once felt quite too weary to do any thing but sleep after supper; and if your work takes up all the daylight, and your scientific studies all the time you can spare from sleep, what remains for this star and landscape gazing, this fine idling.

Do not think that since the bandage was taken away you have seen all that is to be seen. There is to be a wider range to your vision. You have learned to admire and love things at which you once sneered, have learned that they are for you as well as for the rich and the men of leisure, and they have lightened your toil, and given a new value to life. You have tasted the exquisite pleasure of mental growth, and should be wiser than to think yourself familiar with the full extent of this joy. Learn now that the greater ease with which you get your living, the higher stand you have taken in the estimation of your townsmen, since you began these studies, is but a small part of their value, is, indeed, merely an accessory of their value, which really lie in the degree of help they give you in carrying out the law of mental and spiritual growth. You have found out that the man who only does his work, eats his allowance, and begets his children, is but one remove above the brute; and even if he does this honestly and morally, you think him entitled to no great credit for doing what is no more than what is his duty. You are rising; but the wings have but just begun to grow, which shall finally lift you high enough from the earth to see what that word *duty* means. That word, among many other things, will grow more full of meaning as you grow more full of understanding. Believe me, that as much as you have gained by becoming a pupil of those, at whom you once wondered or sneered, you may gain just as much more, and of a far higher quality, by listening to the lessons of beauty which Nature is ready to read to you and they to expound.

This sense of the beautiful is not to be created, but only to be cultivated in you; it exists in you already, and practical as you consider yourself, it has much to do with your likings and dislikings; under another name, indeed, but with an unmistakable resemblance to the feeling which moves poets and artists.

You have in your stable two heifers; one straight-backed, with a small head, fine neck, tapering limbs; the other high in the rump, big-jointed, coarse-headed, clumsy limbed. One you call handsome, the other homely. You like to look at the one, and dislike to look at the other, entirely apart from their relative qualities as a matter of profit. One of your yokes of oxen is sprightly and well-formed, with small heads, small and shapely horns; the other is awkward, heavy-headed, and large-limbed. Again you pronounce one yoke handsome; the other you say are "monstrous fellows to work, but homely," and you "rather hate" to drive them yourself; you send a hired man or boy with them, and work the others yourself. Your mind insensible to beauty? By no means.

As you drive up to your own home, the evening sun is gilding the tassels of your corn, is caught like a cobweb in the branches of the old Elm which shades the door, gives a new charm to the meadow behind the barn, is full of swallows flitting to and fro, and you say "handsome enough for a picture." Handsome, is, perhaps, your only word for such things; you know it means something about appearances, or, as you term it, "looks;" and you say 'tis all well enough to have things look well and be handsome, if it doesn't cost more, and doesn't take time that belongs to other things.

You cannot be indifferent to beauty, for the nature, which your Maker implanted in you to enjoy the world, which he has made beautiful, because he loves the beautiful, will assert itself. And now assuming you to be in earnest to develope the nature he has given, you will look about to find how the beautiful may be cultivated without interfering with the practical.

As you feel yourself greater, and life grander, because of this study and insight into the natural sciences, so will you become beautiful and refined; so will your home be calmer and holier, your work nobler and more elevating, from constantly cherishing and studying nature's beauty. And in time you will feel artistic beauty, for all true art rests on natural beauty, and presupposes an acquaintance with it; is great only so far as it is true to nature. So we must know nature before we can enjoy art, and then, when our enjoyment is at the height, we shall feel that nature is as much above and beyond art, as it is the manifestation of a greater artist.

I have talked to you as if you went along with me; I have tried to show you how our natures may be opened and developed, and how our occupation more than any other, affords a wide field for pleasure and improvement. We have seen that the better the influences about a man, the better can he do his duty. I have faintly indicated what that duty is. If, for one year, you will follow out this plan, you will be so strengthened, instructed, and delighted, that your motto ever after will be, "Onward!"

The farmer is like a fallow field, turned out to be benefited by the elements. Every thing about is favorable; no envious walls between him and the sun, the wind, and the rain, to shut out the exhilarating winds of winter, the delicious zephyrs of spring; to blind him to the rich colors with which the world is painted; to dull his eye to the variety, grace, symmetry, grandeur of the forms of creation; — and yet he obstinately refuses to look upon the earth as any thing but a workshop, where, with difficulty and much toil, he may earn a meagre support. Talk to him of knowledge, science, beauty he shakes his heavy head and says: "Get up at sunrise and go to bed at sunset, — no time for that." He will open his shell like an oyster, to eat and drink, but attempt to show him how much more there is in life, and he shuts it up tight again.

Farmers are discontented, when they have every thing to make them contented. Remember that the purpose of your lives is to develop your mental and moral natures, whilst you get your living, and that this is your duty, as it is the duty of all men; that for the secondary object of getting a living, your chance is as good or better, than the average; while for the primary objects of life, your chances are far the best, if you will seize and improve the opportunities held out to you. God and Nature are your next neighbors. You can grow food and clothes, and cultivate your mind, and fit yourself for the real life to come, without the help of those men and neighbors engaged in other pursuits, while they are dependent on each other and on you. If you choose, you can have the pleasantest homes, the most beautiful farms, the best schools, the bright-est children, the purest morals, the most satisfactory lives; and, striking the average of the years, your drawbacks and discomforts are mere trifles not worthy of notice.

Assuming that you purpose to be "improved" farmers, I will next show how such farmers get larger and better crops than their ignorant and prejudiced neighbors.

VIEW IN THE GROUNDS OF J. WILEY EDMANDS, NEWTON CENTRE.

CHAPTER XLII.

GREENHOUSE.

FEBRUARY. I shall not weary you with a repetition of former directions, for now that winter has come with all its rigor, there needs nothing but care and watchfulness. During clear days, the sun will heat the house immoderately, unless ventilation is constantly maintained, and this, too, when the cold winds have kept the thermometer at zero out-of-doors for many days. Remember that you must keep your plants growing and healthy, and allow no check or chill, but must not, on account of excessive cold without, overheat within; at night allow the thermometer to go to the lowest limit hitherto given for the different species of plants now in active growth, and on cloudy days raise the temperature but little over the night heat. Such treatment will make the plants stocky and vigorous, and insure a rich reward at flowering time.

Remember that now all the bulbs are to be brought near the glass for direct light, and that sunlight is good for every plant. Pans of seed should be sowed, and cuttings made, and the pans set where they will get bottom heat. As the bulbs grow, and show indications of flower stems, give more water. Some of them which you know blossom in their native lands, in swamps, or during the rainy season, should stand in saucers filled with water.

Japan Lilies, Achemines, Gloxinias, Fuchsias, Cinerarias, Stephanotus, Alamandia, Pansies, Dielytra, Roses, Verbenas should be repotted; Monthly Carnations, which have outgrown their pots need larger. Azaleas as they grow, may receive more water; early Pelargoniums should receive a final shift, and be pruned well to make them stocky.

I have, as may be seen by turning back, given the treatment proper for all the cuttings, seedlings, etc., which you need make for several months, and to these directions you should now refer. Besides this, read all books upon the treatment of different families, to which you have access, and thoroughly acquaint yourself with their natural history and habits. By so doing you will not only become a more successful cultivator, but will acquire a large and entertaining stock of information.

I spoke last month, of commencing hotbeds as a work to be undertaken about this time, and will now give directions for making them.

HOTBEDS.—They are of many kinds, and heated in various ways. Where not a large surface is to be covered with them, the easiest plan is to use rank manure, which, by its fermentation, gives out a large amount of heat. As this is the oldest and cheapest method, I have no doubt it will continue to be generally practised, to the exclusion of all other methods, but, as I shall show, it is not the best.

Market gardeners, who depend upon the earliest crops to obtain the largest prices, will have begun their new hotbeds in January, and will have carried some through December; but this would be a very foolish course for us. Had we been very desirous of early salads, we could have grown a few in some of our glass houses; to go to all the trouble of hotbed culture for them, would not be good economy. It needs the greatest care and judgment to carry hotbeds well through such a month as February, when the thermometer is sometimes at zero for days together, and when the seedling plants from beds prepared in January, are just in the state to be quite destroyed by a moment's carelessness. I therefore, recommend you to prepare your hotbeds during the last of this month, and have them ready for planting early in March. We have two months of virtual winter after this, and but little outside culture can be undertaken before the first of May.

Hotbeds are usually made of about the following proportions, the length of the range varying to suit the kind of plants you propose to grow, or the amount of glass you use; the bed should be 5 feet wide, and be divided into lights or frames 3 feet wide; the sides of the frames are to be of 1½ or 2 inch plank, as high again above the surface behind as in front. Dig a trench 6 inches larger every way, than the inside of the frame, and 1 foot deep; spike the planks firmly to 2 × 4 joists, which are to be cut as long as the entire depth of the frame, which depends on the plants to be forced in it; Cucumbers, Salads, Flower-seeds, needing only shallow frames, whilst Asparagus, Tomatoes, and similar tall plants, need something deeper. For the former class of plants, the frame should be 18 inches to 2 feet in the back, and 9 inches to 1 foot in front; larger plants need 3 feet in the back, and 18 inches in front. But where it is necessary to use the same frame for all kinds of plants, another expedient may be resorted to; make a frame of the ordinary size, and another which will just fit on to the first, covering it exactly; it may be held in place by bolts or bands. When the plants have grown so as to fill the first frame, take off the sashes, and, placing the second over the first, put the sashes on the upper frame; thus you will get all the additional depth desired.

The front plank should be ½ inch lower than the outside of the frame, to allow the sashes to slide; and the end planks should be rebated from 1 to 1½ inches, to leave a place for the same purpose; mortise into the top and bottom sash, 3 feet from each end of a 9 feet frame, crossbars, 3 inches wide, and 3 inches thick, into which, on each side, a groove or rebate has been made, corresponding to the groove in the end plank, into which the sash is to slide; over every joint, where planks, etc., come together, nail, or screw strips to exclude any air that might otherwise creep in. This done, prepare the sash, which is to be made like the sash of a greenhouse, — 3 lights wide for a sash 3 feet wide. The glass is not set as in a window, where each light starts from, and ends in, a properly prepared piece of wood; the sash is divided into 3 equal parts, which are separated from each other by two transverse bars, grooved like an ordinary sash, to receive the glass; the lower pane of glass is put in first, the next laps over it, like a shingle, ¼ inch, the next over that. When the glass is firstrate, it is not necessary to lay any putty between the panes at these joints, but with ordinary glass, the joints will not be tight, and must be filled in with putty. Of course, glass thus laid, sheds rain like the roof of a house.

The frame and sashes ready, begin to make the hotbed. My directions were to dig a trench 6 inches larger in every direction than the frame, and 1 foot deep, which will carry the bed 1 foot into the ground. Some cultivators prefer to have the whole above the surface, because they think it then easier to regulate the heat. Ours, however, is sunk 1 foot.

Drive down at the four corners 3 × 4 joists, and spike to their outer sides 2 inch plank, as for the cold pit; this framework is to be brought up nearly flush with the top of the ground, and to be just the size of the frame previously made. Set the frame on to the foundation, where it may be kept in place either by screwing down a few cross strips, or by its own weight. Now fill into the bed 2 feet deep of strong manure, unfermented; — a mixture of litter soaked in the urine of cattle and horse droppings; — lay this in, shaking it well and beating it with the fork, but not treading it; fill the bed 3 to 6 inches higher than it is to stand, — it will settle that much in the course of a week or two, — and pack it in higher behind than in front, so that the top of the finished bed will have the same slope as the sash. Lay over the manure 3 to 6 inches of the best light loam to be had, which should be taken from one of the heaps made for this purpose last year from lime, leaves, and sods. Such heaps should be covered up all winter to prevent their freezing solid; a slight freezing is beneficial, as it kills the eggs and larvæ of insects and the seeds of many weeds, but it is better not to let it freeze at all, than to have it solid and unmanageable.

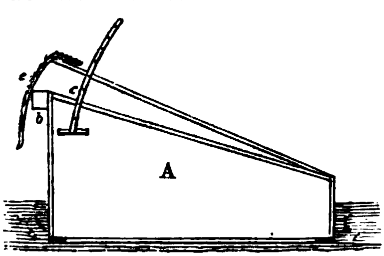
Your bed is now ready for the sashes. When they are in place, surround the bed as high as the sashes with seaweed, leaves, or coarse litter; this is called a lining. Later, as the heat of the fermenting manure reduces in intensity, this lining must be replaced with strong manure to keep up the proper temperature. In a few days the manure will begin to ferment, and will give out an immense amount of hot, ammoniacal gas and steam; so hot often as to burn the vitality out of the loam above the manure, and totally destroy the tender roots of young plants. To avoid this it is well to sow the seeds in small pots, which are plunged into the earth up to their rims; as the heat grows more intense, these may be withdrawn a little every day, just enough to save them from being burned; as the heat moderates, allow them to settle back into the earth. At the same time sow in the mould the seeds of such plants as you intend to cultivate.

It is always quite easy to ascertain proximately the heat of the beds by thrusting down pointed sticks into the manure, and after a short time withdrawing them; the degree of heat which their points indicate to the touch, will show how safe it is to sow seeds.

It is a good plan to have two beds, the second rather larger and deeper than the first, and made later; into the second may be transplanted, or, as it is technically termed, "pricked out," the seedling plants which have been started in the first bed. If there then is but one bed, the seeds which have germinated in the pans are to be pricked out into it.

Should the heat threaten to be too great, thrust large, round stakes down to the very bottom of the bed, and then withdraw them; the holes left will act like smoke-jacks, and will carry off into the upper air of the bed considerable of the heat, which may be discharged into the open air by raising the sashes. The heat will soon abate, and this, too, at a time when perhaps it is most wanted, when the outer air is intensely cold, while within the frame the young plants are just expanding their second leaves. Until several leaves are open you must keep the heat well up, and ventilate constantly, but moderately; afterwards more air may be admitted, and pains be taken to harden the plants as much as possible. It is important in the hotbed as in the greenhouse to prevent the direct access of decidedly cold air to the tender foliage.

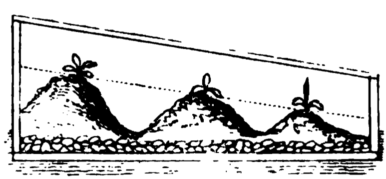
To admit air within a frame to which the sashes are not confined by strips of wood, you raise the sash at the back; but when this is done, cold air would rush in and cool the frame too rapidly; so nail blocks of wood to the back of the frame A, at *b*, also screw or nail a ratchet pierced with holes, *c*, to one side of the frame; nail to the top of the sash at the back an old mat, *e*, which may hang down over the opening into the frame, and being kept by the block *b*, from clinging to it,



and thus shutting out air, will temper and retard the current as it enters, and thus give it time to mix with the warm air within, and lose its dangerous qualities. The sash is kept up by thrusting through one of the holes in the ratchet an iron pin, which will pass under the sash and give it sufficient support. When more air is wanted than can be supplied by the opening allowed by the ratchet, slide the sash down the frame or remove it entirely.

The strong manure which I have said should be substituted for the "lining" of leaves, as the manure ceases to ferment and furnish sufficient heat, is to be thatched on its outside, or be covered with boards to keep the heat from escaping into the air or being reduced by rain and snow.

When Cucumbers or Melons are to be forced in such beds, it is usual to start them on bits of sod laid into the loam, grass side down; if they are afterwards to be grown in the open air, these sods are removed thither as soon as the plants are well grown and the external temperature permits; but if they are to be forced in beds they are removed as soon as they begin to run, to a fresh hotbed, where to prevent injury from heat, they are at first planted on mounds of earth (see cut); the earth is filled in level with the mounds as soon as the heat abates. On these mounds, the vines are set as in the figure, the top of the mound being within 4 or 6 inches of the glass. The vines do not increase much vertically, but they run, and as their growth is the better the nearer they are to the glass, they should be properly placed at starting.



The second story which is added to the bed when the second frame, already described, is put on, gives room enough for Tomatoes and other tall plants.

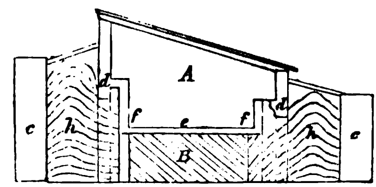
Asparagus may be forced in frames so as to be very early. The manure pit is to be made 3 feet deep, and at least 6 inches of earth laid over it; into the earth set the roots, covering the crowns 2 inches. The plants should be from 1 to 3 years old, and should be set as follows: at one end make a small ridge of earth, 4 inches high; along it set the plants as close as possible without crowding top and roots; cover the roots with a little earth, and set the next row, and thus continue till the bed is full; then cover the crowns with 2 inches of rich loam. After the sashes are put on, examine the manure daily, as directed to ascertain its heat; overheating at the beginning of forcing will kill the roots. For cooling the manure, proceed as already described. Be very careful in cutting the shoots not to injure the crown or the roots, either of the plant you cut, or of its neighbors. No culture is easier or more satisfactory than this. When Asparagus is to be winter forced, the roots should be moved in the fall, to dry sand in the cellar, where they may bé kept dormant till you wish to use them.

This, then, is the common and the cheapest way of heating beds, but as you see it is very uncertain, and not only needs constant care, but may at any time result in disappointment.

From the temporary character of the frames, and the necessity of having the manure all below the bed, whence it can be removed only when the bed is abandoned for the season, it is obvious that when once it has ceased to give out heat, its uses are over, except as food for the roots of plants. Again, the "linings" are outside and above the surface, consequently, even when they are well covered, much of their heat must be wasted by escaping into the air. Finally, the heat when obtained, cannot be well controlled, but is now so much too great as to endanger the plants; and presently so slight that tender plants are liable to damp off.

No better heating material for temporary uses can be found, as for instance in making a bed in which to strike cuttings or germinate seeds, which need bottom heat in moderate weather, and which, when once they have fairly begun to grow, need no more extra heat, but are to be potted or transplanted to the open border.

The temporary character of the bed and the exposure of the lining may be obviated by pits made with vaulted brick bottoms, which can be more or less heated by linings external to the frames but under the surface of the ground. A frame made after the manner of the Cold Conservative Pit answers well for this purpose, if we add a dungbed in which to get immediate heat, and where seeds, etc., may be planted. The pit shown in the cut is one of the very best if manure is to be the means of generating heat. A is the interior of the pit, and the space between, *f*, *f*, holds the loam for cultural purposes. The pit A is 5 feet in breadth; allow 16



inches for side walls = 6 feet 4 inches, add to this 2 feet for the space *h*, which holds the manure = 8 feet 4 inches, and 9 inches brick walls. The whole space will be 9 feet 10 inches wide. Dig this whole space 3 feet deep; build the walls *c*, 9 inches thick; and the front wall 3 feet 6 inches high; back wall 5 feet high. Mark off 2 feet inside each wall, and carry up on brick piers the walls *d*, 8 inches thick, on piers 2 feet apart. The full height of the back wall is 6 feet 6 inches; of this 3 feet 6 inches, is open, and supported on brick piers; the front wall is 5 feet high, of which 2 feet is solid.

The space B is now enclosed on each side by a row of iron or stone posts which support the bottom, *e*, of the pit. From *e*, and resting on these piers, carry up on each side 2½ inch brick walls, *f*, *f*, to a convenient height; at the top of these walls carry over tiles to cover the space between *f* and *d;* this will leave a hot-air chamber between *d d*, and the piers which support *d;* cover the top of these piers with tiles, slabs, or planks, which will make the floor *e;* on top of the walls *d*, lay the sashes as for a wooden frame; cover the tops of the openings *h*, *h*, in each side of the pit between *c* and *d* with a lid fastened into the walls *d*. This space *h* is to be filled with closely packed fresh manure, shown in the cut; there will always be an air-space between *d* and *f*, and under the floor *e*, through B; and through these air-spaces there will be a constant circulation of air, and the bed may be kept as warm as you please.

Whenever the heat is too little, a part or the whole of the lining may be withdrawn, and its place supplied with fresh. Being under ground, covered with a substantial cover, and enclosed by brick walls, there can be little or no loss of heat.

The floor, *e*, of the pit may slant like the sash, or be level, though the top of the earth when filled in must slant like the sash.

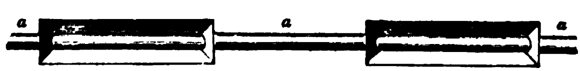
This pit, which is taken from the "Book of the Garden," and Loudon's Enclycopædia of Gardening, is undoubtedly the best for manure heat, but is sometimes objected to as taking a very large amount of manure, and not giving so quick heat as the common bed; but this is more than equalized by the facility with which linings may be removed and added, and by the complete protection of the plants from any danger of being burned. Should the location of the bed be at all wet, underdrain with tiles. It will add to the permanent efficiency of this frame to line the inside with rough mortar.

HOTBEDS HEATED BY WATER OR STEAM.—It is strange that the best cultivators should continue using even these improved dung pits, which, at the best, are troublesome and expensive, and uncertain in their heat, when they have at hand heating apparatus vastly better for the purpose. The second step in heating horticultural buildings was the use of hot air; a furnace being placed in one end of a building, the chimney at the other; the two were connected by a flue, which carried the fire and smoke, and of course grew hot, and gave out a great deal of heat. This was, for a long time, the only way of heating large glass-houses, and even now a slight improvement on it, known as the Polomaise, is much advocated and used. Such apparatus is better than to rely on heat from dung and sun, but it is not the best, and there are grave objections to it; the bursting of flues, dryness of air, and what is more important, the constant leakage of gas through the chinks into the house; almost all gases from fire are injurious to plants, and those from the burning of coal are particularly hurtful.

Seeing that apart from its disadvantages it was difficult to apply this cumbersome apparatus to hotbeds, cultivators naturally preferred for them the old manure plan, for which they moreover claimed the advantage of supplying ammoniacal gases.

Unquestionably these gases are good for plants, but it is not necessary to resort to unsightly manure-pits to get them. Pans of dissolved guano, of sulphate of ammonia, or of urine, set in hot-beds, or on the flues of greenhouses, will give all that is needed of such gas. And this can be done with the later invented and vastly superior apparatus for water and steam, where the pipes occupy but little room, rarely get out of order, and of course can discharge no noxious gases into the house. The wonder is that any other apparatus has been used, since they appeared, for although their first cost is greater, their greater durability makes up the difference, and they do the work much better. Pits heated by water or steam, or by both together, are so much simpler to manage, and so much more efficient than those just described, as to scarcely admit of comparison. The air from these pipes is never so dry and burned as that from hot-air furnaces, and by a further improvement (tanks or troughs) all dryness is removed and much warmed moisture thrown into the air of the house.

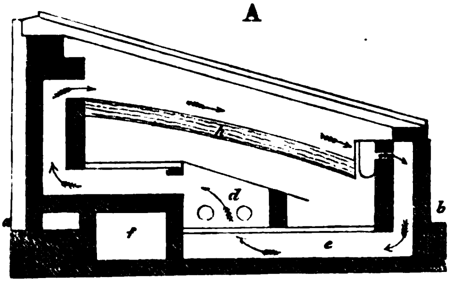
I have several times, in the different months, given directions for setting pans of water — pure or otherwise — upon the hot-air flues to evaporate, and both warm and moisten the air. This leads at once to the idea of making tanks of heated water do all the heating for a house by their evaporation. On a large scale they would give off a great deal of moisture, sometimes too much. We may regulate this by reducing the number of tanks, and supplying the place of those removed by hot pipes carrying air, steam, or water: thus *a*, *a*, *a*, are such pipes carried through gutters or troughs of water. These gutters may vary in breadth and depth as we please,



and thus we may have entire control both of the heat and the moisture.

I now propose to give a plan of a hotbed, to be warmed with water, and unquestionably superior to any hot-air or dung-heated bed ever used. The range may be as long as you please. The bed is figured in McIntosh's "Book of the Garden," p. 442, whence I also take the description. It combines in the best way top and

A

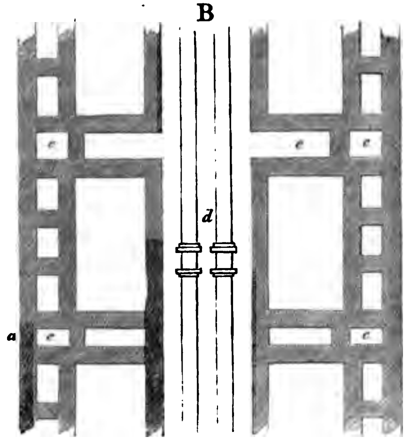


bottom heat, with the humidity requisite for such structures.

" Fig. A is a section of the pit supposed to be built entirely above the ground level; the walls are hollow, and built of brick on edge, to economize material."

As this pit is planned for England, where the weather is milder than here, it will be well for us to build thicker walls, by setting the bricks flat.

B



" Fig. B is the ground-plan, *a b* marking the sectional line. The details are as follows: Under each rafter is carried up hollow pillars *c*, *c*, *c*, *c*, projecting only four inches within the pit, and having no communication with the general cavities in the side walls. In these a cavity is left at the top and bottom; along the centre of the pit a flue of brick in bed *d* is carried 2 feet wide, and 1½ in depth, with openings in its bottom, *e*, corresponding with those in the pillars along the front of the pit, and also with those in the back; the openings in the latter being just below the levels of the tops of those in front. These openings are all to be connected by flues or tile-drains; the hot-water pipes are to be laid along the centre, as shown in the plan and section, but somewhat elevated above the floor on which they are placed, and covered over about 9 inches above their upper surface, with slate slabs, three-fourths of an inch thick. The communicating openings between the flue in which the pipes are laid and the hollow pillars of the back wall, should be 3 inches below the top of the said flue, to act as chambers to retain heated air. The boiler is to be placed at one end of the pit, unless the pit is so situated as to be heated from a boiler adjoining; the space *f*, between the hot-water pipe flue and the back wall, are to be made solid with earth and rubbish, so as to form a good foundation for the connecting openings or flues to be laid on top of them."

"In this climate, and to economize heat, it would be better, instead of filling this space with rubbish for a foundation, to carry through it, in solid brick-work, the chimney flue from the boiler; the smoke, etc., would heat it thoroughly, and go far toward warming the pit in an economical manner."

"The space between this flue and the front wall should be filled with hard, dry, open materials.

"In fitting this pit for the reception of plants, the space between the hot-water pipe flue, and the front wall of the pit, as well as the whole surface over the flue, should be covered, as shown in the section, with stones, brickbats, or coarse gravel, to the depth of not less than 12 inches.

"Over this, if for Melons and Cucumbers, is to be placed a layer of turf, with the green side undermost, and over it the necessary compost, *h*. If the pit is intended for Pines, or other plants in pots, then gravel or coal ashes may be substituted."

"By this arrangement three things are attained, bottom heat, top heat, with an atmosphere constantly moist, and finally a constant circulation of air. Unless I am much mistaken, supposing the pit to be 6 feet wide and 3 feet high at back, and 1′ 3″ in front, above the mould, the whole atmosphere of such a pit would pass through the flue once in every two minutes, when the apparatus was in full work, thus producing a constant and vigorous circulation; farther, if it be desirable to change a portion of the air continually, small apertures to the outward air may be made in the front descending-flues; a small portion of fresh air will then pour in continually, mingling with the descending air, and ascending heated into the pit, supplying the place of that which will escape through unputtied laps and other crevices."

"The internal areas of the pilaster-flues should not be less than

6 inches square, which they may be according to the proposed plan; and the cross-flues and apertures into the pit must have the same area. If it be found that, with this area, or apertures, the heat produced by the pipes is brought up too rapidly, not having sufficient bottom heat, and overheating the top, these apertures may be diminished. If they be too small, an inequality will arise between the temperature of the back and front of the pit, caused by an excessive difference between the ascending and descending air; the total heat brought up will be the same; for as the heat increases the velocity with which the air will ascend will increase also. But if an aperture of the size above recommended be employed, there will not be two degrees difference between the front and back of the pit. In order the better to disperse the ascending currents, it may be well that the aperture, instead of opening directly into the pit, should have a semi-cylindrical draining-tile, placed in front of it, to throw its draught right and left. But this is an unnecessary refinement; a pair of 4 inch pipes will be found sufficient for Cucumbers, Melons, or Pines, in a 6 feet pit."

You remember that these two pipes are to be laid in a chamber just above the floor; the only drawback to the perfect action of this arrangement is, that the air is liable to lack the great moisture needed in a pit; by enclosing a portion or the whole of the pipes in gutters or troughs, as previously shown, to be kept full of water, moisture will be supplied in abundance. These troughs may connect directly with the pipes, and thus ensure their being constantly full.

"Should the temperature afforded by 2 four-inch pipes be insufficient, 4 may be used, but if a nozzle-pipe were attached to the boiler, and the entire flue in which the pipes are enclosed were made water-tight, and used for a tank, an ample supply of both heat and moisture would be afforded."

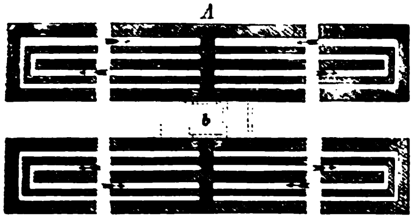
There are some apparent but unreal objections made to this plan by McIntosh, and afterwards refuted by himself, which I shall not quote, but shall leave it with his further endorsement; viz., that experience has proved this to be a very superior pit.

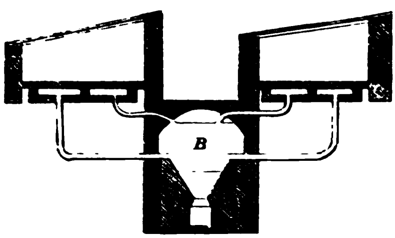
* "Pits might to a very considerable extent be heated on the tank

* "Book of Garden," p. 450.

system, at little expense, if arranged as shown in the cut. Figs. A and B are ground plans and sections of such a set of pits; they show how a large range of pits may be heated by a single fire in a very economical manner. The ground plan is intended to represent four distinct pits, each 50 feet in length, and 6 feet wide in the clear; the boiler is to be placed in the middle (dotted lines), at *b*, or as better seen in section B, with the stoke hole under the level of the walk or passage between them; the floors are to be rendered perfectly level and firm with a coating of concrete, and afterwards covered with cement over their whole breadth, as are also the side walls to the height of 6 or 7 inches. Down the middle of each tank under each pit, let a line of bricks, set on edge, be placed, leaving the ones nearest the extreme ends out; this will give a flow and return current, the line of bricks forming the outer edge of each tank being kept 3 inches clear of the side walls, to prevent the loss of heat by absorption or otherwise; over the tanks thus formed, thick slate or thin pavement is to be laid, and closely joined with cement, extending from back to front of pit. Apertures at every 5 or 6 feet may be cut in them, to which iron or earthenware tubes may be attached of 4 inches diameter, and furnished with stoppers, to be taken out for the admission of moist heated air into the atmosphere of the pit, and replaced when that is not required. Cut C, *a*, tank; *b*, pit; *c c c*, tubes of iron leading from tank to top of earth in pit, and open air; these tubes would not only moisten and warm the air

A

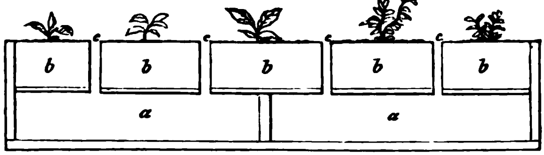




B

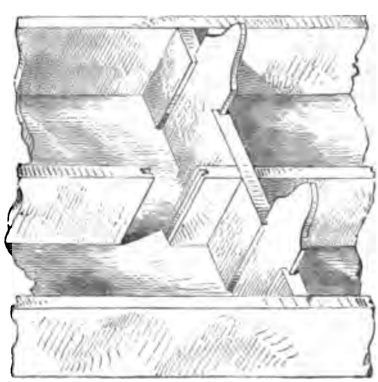
when opened, but would radiate heat into the earth around them at all times.

C

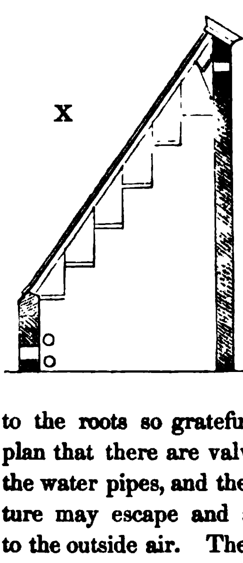


"Similar provision should be made over the apertures *a*, between the outer edges of the tank and the side walls, to allow the heated air in them free access to the pit, and as the air from such openings is not over moist, the apertures may be left uncovered. The back walls may be 3½ feet high above the ground line, that is, allowing 8 inches for depth of water and top covering, and 3 feet 10 inches from top of covering (of tank) to the glass.

"The front wall above the ground line should be 2 feet 6 inches high. Circumstances will always direct this, as the height of pits must be suited to the purposes for which they are intended. The boiler will supply all or part (of the tanks), as may be required, and this can be regulated by stop cocks placed in the pipes which connect the boiler with the tanks, and these again can be subdivided by sluices, as in the adjoining cut.



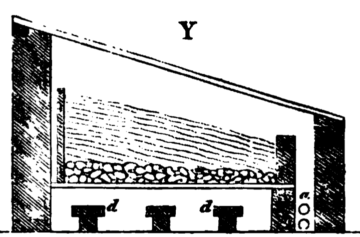
"By this means we should have 1200 feet of surface heated by one fire, and for the purpose of growing young plants in pots, forcing French Beans, Strawberries, Asparagus, Salads, etc., such pits would be invaluable. The walls should be 9 inches thick for durability, and also to retain heat and exclude cold, and if they are built hollow so much the better, and the sashes of the best Yellow Pine timber; the glazing should be with 6 x 10 crown glass; to use larger glass in such structures would be unnecessary. The roof may be on the ridge and furrow principle without much difference in the cost; the range should extend from east to west, so as to present the frontage nearly to the meridian. To heat the greatest possible space at the least possible expenditure of fuel and cost of erection, we think this the best of all methods."



X is a house for Strawberries, heated by hot-water or steam pipes; in the spring and latter part of the year for Tomatoes, Melons, etc., which are grown in pots; the pots are set on shelves, which are suspended by wires to the rafters, and may upon occasion be unhooked and entirely removed.

Y represents another pit, heated by both hot-water pipes, *a*, and tanks, *d*.

There were many difficulties in growing Melons by hot water or air, from the difficulty of imparting that amount of moisture to the roots so grateful to Melons. You will see by the annexed plan that there are valves (shown by the dotted lines) just above the water pipes, and the moisture may escape and ascend to the outside air. The tanks are covered as usual with slate slabs, over these is laid rubble, and over that loam for the plants. Small pipes or tubes go through this loam to the rubble. When it is desirable to moisten the roots of the plants, water is poured into the pipes, and is thus diffused through the rubble and spread over the warm surface of the slates, where it is converted into vapor, and thence ascends into the earth of the pit; as the fruit arrives at maturity, this moisture can be withheld, and the fruit thus attain perfection.

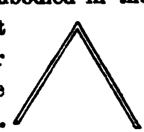


We have thus followed all the improvements in hotbeds; and I think it must be clear to every reader that he, who has any large surface covered with hotbeds, can hardly afford to heat them by the rude and unmanageable dungbed, when it is so very easy to heat to any desired degree, in a clean and neat manner, by the use of steam and hot water.

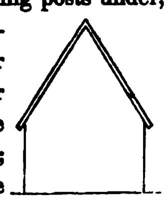
ROOFS.—I have not given any explanation of the method by which steam and hot water are made to circulate, so as to diffuse heat throughout and over a large surface; nor have I referred to the great difference between hot air, hot water, and steam. Before doing this I will say something about the glass roofs of hotbeds and similar structures. Thus far we have supposed ourselves to be using the ordinary flat sashes for hotbeds and for houses either flat or curvilinear sashes.

There is another kind of glass roof which on the large scale is in all respects superior to any other kind of sash, the ridge-and-furrow roof. This is, as you will see, built according to the best principles of construction is applicable to both large and small surfaces. I should, however, prefer it only on the large scale, or for hotbeds, as I think the other roofs about as efficient in this country and rather easier to manage; but to cover a large surface, the ridge-and-furrow is best.

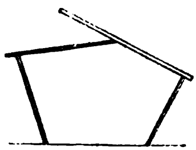
The original principle of all steep roofs is that embodied in the child's card-house,—mutual support by leaning. But as the material used for roofs is very heavy, another problem, beside that of sustaining them at the ridge and holding them up at the eaves, must be calculated.



The mere support at the eaves may be got by setting posts under, as in the cut, but these posts only hold up the perpendicular weights over them, which is more or less, according to the pitch of the roof; the sharper the pitch, the more the weight is brought over the supporting posts; the flatter, the less over the posts; and in all cases the weight not carried down to the perpendicular posts, tends to fall in the direction of the slant of the roof. This is called, technically, the thrust of the roof, and if not



prevented, this weight or thrust would press the tops of the supporting posts apart, till the ridge fell in (see cut). To hold the posts together against the thrust, beams were carried across from the top of one to the other, and to these the roof was securely attached; so that whatever weight was not carried directly to the perpendiculars might be so tightly hold to these cross beams or "plates," as to be indirectly carried to the perpendiculars. Of course this expedient is useless in very wide buildings, for there no cross or tie beams can be long enough to hold the posts together. In building with opaque walls, this difficulty is easily overcome by the introduction of inside walls, floors, rooms, etc., and in churches and other large structures, by various contrivances of timber and masonry. But these, though well enough where the roof is valuable only as a protection, are impossible when light and heat are to be admitted through the roof.

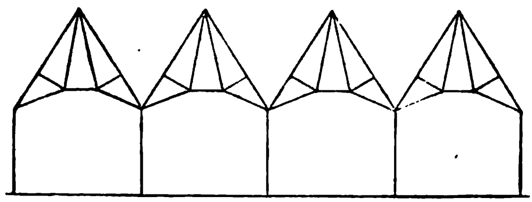


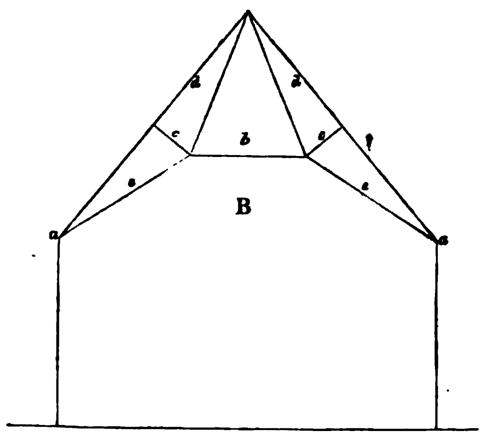
Thus a limit was set to the size of glass-houses; their number might be increased indefinitely, but beyond a certain limit their size could be increased only in the vertical direction, and in that case the difficulty of heating set a new bound. By the device of ridge-and-furrow roofs this difficulty was removed, and the means of the proprietor are now the only limit to superficial extension; and with all your plants under one roof, you may get much more pleasure and profit from the same expenditure than when they are divided between several houses.

This roof is simply the combination of several common pitched roofs, which, but for the introduction of iron as a building material could not have been done successfully and economically; for were these many parts connected by timbers, the inside would be dark and obstructed.

On the ends of an iron rod *b*, cut B, of the proper thickness, and about two-thirds the length of the distance between the posts *a*, *a*, screws are made; other rods *c c*, *e e*, *d d*, of proper length and thickness have screws on their ends, which enter into clasps made for the purpose, where either two are screwed up at once, or each has its own nut, and is screwed separately; 3 rods like *c*, *b*, *c*, which tie the posts together, are tightened by a screw of this character. See

C. *b*, *b*, are the hollow ends of a clasp screw, or nut on a large

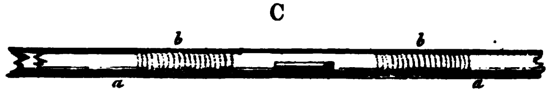




B

scale, the ends *b*, *b*, are chambered, and have a female screw turned on their inside, into which the ends *a*, *a*, of the rods are entered. These ends have a screw made on them which will screw into the

C



ends *b*, *b*; the space between *a*, *a* (the ends of the rods), is open; into this space a hand spike is entered, and by turning this, the whole clasp turns, screwing on to the two rods at its opposite ends, and of course drawing the two rods toward each other. This is a very powerful apparatus, and enables the rods *a*, *a*, to be tightened at will. Into the aperture between *b* and *b* the other rods may be brought and tightened by nuts on their lower ends.

This is the principle followed in putting up a ridge-and-furrow roof. The methods, the screws, clasps, etc., differ according to the building and the architect. Thus we may extend our roofs as much as we please, and yet bind them together tightly, cheaply, and even ornamentally. But at the same time, we seem to run into a new difficulty, arising from the great quantity of water shed from these many roofs, into their valleys, where there is no inclination to send it off; there it would accumulate till its weight endangered the whole house. This difficulty however, is met by making the columns, that support the roofs along the ends, and through the length of the building, of hollow iron, and thereby economizing material, without losing strength, and, at the same time, providing gutters by which the water runs off from the valleys. A drain under the bases of the columns, collects and carries off the water, either to waste, or to a cistern, from which the water for the boilers, and the other uses of the greenhouse is supplied.

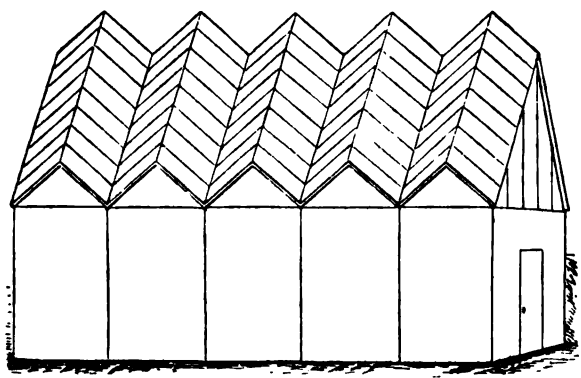
Houses with this roof, have the further advantages of requiring a less proportional amount of heat, of securing more light and heat from the sun, and of resisting hail better than houses of the same area, with an ordinary roof.

They can be thoroughly heated at a much less cost than a building of smaller area, which is higher in the centre, for as you increase the height of a room, you increase the difficulty of maintaining a proper temperature at the bottom, without over-heating the top; in other words, the waste of heat is in proportion to the height of roof, not to the area covered,

They secure more light and heat by having the same advantage over an ordinary roof, where there is but one angle of inclination, which I some time ago showed is a recommendation of the curvilinear roof; viz., that of presenting some surface at right angles to the sun's rays, in whatever position he is in the heavens, and thus admitting those rays, which, like the vertical rays of midsummer, bring most heat with them. And, securing as these roofs do, the advantages of the curvilinear, they are more easily built, because the choice of material is not limited as in the curvilinear, to that which is pliable, and can be bent to the proper curve.

They resist hail better, because they make its blow glancing instead of square, for they receive it at an acute instead of an obtuse or a right angle, in which position they would have much less power of resistance.

Accumulations of snow are borne up by the strongest part of the roof. And if the principle be applied to an ordinary span-roof, as shown in the cut, or even to a lean-to house, the roof will rather facilitate, than obstruct the discharge of snow and rain, an important



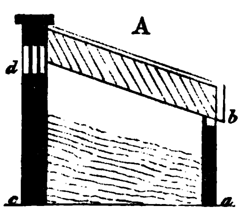
consideration in our climate. The cost of making span or lean-to houses in this way, will be greater, but they would gain in every other respect.

When a ridge-and-furrow is to be used horizontally, the valley posts, and consequently the valleys, should be 20 feet apart; but when applied to an ordinary house, this distance is to be determined by the angle which we wish the sashes to present. The width should be much greater than that of the ordinary sash; about that made by leaning two ordinary sashes against each other at a good angle.

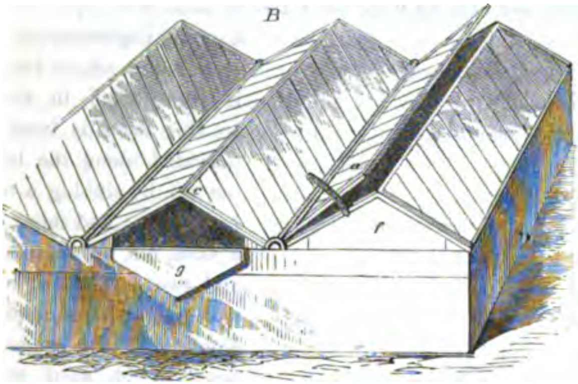
I have described these houses minutely, because, although they are much admired and frequently built abroad, they are rarely seen here. Their greatest value seems to lie in the ease with which they allow large surfaces to be covered, and the reduced cost as compared with any previous plan to effect the same thing.

Any small garden might be wholly covered in in this way, and, by a little more expense and variety in the roofing, the effect would be made more picturesque, and the facility in removing snow increased. Such a garden would be a real winter-garden. Parterres of flowers, small trees, shrubs, and other plants, could be enclosed, and the most beautiful combinations effected. Of course, this is not a luxury for the poor, and cannot be accomplished at small expense, but any one who has the means to spend upon it can procure a more satisfactory result for the same amount of money, in this way, than in any other. In a southern latitude, the cost of maintaining such a garden, would be slight, as the sun's rays would supply even more than heat enough, except in decidedly cold weather, and during the sun's absence.

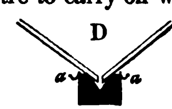
The ridge-and-furrow roof applied to hotbeds is very advantageous, and costs but little more than any other roof, while it is very much better.

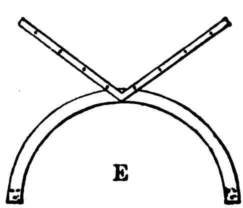


In the case of a pit 78 feet long and 7 feet wide, an English gardener, who gives the views of Sir Joseph Paxton, advises as follows: "Cover the pit A with a ridge-and-furrow roof, making the space from the ground in front of the pit *a*, to the valley-rafter *b*, 3 feet 6 inches, and the back wall below the rafter *c*, to *d*, 5 feet 6 inches. Divide the whole length into 4 compartments, for growing different sorts of plants, by 4½ inch brick walls. Divide the whole length of the ridge-and-furrow roofs into 12 bays, having ventilation in the angle of each pediment, *f*, *g*." Now to get at the plants, each light is hinged at the valley-rafter, and fastened with a thumb button at the ridge-rafter. By referring to cut B, it will be seen that the light or frame leaves the ridge-rafter in the direction of, and lies flat upon, the next light at *c*. Each light may be opened in this way so that the workmen may get at the pit. Each ridge is formed of two lights, resting on the top sides, where they open from each other, and secured at the lower sides by hinges, so that when it is necessary to give air, or to work in the interior of the

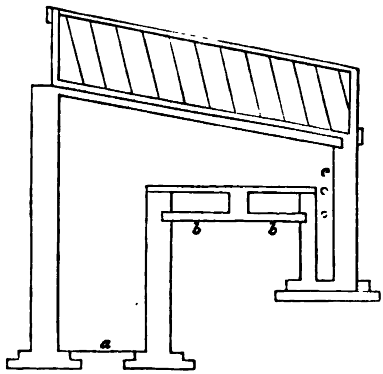


pit, they can be tilted to any required height, or be thrown back like the leaves of a book against the ridges on either side. In wet weather these top lights can be kept quite closed, as an abundance of air can be admitted at both the back and the front of the pit, by means of triangular ventilators situated immediately under each ridge. The water which falls on the pit is carried off in gutters formed in the rafters upon which the lower sides of the roof rest. In Fig. B, *a* represents a light open, with the iron stay pierced with holes to regulate the opening, and to which the lights are secured by a bolt, which can be easily removed; *f*, wooden ventilator, closed; *g*, the same, open. Fig. D is a plan of rafter under each pair of lights, with a concave centre to carry off water, and small gutters, *a a*, on each side the rafter, to carry off water of condensation. Fig. E is the plan of a hinge. In the pit figured above, all the work is carried on from without, and consequently the plants, etc., in the back of the pit are rather inaccessible; the plants to be forced are grown upon beds of fermenting material, whilst the pit is also used to keep plants through the winter, which stand upon a plank or slate flooring.





But increasing the size of the pit so as to introduce space for entrance, and heating with hot water in tanks and pipes would be a great improvement. The section of a pit so improved is represented in the cut. In this there is head room provided along the back of the pit, by sinking a narrow passage, *a*; and there is also a tank, *b b*, for bottom heat, and two 3 inch water pipes, *c*, between the tank and the front wall, for atmospheric heat, to be used together with the tank, or not, according to circumstances, that is, as dry or moist heat is required. Under the tank Sea-kale or Rhubarb may be forced, or Mushrooms grown.



It would hardly be necessary to have the sashes themselves movable, when the pediments may be lowered down, as through the latter, being at opposite ends of the pit, any amount of air may be introduced. "Of course a pit made in this manner would require to be broader than that first described, and more expensive, and would be unnecessary for simple forcing."

I have now presented all the best methods for the construction of hotbeds.

The hotbeds upon our place are near the house-stable and the greenhouse. The range is double, and heated by a boiler placed in the middle, which warms tanks and pipes in the different beds. Two of these beds are for the conservation of plants through the winter, and are upon the plan described in October, in which fire-heat is resorted to. As I said in the commencement of this notice of hotbeds, we shall not begin culture till the first of March, as that will give ample time for the growth of all the plants that we wish to force. We shall begin a slow fire the last week in February, so as thoroughly to warm the pits and the earth before planting seeds and cuttings. When the dwelling-house is heated by steam, or has a kitchen-range with a hot-water back, a small number of hotbeds placed near the house can be conveniently heated by pipes from the house. Hotbeds seem a formidable care to those who have never been accustomed to them, but they are in reality simple and easily managed, the chief requirement being watchfulness, to keep the temperature at the proper height.

CHAPTER XLIII.

CONSERVATORY.

THE pleasure derived from this house continues unabated, and the number of flowers is constantly increasing. After plants *fairly* begin to grow, the development of leaves and flowers is usually very rapid. Some of the orchids are now beginning to bloom, and *their* strangely fantastic forms lend a weird charm to the whole interior.

Watch the plants carefully, to detect the earliest signs of *thrips*, aphides, red spiders, and other insects, and be after them at once; it will not do to delay at all, for their power of reproduction *is* wonderfully great, and the sooner they are attacked the easier it will be to exterminate them.

1


2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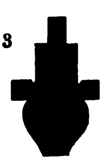

The intense cold of the outer air renders more fire heat necessary now than hitherto. Any snow that falls upon the roof should be removed as soon as possible, both to avoid the injury *to* the glass from its freezing and thawing, and to restore the light which it excludes. It will be easily removed on the first bright day. For the warmth of the house, and of the sun, will at the same time compact it, and loosen its hold upon the glass, so that by starting it near the eaves the whole mass will slide off together.

During the intensely cold days of this month the water of condensation will collect rapidly, and run down over the glass and astragals, and on to the floor and plants, in all badly ventilated houses. The only way to remove it is to suspend tin conductors under the sashes. But rafters and astragals may be made to provide against this difficulty. When the ventilation is good there is comparatively little condensation, as the constant circulation prevents the moist air from remaining for any length of time in contact with the roof. A very simple rafter and astragal may be used in building the house, which will collect such moisture as may be formed, and carry it down to the gutter in front of the house. The cut shows sections of three rafters, either of which fully answers the purpose.

The second one has small copper conductors nailed along its side. The house should be so well ventilated as not to need these articles, but it is always safer to have them in case of need. The rafter may be made as ornamental as the architect chooses.

CHAPTER XLIV.

GRAPERY.

We begin to force one house this month. First cover the whole border with a good dressing of 1 to 2 feet of strong stable manure. Fork it well together with the old litter already upon the bed, and then cover with mats or boards, to protect against snow, rain, and cold.

The slight warmth which has been for the last two months kept up in the house to protect against frost, is now to be raised to 60° in the daytime, and 40° at night. Keep this temperature up for 10 days, and then slowly increase to 65° by day, and 45° by night. Water the vines well with the syringe, and keep pans of water over the pipes or flues, for evaporation. Some ammoniacal preparation mixed with the water benefits the vines, by the exhalation of gas. Admit air freely in sunny weather, and at all times allow as much air to pass through the ventilators as is consistent with the proper degree of temperature. The sun may raise the heat in the day much above 65°, but it should never be higher from fire heat. Towards the last of the month, about the 25th, perhaps, raise the temperature 5° more, and allow the sun heat to become even more powerful than before. You may now expect to see the buds begin to swell, and very likely some of them will break, or commence to grow. As soon as they are well broken along the whole vine, tie the vines to the trellises. Syringing the air frequently, and keeping it very moist by evaporation, will conduce more than any thing else to the uniform and rapid swelling of the buds.

During the month it will be found advantageous to water the grape-borders with rather weak liquid manure; which, as well as all the water supplied during this period, should be warmed at least as high as 65°. The easiest way to warm the water is to let it stand in shallow tanks in the grapery about 24 hours.

The temperature of the cold grapery to be kept as hitherto, and the vines are not to be excited in any way.

The vines in the retarding-house will by this time have ripened their wood, and probably lost their leaves. As I have said before, the method of pruning these vines differs a little from that where the grapes are to be induced to grow early. The pruning in the retarding-house is to be delayed as long as possible, and though late pruning is likely to make the vines bleed, it does not materially injure them, but tends to delay the ripening of the fruit. It is best to begin the process of retarding in November, by disbudding. Pick off all the buds but the lowest, which you wish to have grow the next season, as soon as the wood has fairly begun to ripen, but not until all danger of a new breaking of buds is past, as if the bud which is left should break, it would probably cut off all prospects of crop. In February cut back to this bud. Pruning should be done about six weeks before the vines start, which will be the last of March or the first of April. After pruning, dress the vines with the soap and sulphur preparation; untie them and lay them down as the other vines, and keep the house as cool as possible without freezing. One of the benefits of this treatment is that the wood thus seems to gain vigor and elasticity. Vines long subjected to a high temperature, dry and crack; the wood becomes brittle; but by giving them a share of cold weather each year, this danger is partially avoided.

Should there be any days sufficiently warm, air the conservative pits, and the frames which contain the salads, etc. Remove into the forcing-house and cold grapery boxes and pots of Strawberries, Salads, etc., for early forcing; also from the cold pits some Cauliflower, Broccoli, and Endive, and boxes or casks of Cardoons, Sea-kale, etc., as will be more particularly described hereafter.

CHAPTER XLV.

THE FARM.

I HAVE treated the subject of farming, thus far, wholly from one point of view, and have implied, it may be thought, too strongly, that self-improvement, for both profit and pleasure, is not only the best but the easiest thing to do, and requires only resolution for its success. But I am by no means ignorant of the many great difficulties in the way of the farmer, who seeks to develop himself into the perfect man.

One great drawback is the pecuniary one. The want of money not only makes more work necessary, but it irritates the workman and leads him to attach too great importance to it, and so forget the greater in the less. He must work himself, because he cannot afford to pay others, and labor early and late to accomplish his work in season. The day's fatigue unfits him for evening reading or study; even the most ambitious student must yield to this difficulty. But these days of extra work are not constant, and time will come in the course of the year which it depends only on ourselves to improve. Besides, however hard the day's work, it is not often that the farmer is too tired too talk, or to hear others talk; and often when eyes unaccustomed to reading would swim and close over the printed page, he could talk for hours with a neighbor about the approaching election, or the new candidate for the vacant pulpit. Seldom is a day's work hard enough to unfit him for going to the caucus, which is to nominate a friend or a favorite politician; he can go to a circus or a prayer-meeting, although his day's work has been large enough to excite the admiration of all beholders.

This leads us to the secret of improvement in agricultural pursuits, — *association.*

Combine with a few neighbors who are also interested in the advancement of agriculture, and form a club, which shall meet weekly, for the interchange of information, or for special remarks from some member appointed by the rest, to find out something interesting and instructive. Go to the club-meeting willing to be taught even by a neighbor, whose general information you think not superior to your own, but who on this occasion has taken pains to acquire new facts on a given subject. Listen to his communication; take part in the discussion which will arise; tell what you know on the subject; ask explanations of all doubtful points; express your doubts and difficulties freely; you may thus get help from those who are better instructed, and gain the gratitude of those who share your ignorance, but lack the courage to say so, and who will thank you for speaking for them, and opening the way for them to speak for themselves. The replies you get may be satisfactory or not; if not, and the crooked path is not yet straight, you will have something to think over in the interval before the next meeting. Your mind will be excited by the inquiry, and you will find yourself in the evenings more inclined to look up the subject in books, and get what light you can upon it, than to go to sleep over the fire. Perhaps you can find nothing in your books, and have no newspaper whose light is more than the glimmer of a farthing candle. Some of your neighbors have other books or better papers, and will gladly lend to you. Have no scruples about asking them. We are all complimented by having our opinion asked. Press on in this way, now talking, now reading, now inquiring, now imparting, and you will soon have an increased knowledge and zeal that will necessarily lead you to farther acquisition.

Such associated efforts in the way of clubs and social gatherings are of great value to farmers. They bring together a great variety of information in the form most easily appreciated. A distinguished man once said that good talk is the healthiest and most nourishing food for the mind; that each man's mind is both a sieve and a mill, which selects, assorts, and grinds all the facts and theories presented to it, turning out an elaborated result, flour or bran for the use of others, just according to the character of the individual mind. And this result of the process of sifting and grinding, when forced into the minds of others through the channel of conversation, is particularly well adapted for their nourishment and expansion.

In your farmer's club, where no member has had much intellectual training, the winnowing process may be less thorough than the case would justify, but it will certainly be more complete than any member could make it alone. The idiosyncracies of different members will lead them to select different books, to fasten on different facts, or see the same facts in different lights, and so to make good each other's deficiencies.

But remember that you do not meet to register isolated individual experiences,—of how many quarts A's cows gave, how many bushels of Corn B got to the acre, or how large a crop of Apples C expects. Unless these things have some relation to each other. some bearing on the topic for the evening, they are mere gossip, and will not expand your mind, though they may keep you awake. Remember that you and your associated fellows are building an edifice,—the perfect farmer, who is to be a conglomerate of facts, experiences, and theories, and will be perfect in proportion as these are of the best quality, and harmoniously combined. If you were building a dwelling house, you would select among the materials offered, would reject many stones and bricks, would cut off the ends of boards that were shaky or pierced with knot-holes, would throw away many imperfect nails; but if the plan with which you started was good, you would at last have a satisfactory house. So in building up your intellectual structure,—the perfect farmer,—you must expect a great amount of rubbish to come under inspection, to be tried and found wanting; but build on according to the best plan you can make, and with the best materials you can get. Want of practice here will of course make it more difficult to start with a perfect plan than in house building; you can only block out the leading features of the character you wish to form, and may even then be unable to get the best materials, or to adapt them to your peculiar circumstances. But, as in house building you use materials brought from many places, so your farmer's character cannot be completed without many imported materials. The experiences of his native village will never suffice; they must be thrown aside unless they are fit for your purpose.

Lay it down then, as a rule of the club, that no member shall relate his personal experience, except to throw light on the question under discussion, or to ask for information. Appoint some member or members, who are best fitted, to find out what man or nation, is acknowledged to succeed best in farming, and use the treatise which describes their practice (or his, if you can narrow it down to an individual), and the reasons for it as a standard text-book, to which all questions are to be referred for decision.

There is a strong prejudice against book-farming, among farmers, because they think the statements of books are mere theory. Nothing is more common in farming communities, than to sneer at some man as a book-farmer. Men who get together and relate the traditions of their ancestors, in the peculiar dialect of their native district, and conduct their farms in accordance with those traditions, often refuse to listen to the same doctrines embodied in a book, and expressed in good English; or, if, having condescended to listen, they hear something plainly in accordance with their own preconceived ideas, they are confirmed in their self-conceit, and approve the book so far as it agrees with them, or condemn it for disagreeing with the same authority which they set up as final, never admitting that there can be a wider experience, or a closer observation than that of themselves and their fathers. Whoever knows common farmers, knows that this is true; and yet, there was never a more narrow and inconsistent prejudice. The traditions which they hold and follow, are the maxims of some man, who in his day, got the largest crops, and raised the best stock of his neighborhood and was therefore, with reason, consulted and imitated by his neighbors; in other words, became an authority on farming in his district. What are books, but the history of the practice of some man or people? and if the practice set forth in them is universally successful, producing the most satisfactory results, are they not worthy of the most respectful attention? Should they not be received as authorities, instead of being sneered at, because they are printed instead of spoken?

There is another reason why book farming is lightly esteemed by farmers. They have toiled painfully for years to get the experience which is necessary before the traditions aforesaid can be put into profitable practice, before they can even be fully understood. Somebody inexperienced in farming has read a book, a good book perhaps, which pleasantly portrays the pleasures of agriculture, comments on the rudeness of the ordinary practice, and describes methods of culture by which time and labor may be saved and money gained; and forthwith he knows not only enough to carry on a farm, but — to judge by his talk — more than men who have farmed from childhood. Practical farmers watch his course, and see him wrecked on the shoals which lie in the path of all beginners, on difficulties which perplexed them long ago, and were long ago overcome; then they grimly smile, and say, "So much for book farming! might have known it." The failure is put down altogether to the account of the book, whereas the book had nothing to do with it; want of elementary, experimental knowledge, was the cause. In the hands of a practical farmer, who had this knowledge and was used to hard work, the same book would have been of immense value, as the mariner's compass, which would be of but little service to a landsman turned adrift in a boat, ignorant of its management, is to the experienced sailor comfort, and perhaps life.

A book is, as I have said, the history of some one's practice or theory, and the farmer's club having found out, through a committee, what nations have been most successful in farming, should procure those books on the subject which are considered the best authority by those nations. Do not swallow any one of these books whole, but either read aloud at the meeting of the club, or appoint some member to read it at home and report at the next meeting such new ideas as he may have obtained from it. Discuss this information, see how it agrees with your own experience, and where it differs; find out, if possible, the cause of the disagreement; ascertain whether it arises from difference of climate, soil, etc., and having sifted thoroughly the whole matter, throw aside the chaff and garner the wheat for use.

The continuance of this process with one book after another, will bring you into contact with a new class of minds, men, and practice; will teach you new things about your special vocation, and will increase your geographical, historical, and scientific knowledge; in short you will have begun to *grow*.

This way of passing an evening each week when you are too tired to read, will soon awaken your minds to such an interest in books and study, that you will be too tired no longer.

Nor is this the only good to be derived from such clubs and associations; people from different parts of the town, brought together to exchange experiences, will feel a mutual interest, and will be desirous for the progress of the whole; sectional and district jealousies will be forgotten, and the spirit of improvement in agriculture will gradually extend to other things, till the whole community will be raised above its neighbors in knowledge, refinement, and wealth. No proverb is truer than that Scriptural one, "A little leaven leavens the whole lump." If a few men combine earnestly for improvement, there will surely cluster around them all the good and growing men in the town. They will start and support many great movements in town, and state, and national government, for mental, moral, and social progress, and the result will be that each will find himself at the end of the year better and wiser than at its beginning, and will begin to see beauty in objects before uninteresting, and to take pleasure in things for a value in them not to be measured by money.

Assuming, then, that you have determined to do all in your power to develop a perfect system of farming, and that you have inaugurated your farmer's club, and brought it to a flourishing condition, I will call your attention to a few improvements in the practice of agriculture, which not only are better for mind and body than the old methods, but will give fuller barns and storehouses, and larger moneyed returns.

America will eventually become the best farmed country in the world. At present England holds, on the whole, the highest rank. Belgium and Holland surpass it in some respects; larger crops are raised from a given area, and more expensive improvements are undertaken and carried through to a successful result; but the soil and surface of the Low Countries are, as their name imports, unfavorable to a varied culture, and many things are never attempted there which fill England with wealth and beauty.

The English farmers are mostly tenants who occupy the cultivated portions, and cannot afford, on land not their own, to make the outlay necessary for great improvements, which, though profitable in the end, are so only after a term of years. Still, what with the liberality of the proprietors, the enterprise of the tenants, and the aid extended by government, the state of agricultural science and practice in England is very far beyond that in this country, and it will be long before we shall overtake, and longer before we shall surpass it.

In New England, farms must be comparatively small, and the soil is of such a character as to compel us to adopt the most thorough system of culture, if we wish to secure that home market which gives us the advantage over Western farmers, whose crops must be transported to a great distance to find a market, until the cost of freight makes them as high priced as ours in the end. This home market is sure to continue, for the population of New England will be more and more engaged in manufactures, and trade must become denser and denser, and increase the demand for the fruits of the earth.

New England farming must be "high farming" in order to be successful, and only as it approaches to the perfection of the English and Flemish systems, will it secure the best return for outlay of labor and money.

In November, I said that during the winter the farmer should lay his plans and arrange his work for the next year. But the work of no one year is complete in itself; it springs from the years before, and influences the years that come after; so that in making these plans you must have an eye to the long future.

There are several distinct kinds of farming: stock farming, cereal, grass, and root farming, milk growing, fruit culture, market gardening. Which of these an individual will follow will depend on such circumstances as the district he lives in, his means, his tastes, natural or acquired. It is not probable that he will follow either kind exclusively. This is rarely done in any country, certainly not in ours where labor is less subdivided, and pursuits less hereditary than in any other.

Stock farming (if it is of neat stock) necessitates the production of milk, cheese, and butter, of some cereals to feed the men and animals, of roots for winter consumption. Market gardening is generally pursued alone, and is more like horticulture than the ordinary work of a farm; to follow it successfully, a knowledge of vegetable physiology, of varieties, of forcing, etc., is necessary, things not essential in ordinary farming. It is more often connected with milk farming (where the milk is sold in the fluid form) than with the other kinds; for milk farmers have plenty of manure, and are within a short distance of their market (20 or 30 miles is soon travelled by railroad). This readiness of access to market is essential to the success of both kinds of farming, for both milk and market vegetables are bulky, and the expense of freight eats up the profits when they are transported far.

Stock farming will generally be followed at a distance from cities, in districts where land is cheap, and a large surface can be devoted to pasturage. So it has been ever since want of pasture has governed the movements of the great migratory, pastoral races; and thus has arisen the popular idea that stock farming can only be carried on where there are extensive pastures.

The stock farming of which I propose to treat deals with small herds and moderate sized pastures; it feeds the stock on green food during mild weather, but as winter comes on it provides them with shelter, and with food, garnered beforehand. The pastures will be comparatively large; will be at a distance from large towns, but this does not much increase the market price of the animals, for stock has this great advantage over all other farm products: when it is marketable it can be made to take itself to market. The farmer, much of whose land is hilly, rocky, or otherwise unfit for tillage, will incline to this kind of farming, which he may follow in one of two ways; either by buying the food necessary to support his stock through the winter, perhaps by growing barely forage enough to keep them through, or by raising on that portion of his land which is fit for tillage, fodder crops in abundance, for both summer and winter use, and for sale, so as to give a source of revenue in addition to his regular stock sales. Evidently this is the best kind of stock farming; it is complete and independent, and only among such farmers can we expect to find perfect breeds of animals.

The cost of fencing extensive pastures is so great as to induce some men to neglect their fences and suffer their cattle to roam over their neighbors' land as well as their own; but the model farmer never follows a course so slovenly and productive of ill feeling in a neighborhood; in his mind, good stock farming implies the employment of no more land than can be well and securely fenced, and of no more stock than can be well supported on the pasture land with the assistance of fodder crops sufficiently abundant to leave a surplus for sale, and a guarantee against suffering from drought or flood.

On this basis stock farming may be followed among our hills and mountains, where every farm can have some interval and some upland, the one for tillage, the other for pasture. Climate, the market, the proprietor's tastes, will decide what kind of stock shall be grown. Undoubtedly the time will come when the sides of every hill and mountain in New England will whiten with the harvest as much as the valleys and meadows,—not with Wheat, Corn, or Rye, but with wool,—and the flocks of sheep will be as countless as the herds of the prairies. Lower on the same hills will be cows and oxen, and on the edge of the plains and valleys, horses.

Our stock farmers may with advantage take lessons in this matter from foreign lands. Sheep growers in Scotland, Switzerland, and other mountainous countries, use their mountains strictly in accordance with climacteric laws. These heights are not absolutely sterile, though the climate is too cold to allow timber to grow; the higher you ascend, the lower is the temperature, the later the spring vegetation, the earlier the winter frost. The herdsman of the valley drives his flock in the early spring to the base of the mountains, where the green herbage is eagerly cropped by the winter-weary sheep and lambs; as the weather grows warmer, the grass grows green higher up, and by the time the first pasture is fed off the next above is ready, and so on to the top of the lower mountains. Again, as the frosts of early autumn seize on the summits, the flocks descend with the grass, till winter finds them again at the base, ready to snuggle into the warm fold. I do not mean that there are definite, precise steps in this process; when we deal with large natural surfaces, we find no exact limits; all is on too large a scale; but the general statement is true.

There is no reason why our hill-sides should not roll down a covering of wool after the summer's pasturing quite as white as the winter blanket of snow, and of a value which will equal or surpass that of all the present agricultural productions of the Northern States. The same kind of pasture is good for other cattle, and hardy oxen and tempting beeves may do as well as sheep, though they must be less in number. These larger animals need more abundant food, and are better adapted to the more succulent and coarse herbage of the lower lands. Horses will never thrive on rough hills; the loss by accident would be large. The early months of the colt must be passed in pastures that will never twist or wrench his tender bones, but will allow him to grow symmetrically, and after his frame has become firm, he must still be pastured where his adventurous and frolicsome disposition will not subject him to the risk of rolling down steep hill-sides, or of injuring his wind by racing up the steeps with his companions. Yet good horses can only be raised where there is pasture room enough to give them constant exercise, and if a pasture is tolerably level and free from holes and stumps, its poverty does not unfit it for colts (unless it be overstocked), as the necessity of taking a good deal of exercise in getting their daily food, tends to make them hardy and enduring.

Under favorable circumstances, stock farming is the pleasantest kind; there is less hand and more head work, and the variety of culture, of treatment of animals, gives constant variety and change of occupation, and calls out all the faculties. Besides, there are two strings to this bow, the crops and the stock, both of which can hardly be broken at the same time; hence the loss can scarcely be so great as when all is staked on a single crop.

I think such farming may be made the most delightful occupation in the world.

It need never be monotonous; the culture of crops and the rearing of stock in summer, their protection in winter, the health and joy to be gained from the fields and fresh air in warm weather, the long winter evenings for reading, the ready hospitality to be extended to friends and strangers attracted to our door by its home-like look, thoughts and practices for the welfare and advancement of others, — all is full of variety and pleasure, and such a life, properly lived, may be a lighthouse for the guidance of others along the road of life.

Stock farming is comparatively simple in its description, and it seems as if only a little money and an enthusiasm for the work might enable any one to follow it with ease and profit; but it is really the most difficult kind of farming if done in the best way.

First, the farm is to be selected. The land should be near a village or town, for the convenience of the family. There should be some level or interval land for profitable culture, easily drained, easily irrigated, of good texture, and sheltered from the coldest winds. The hill land should be near the house, easy of access, as little rocky as possible, well-wooded in parts, and facing the south and east, so as to receive the early and late sun.

Next the house is to be erected; not a shingle palace, not a cube or parallelopiped of boards, not a Gothic cottage, not a show-box of any kind; but a comfortable, roomy house, of two stories, with a spacious kitchen, a good cellar, and convenient dairy. The living rooms all on the pleasant side of the house; no best parlor too good to live in and only for show. The outside of the house to have at least 20 per cent of the whole cost expended upon it, so that when it has been inhabited a few years it shall be beautiful to the eye of every beholder. Let it express in every window casing; in the verge boards; in the hospitable entrance; in the cozy chimney stack; in the vines already growing, and ready to wreathe their graceful tracery over every point and projection; in the broken gables; in the blooming flower-beds; in the protecting branches of the old trees near which it is set; in the shrubs and young trees well disposed around it; in its general effect on the landscape where it sits nestling among hills and mountains, or crowning a gentle eminence, or giving entrance to some wild lawny meadows, — the

CHARLES RIVER, AT AUBURNDALE, NEWTON, MASS.

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Home Spirit, — that indefinable, intangible atmosphere which can never be seized and appropriated, can never be added to an ugly and tasteless place, has no money value, cannot be won without wooing, but which breathes from every tree and shrub, catches up and intensifies the colors and fragrance of the flowers, gives comfort and joy to the simple farm buildings, hallows the whole place, and makes every member of the family radiant with a *something* which all can recognize, love, and desire, though they cannot define.

This home spirit is not the result of calculation and carpentry; it cannot be built into the house, and yet it is never more plainly shown to the stranger than in the very work of man's hands, of carpenter, mason, painter, and gardener. The architect does not design it; he cannot. It is individual, and belongs to those who build the house and ornament it. It influences them in the choice of a design, it instinctively teaches them how to select aright the plan of the house, the location, the externals; it is the natural result of a life spent in the love of nature, of beauty, of religion; it comes only to those who humbly seek to be all that the best men should be, and when it comes, they are as unconscious of it as the Heliotrope of its fragrance; but it issues out and enfolds a house and its inmates, so that the rudest hind feels it, and every one seeks to reproduce it. The children who grow up in the house redolent with it always love their birthplace, and return to it long years after, when perhaps the hand of time has picked out the mortar from the chimneys, has broken the trellis from the vines under which they used to sit and play, has planted weeds in the flower-beds, and neglected to prune the long ago too luxuriant hedge. But amid all the change those who love it see their early home, and can easily reproduce it. It is rare that the child of such a home is any thing but an honor to it; its light burns to him forever; he carries the sacred fire in him, and his share of the home spirit will live in him to be breathed out in a new home at some future time.

The stock farmer, as I have said, is well able to found a home like this.

Next he must select a good position for his barn. It should be at a convenient distance from the house, near, but not too near, and towards the centre of the farm, sheltered under some grove or hill-side, easy of access for teams coming in with the crops or carrying out manure, and in such place that water can be brought to it. This farmer, then, must be a good farm architect.

Now the land must be studied with a view to its division into fields, and to the best crops to be raised; the rotation of crops must be decided upon, and their probable rate of increase. The pasture lands must be examined, to find out what stock they are adapted for, and how much they will feed.

Having decided on the kind of stock, the farmer must next learn the best breed for his various purposes. In England this question is decided by the traditions of each county. The business of stock raising has been so long established there, and the various breeds so carefully tested as to their capacity and adaptation to different localities, that as soon as a man has settled upon his plan in farming, he knows at once what stock is best for him, and without danger of loss in unsuccessful experiments, he buys the proper cattle and goes to work.

Not so here. The English and European breeds do not present precisely the same qualities here as in their native countries. The intensity of our heat and cold, and the dryness of our atmosphere, affect both the constitution of the animals, and the quality of the pasturage to which they are confined. Experiments have been tried in various parts of the country by a few earnest individuals, in propagating certain kinds of foreign stock, with the hope of deciding which is best for their locality. In some cases these experiments have been very fairly tried, and have elicited valuable information; but too often there has been a flaw in the experiment, owing to the prejudice of the experimenter, which has made it unreliable.

On the other hand, some men have imbibed a prejudice against all foreign stock, because it is foreign, and brought hither only by the rich, and they pertinaciously deny that it has any practical value. They content themselves with picking up the best native animals they can find, and often have stocks of cattle in their barns better than any blood stock that can be bought. But this is the result of something very like accident; viz., a rare individual power by which they detect the excellences or defects of a creature at a glance. A man with this power needs no single standard stock, for he can choose from an immense range; but the mass, who lack the judgment necessary to successful selection, are subject to frequent losses.

One thing has been settled by the experience of many generations of stock-breeders: that like produces like, under ordinary circumstances. Could you have a cow and a bull, both of whose parents, 4 cattle, were noted either for their milk-producing qualities, their tendency to butter, to fat, or as workers, you might feel absolutely certain that their offspring would have the same qualities. So universally does this hold true, that it is in the power of any individual to produce such a breed of cattle as he prefers, if he will persevere with care and judgment. Consequently, if there were no desirable breeds, it would be possible for our stock-farmer to produce a breed exactly fitted to the hills and valleys of New England.

The requisites for this breed are a fair amount of rich milk in the cows, a tendency to fatten, — both in the cows when not in milk, and in the oxen when at work, — a moderate size, which can be readily supported and fattened on our somewhat meagre pastures, in summer, and sustained at small cost in our barns during winter, and a frame and muscular development which fit the males for work. If sheep are the stock, a large fleece, with small bones, and delicate meat, and a hardihood of constitution, which enables them to defy both heat and cold, and to protect themselves and thrive with but little attention from man.

In establishing this new breed, it is important to cut off as many of the preliminary steps as possible. This may be done in part by beginning with those breeds of cattle, which, in a country similar to our own, possess most of the qualities just enumerated. The breeds most in repute in England are Durham, Hereford, Ayrshire, Devon, Alderney. Of these there are various grades and crosses, and many varieties, assimilating in some respects to either.

About 60 years were spent in bringing one of these breeds to its present state; and since the type was fixed it has been easy, as I said, to keep it so. If we can cut off 30 or 40 years of the experimenting, and at the end of the remaining time have a stock just suited to us, it will be a fortune to the successful breeder, and an incalculable benefit to the community.

The popular breeds may be first divided into sizes, as large or small. The Durhams and Herefords are large, the Devons, Ayrshire, and Alderney, or Island Cattle, small.

The large animal has a large stomach to fill, and an appetite in proportion, larger bones, greater amount of offal and waste; but when grown, gives more weight of beef, and a larger quantity of milk. To produce these large breeds in perfection, the summer pasture and the winter fodder must be rich and abundant. Does this pay? is the question. All these peculiarities of size are against the hilly country, and in favor of the prairie. These cattle are good as food and to work, and often can be fatted to astonishing weights, whilst cows of the same breeds are mentioned which have given from 20 to 30 quarts of milk, for 4 or 5 months after calving, and afterwards fall off to a reasonable yield, until they have finally dried up. But to produce such weights and such quantities of milk, a large and constant amount of food of extra quality was necessary, and the animals were grown under the equable and moist climate of England.

Such great weight it is desirable to attain, as it is better to feed one animal, and to have only one to care for, than two, but it can never be attained on such a farm as we have been considering, except by stall feeding, and that kind of stock raising is to be pursued under different circumstances, and will be described hereafter. The milk given in such abundance is not rich; it takes from 10 to 15 quarts of milk to make a pound of butter, and, although good for those who sell milk, is not well adapted to our stock farmer.

The Island or Alderney cattle are as much below the medium size as those that I have described are above it. These animals are not valued for their working or beef qualities, being inferior to many other varieties in these respects, but, as they are small, the cost of keeping them would be so also, were it not that the delicacy of their constitution requires an extra quality of food; as milkers, too, they are deficient; the quantity of milk is small, and the quality, after skimming, watery and poor. Their excellence is in the quality of their butter. Four quarts of milk often make a pound of butter, and butter that is most attractive, too, from its golden yellowness. But butter is only one among many things required by the stock farmer. So the Alderneys must be rejected. Indeed, as a breed they are not valuable to any one. The rich cream, the small size, and the peculiar beauty of the young cattle, are urged as its claims on the man of wealth, or the man who can keep but one cow. But the chief requisite in a cow is good milk; our children, our pigs, and ourselves, to a great extent, depend upon it; butter can far more easily be dispensed with, and is, besides, not a bit better for its beautiful yellow color. Moreover, the beauty of the young Alderney is more than counterbalanced by the ugliness of the old one, which is the ugliest in appearance of all neat cattle.

The Ayrshire is often called the poor man's cow. It is small, hardy, and handsome, is easily supported, makes good, quick working cattle, and fattens pretty well. This seems nearer the mark, and, at first sight, appears all that is wanted for the foundation of our breed. But the Ayrshire is found to have a tendency to fatten in rich pastures, which often gets the better of its milking qualities, to the great disappointment of the owner. Besides, the milk is poor in quality, ranking only above the Durham in this respect.

I am aware that statements are made of the amount of butter made from the milk of Durhams and Ayrshires, which go to prove it as valuable as the Alderney, the quantity being greater. But these statements must have been made by persons whose herds fed in pasture where the clover was up to the top of their horns, and when the same animals, or others of a similar breed, were transferred to poorer pastures, or less abundant feed, they have shrunk, both in the quality and quantity of their milk; and, however much butter may have been made in any case, it cannot be denied that the skim milk is a poor and washy article.

The last breed I come to is the Devon. These, too, are small cattle. The males are noted for their docility and enormous working powers, as well as for a decided aptitude to fatten, and for the superior quality of their beef, it being better than any other. They do not ripen, or become fat and fit to kill at so early an age as the Durhams, being seldom fit for beef before they are 5 years old; but they can be worked till 4 or 5 years old, and then put up to fatten. "They need work to develop them, and if kept idle will be invariably stinted in their growth, whilst the Durhams, or short horns, are impaired for beef if worked. They do not, indeed, attain the great weight of some breeds, but in a given time they acquire more flesh, and with a less consumption of food, and their flesh is beautiful in its kind."

The milk of the Devon is very rich, instances being given where 4 quarts have made a pound of butter, and 6 quarts being sufficient to do this at any time. It is very rich, too, after being skimmed; no length of standing will free it from all its cream, and the skim milk of the Devon is equal in richness to the new milk of the Ayrshire and Short Horn. The quantity is reputed to be small, and this is generally set down against them; but there is a difference in the quantities given by different stocks of Devons. Devon cows of some breeds have given in America 3,500 quarts in a year, and will constantly average 1,600 to 1,800 quarts. They never come in with an immense bag, to dwindle down to nothing soon, but are constant and steady milkers till within a short time of calving.* They are very hardy, — both males and females thriving on pastures where a Durham would starve, — and the cows have not the tendency to milk diseases so characteristic of the Alderney. Does not this stock offer the best foundation for a New England breed, good for all parts of the country, high or low?

The general virtues of the Devon stock are shown in its already wide diffusion over New England, for by either chance or design most of the earliest importations were Devon, and their blood is now shown in the red cattle found in all parts of the country.

Our farmer having selected his horned cattle, next turns to horses.

The Morgan is the New England horse, and probably he will always maintain his supremacy for general purposes among our hills.

Pigs must be bought, to eat up the skim milk, and their breeds,

*"And two cows are mentioned in England, of the North Devon breed, one of which gave 19 1·2 pounds of butter in a week, and more than 480 pounds in a year. The other produced more than 20 pounds in a week." — *Colman's European Agriculture.*

of which there are many varieties, must be investigated. At one time the Suffolk bid fair to conquer all other breeds, and to drive out the "race horse" and "corkscrew" varieties. Undoubtedly the Suffolks are valuable; they fatten readily, and have but little waste, but they are tender in constitution, small, and make rather too large a proportion of fat pork. Their size is increased, and the pork not injured, by crossing with the longer bodied and larger framed Middlesex, Essex, Hampshire, and other breeds. Pigs can be improved or injured in two years, so that our farmer will soon settle the matter by experience; they are easily raised, and take care of themselves. Not so sheep.

If our farmer has decided on keeping sheep, he has selected a path sown with difficulties, although promising great profits. The sheep farmer has two harvests, the wool and the mutton; he must, therefore, in selecting his stock, have regard to both. At present our people are indifferent to the quality of the mutton they eat, and are more governed, as in beef, by the size of the quarter and its handsome appearance, than by the quality of the meat. It will not always be so; we are beginning to discriminate, and shall soon be willing to pay larger prices for mutton of delicate flavor and juicy tenderness, than for the coarse, rank, hard meat, so generally bought and sold. Let our stock farmer select his sheep with an eye to the quality of the mutton, and he will soon find a taste for the meat growing up among his customers, and a corresponding willingness to pay for it.

But it happens that the sheep which give the largest fleece are less valuable for meat; so we are in a dilemma; unless we can get a high price for the carcase, we must try to get the largest fleeces. Our aim must be to improve some breed so as to combine both. Merino sheep now stand first for fleeces but do not give so choice mutton as other breeds.

Sheep need more attention than any other stock, and if not well attended to at the lambing and tupping seasons, they will surely suffer; and the young lambs need constant care.

Fowls offer a field for improvement, as there are so many varieties.

Having settled all these points, and made ready the house, grounds, kitchen, and flower gardens; having built the best barn, and selected the most suitable stock, and bought some animals, our farmer finds that his farming is no child's play, but will need a great deal of thought and care, and that a field for study and research is opened before him as varied and interesting as that offered by any other pursuit. The best food for the different creatures, the improvements to be made in food, in seed, in sowing, cultivating, harvesting, and feeding will demand constant care and attention, and the exercise of unflagging energy.

He may be a boor if he chooses, may govern his estate by the saws and traditions of his ancestors, may believe in luck and the changes of the moon, may be a mere machine, valuable in so far as he helps to feed mankind, and pays his taxes; or, on the other hand he may be an agreeable, educated, earnest man of practical science.

I have made no reference to cereal and grass culture, or to his fruit or other interests, because they are secondary to his stock. The cereals and grass are of great importance and are to be improved as much as possible, but not more by the stock farmer than by others, and the methods followed by those who make these crops their principal objects will be imitated by him.

This stock farmer has something new at all seasons, and some profit constantly accruing from the sale of early lambs, of wool, of mutton, of pasture-fed steers and oxen, of butter and cheese, of spare fruit, of winter-fed cattle, they are always bringing in a little ready money. And what is not spent on the household, should be invested in improvements, for improving one's farm is, as I have before shown, a better investment than mortgages or bank stock.

CHAPTER XLVI.

GREENHOUSE, CONSERVATORY, AND HOTBEDS.

MARCH. The work for all these structures has been described so minutely and anticipated in so many cases, that it is unnecessary to devote much time to them now.

The long days and the high sun of March will give so much natural warmth, that fire heat may be almost dispensed with; ventilation should be free, and constant care be taken to keep the moisture of the houses as great as is demanded by plants in rapid growth.

There will now be a larger supply of flowers than hitherto; every plant will be either in blossom or rapidly swelling into buds, and the amateur or professional gardener may enjoy fully the pleasure or profit that he has looked forward to, from the very beginning of his winter's work. A well-filled greenhouse or conservatory in March is always a great satisfaction, and as in November its gay beauty consoled us for the decay without, so now its charms serve to moderate our eagerness for the coming of spring and to while away the tedious weeks of weary waiting for her warm days and soft winds and wild flowers.

It is quite time now to finish our cuttings of the bedding-out plants for summer; if set at this time, they will strike root before April, and be quite well grown by the middle of May, which is as early as it is generally safe to set them out.

You will remember that I said the Camelias would be out of blossom in the spring, and would either be just making their growth, or have already made it. So, too, with other hard-wooded plants which blossomed early. They may be pruned into a desirable shape as soon as the wood is fairly ripened.

Azalias will be coming into bloom, and need plenty of water.

Besides the various methods of propagating plants, already described, is one adapted to hard-wooded plants, called *inarching.* Some of these plants are very difficult to graft, bud, or layer, and may be more successfully treated by inarching.

It differs from grafting in the scion's not being separated from the stock, from which it derives the whole, or a part, of its support, until the junction is completely effected.

There are very many methods of performing this operation; the one generally followed is crown and side inarching.

The spring is the usual season for out-of-door plants, the sap being then in rapid motion, but it may be done in greenhouses at any season when plants are growing.

The plants to be inarched (one of which, at least, must, of course, be portable), are to be brought together, and the branches to be operated upon should be selected, and crossed, that the best point of juncture may be decided. Cut from each branch such a slice of the wood and bark, that when the branches are again crossed, they will just fit into each other, the sap-wood, cambium, and bark of one plant meeting the same parts of the other. Cover the whole joint with grafting-wax, to exclude the air. In about a fortnight the joint will be made, when cut the scion across the end, thus freeing it from its original stock. After another fortnight cut away the but-end of the scion, so as to leave none of it not grown to the stock, and the operation is completed.

In all cases the scion and stock must be about the same diameter, in order to effect a perfect union between them. Sometimes scions, which have been cut off the parent plant, are inarched. This is done with such scions as are difficult to graft, they needing a constant supply of food.

Inarch as before, but keep the but-end of the scion nearly vertical; immerse it in a phial of water, and every few days remove the phial, and cut off a thin layer from the end. This will keep its vessels open, and enable them to absorb water for its support. Some gardeners stick the but-end in a piece of potato, for the same purpose.

Resort must be had to some of these means of increase, with many of the choice exotics. But few flowers are naturally double, or beyond improvement by the gardener's skill; but when improved they rarely generate seed which will produce the parent plant in all its perfections. Camelias are particularly troublesome in this respect. Oranges and Lemons are, if I may be allowed the expression, compound plants, and must be budded, grafted, or inarched, to produce flowers and fruit at an early age. It is easy to grow them from the seed, but only one or two kinds blossom, until four or five years from the seed.

The rich fragrance of the blossoms, the color and character of the foliage, and the beauty of the fruit, render Oranges and Lemons favorite house plants, and they are easily cultivated.

They like a strong, rich, and even clayey soil, and during their growing and blossoming season, should be watered once or twice a week with liquid manure. Their growth never stops, if they are properly managed, although it varies in rapidity with the seasons. It rarely happens that a collection of Orange trees is without some blossoms, and it is very common to see the trees, and even the same tree, bearing buds, blossoms, and fruit, at the same time.

They are readily grown from cuttings, which are to be set, 3 or 4 inches long, half their depth into sand and loam. Give them gentle bottom-heat, and moisture, as to other cuttings. In a few weeks the cuttings will elongate; as soon as the roots are well-developed, pot and treat like other hard-wooded plants.

The plants, old and young, need constant, but not superabundant moisture. Too much or prolonged dryness will cause the leaves to fall off, which will not be replaced for a year or two.

The seedling plants may be budded or grafted the fall after they are planted; if you want a standard plant, induce the seedlings to grow tall, by removing all side branches, as they appear. The Shaddock and Citron make the best stock for working, as they grow strong and rapidly, and make larger plants than others. If the plants are set into the shade during the summer, supply moisture sparingly.

There are some small Orange-trees, fit only for flowers; these can never be induced to make standards.

When Oranges become diseased, turn them out of their tubs; cut out decayed and old roots; cut down the branches, or stems, to healthy buds; give new soil and bottom-heat: the plant will soon throw out a new and healthy growth.

These plants need, as they grow, very large pots, in order to supply sufficient earth and manure, and this necessity is a serious drawback to their successful cultivation.

This difficulty is obviated by the use of such a pot as is represented in the adjoining cut. This pot is made of slate or of plank. If of plank, the inside must be covered with pitch, or any paint not affected by continued moisture, to insure durability. The sides, *a* and *b*, are suspended on hinges, with close-fitting joints, and are held tight by transverse bars, *d*, which shut close on the opposite sides.

The roots of plants in such pots can be examined at will, and loam added or removed.

Roses, Achimenes, Gloxinias, Fuschias, Japan Lilies, Heaths, Calceolarias, Carnations, and Pansies should be repotted; bedding plants be started from cuttings. Sow seeds of summer annuals. Give Cactuses, Heaths, and Cape Jessamines more water, and air well all plants in cold frames.

CHAPTER XLVII.

GRAPERY.

THE vines in the forcing-house are now rapidly breaking their buds, and must be tied up just as fast as they break evenly along the whole cane.

The first growth is very rapid, and the fruit will show as soon as the shoot has grown two or three eyes. Allow them to grow until the lower leaves are pretty well expanded, and the flowers well formed; then cut back to one eye beyond the fruit. Never in out or in-door culture cut back to the fruit, as is sometimes recommended. Remember the analogy between the leaves of the vine, the fruit-tree, and Corn, and recall the reasoning applied to topping Corn, where it was shown that removing the upper leaves from the stalk deprives all below of nourishment; so with the vine. The bud above the fruit will probably break and grow a little way; stop it at an eye. The leaves thus formed will draw sap and elaborate it for the fruit. Leave but one shoot or spur.

If you have too many spurs, you can cut them out at this season without fear of bleeding; the remaining leaves will consume all the sap supplied. Increase the temperature slowly, beginning at 60° to 65° by day, and 60° by night; rising even to 85° with the sunshine; increase towards the last of the month to 70° to 75° by day, and 70° by night, allowing the sun to raise it even to 90°; give plenty of air and syringe constantly.

I hope it will be understood that no more leaves are to be removed than is necessary to allow the sun a reasonable access to the house, and to moderate the growth of the vine.

Some persons, following the analogy of Corn-topping, assume that all the leaves and growth are necessary to perfect the plant and its fruit. But you know that it is necessary each year to cut back the vine, both to make it bear and to keep it within the limits of the house. You also know that no plant can grow without drawing on the soil for its support; all that grows and is cut off is just so much impoverishment of the soil, and is an unjustifiable waste, *if it could have been checked by summer pruning and pinching.*

Towards the last of the month the buds in the cold grapery begin to swell a little; keep it cool, and do nothing to excite the vines into activity, as the next month will be soon enough to wish for any start.

The retarding-house must be kept cool; cover the glass with shades, canvass, etc., in the middle of bright, sunny days, and give as much air as you can without chilling the vines.

In the forcing-house may be set on the shelves more Strawberries in pots, and as they ripen they must be attended to. Pots or boxes of Cucumber and Melon seeds, also. Renew the Cauliflower plants as they mature, and set them on the shelf or in any convenient place.

The Mushroom beds are now in active growth, and should be kept moist. If there is any room, French and Kidney Beans may be planted in boxes.

Use all the spare room for purposes of culture. Broccoli, Cauliflowèr, boxes and pots of Cardoons, Sea-kale, Lettuce, etc., may be set in the cold grapery, ready to be put into the forcing-house as they are wanted, but care must be taken that no dead leaves or insects are about them, as the injury these would do the vines would far exceed the value of the vegetables. These plants will all be gone by the time the vines are so grown as to need all the room, and exclude the light with their leaves.

The vines in pots and troughs will be much more advanced than those on the rafters; their berries should have already swelled, and be nearly ready for thinning.

This process cannot be too carefully and thoroughly performed, whether in vines or fruit trees; but in vines, especially, it is essential to successful culture and perfect fruit. To thin, provide yourself with a pair of long, but narrow and fine-pointed scissors; go over the vines carefully, bunch by bunch, and snip out every imperfect berry, and enough perfect ones to reduce the bunch to a good and healthy proportion and size. No rule can be given to guide in this operation, from the difference in the size of the berries, the larger ones needing more thinning than others. The process must be repeated when the Grapes color and swell.

Be very careful not to touch the berries with the hand, which would produce rust; it is well to wear gloves. Remove the berries that you cut off at once, as their decay would injure the atmosphere.

One great difficulty in Grape culture is *shanking* or *shrivelling*, that is, the drying up and discoloration of the bunch and footstalk.

Many reasons have been given for this disease, and many remedies proposed. It attacks the cold grapery in the early summer months, but is less likely to trouble a forcing-house, where heat can be regulated, and where ventilation, light, and moisture, are abundant.

Mr. J. F. Allen, the author before quoted, says, that it is "a disease peculiar to the Grape in its culture under glass structures, caused by a deficiency of nourishment, which deficiency is occasioned principally by a defective atmosphere in the house, causing stagnation in the flow of the sap; and this difficulty may be increased, and the spread of the evil promoted, by various causes, such as a poor border, general weakness of the vine, overcropping, and chiefly by not paying due care to the ventilation of the house."

The last of the month, remove the litter from the border of the cold grapery, and cover it with a thick coat of strong horse manure, which, by its fermentation, will begin to heat the border.

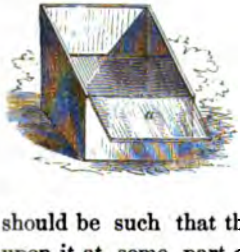
The fruit trees in the forcing-house will soon begin to grow, and must be attended to, according to former directions.

CHAPTER XLVIII.

FLOWER AND KITCHEN GARDEN.

BEDS of Ranunculuses, Daisies, Anemones, etc., should be op
as often as it is safe, and on some of them, it will be well t
sashes, as, by so doing, we may soon start growth and blos
But be careful not to let your spring enthusiasm get too much
under way, as it demands a great deal of care and attention.

Some time in March, if the weather is mild, and the g
thaws, the Snowdrops will bloom, and often in sheltered p
even before the snow is entirely gone, Crocuses will follow
Pansies will prick up their leaves and venture into blossom;
lish Violets can be induced to bloom by setting movable glasse
them.



A very simple contrivance which m
used to facilitate the blooming of
plants, is shown in the adjoining cu
common square box, without top or bo
On the upper edge is fastened a re
frame, the groove of which receive
pane of common glass *a*. The inclin
should be such that the rays of the sun will fall perpendicu
upon it at some part of the day. Lay around the bottom o
box, and over the adjoining ground for a few feet, leaves, or
to keep it a little warm. Plants thus enclosed, must receive
ventilation, and some water, as in a hotbed. You can get e
Violets, Daisies, Polyanthuses, etc., by this method than by
other.

Keep the roses and other plants which were frozen up in
vember, in the coldest place possible, until into April, or, at
until the ground is permanently thawed.

Whatever kind of hotbeds you have decided to use, begin t them now, and, as soon as they are thoroughly warmed, sow the seeds of the earliest vegetables; there is no hurry, as yet, about the seeds of annual or other flowering plants; the last of the month, or the first of April will be time enough.

Examine the beds in which Cabbage, Cauliflower, and Lettuce plants were wintered. If they are in good condition, and promise plants enough, no more seeds need be sown; if not, plant the earliest varieties now. Keep the heat of the beds constant, till the young plants are well started, with little ventilation. After they have made a few leaves, give air cautiously, but enough to harden the plants gradually. Follow these sowings with Cucumbers and Melons. Those which are to be fruited in the bed, may be planted among the Lettuce and other plants, as the vines will not increase much before the Salads are all gone.

If the Melons and Cucumbers are to be afterwards set out in the garden, set small, square bits of sod, grass side down, or thumb pots, just under the surface; sow the seeds on the earth over the sods or pots, so that when well grown, and when the weather will permit, they may be transplanted, sod and all, into the open ground.

Towards the latter part of the month, we shall sow seeds of Tomatoes. To get them *extra early*, sow the seeds the last of February, or first of March. Remember what was said about selecting the seeds from the earliest ripened fruit of last year; if our seed did not ripen as early as those of our neighbor, we had better buy his.

We shall not sow seeds of Salads, Parsley, Herbs, etc., as they will come early enough when planted in the open ground, but, if it were desirable, this would be the time to do it.

Fill two frames with the Asparagus roots taken up in the autumn, for forcing. If planted according to previous directions, we shall have it for the table by the last of the month.

Sow the seeds of Egg-plant, Broccoli, Endive, Cardoons, and prick out into the succession beds, some of the winter-saved Salad, Cabbage, or Cauliflower plants, for an early start.

A market-gardener should begin in February or even in January to start his vegetables in hotbeds, for an early market, but the family wants, in a country place like ours, do not demand this. The little that we need can be grown easily in the forcing-house; and if we had no such convenience, I should not advise you to have many hotbeds. They are costly and troublesome, and the vegetables grown to maturity in them never have the flavor which they attain when grown in the ordinary way. A well-managed kitchen-garden, with conservative pits and cold frames, will afford an ample supply of vegetables to carry a family fairly through the winter, till the natural round begins again.

There are some crops besides the tropical fruits which can be had only by hothouse culture; and there are others, as Salads and Potatoes, that cannot be well preserved through the winter, and the use of which is so important, that we wish to have no interval without them. For Potatoes, indeed, we need hotbeds only to start the sprouts, and even for this they are not essential.

In a dry, well-sheltered place, raise a bed of horse manure 18 inches deep, about the middle of March; lay it down and beat it well with the fork, making the bed as long as you please, and any width. Over the manure lay 2 inches of loam, on which spread evenly seed Potatoes, whole if small, cut if large, and cover them with 2 inches of loam. Box it in with boards like a hotbed, and bank the outside with leaves and manure; but be careful that it does not overheat and injure the Potatoes. The Potatoes will sprout, and begin to grow, by the time it will do to set them out in April. When planted they will require extra care. Plant them in ridges, slightly raised above the surface (not more than six inches) by manure, in a spot sheltered from the north and west, and well open to the east and south. Over the manure throw an inch of earth, on which place the potatoes, and cover them with two inches of earth. If the sprouts appear before frosts are gone, cover the ridges every night with long straw, old hay, or seaweed. This litter may be left in the furrows, shaken on with a dung-fork every night, and removed in the morning. Potatoes grown with this care will be ripe the last of June.

If started in a hotbed they must be even more carefully watched, and as the sprouts appear you may cut them off, with a little bit of the tuber, and prick them out in a new bed. They will all grow, and produce abundantly.

No subject has been more discussed by cultivators, than the proper method of planting Potatoes; whether whole or cut, large or small. It would seem as if this point might have been decided long ago, with regard to a plant so common, and so long known, but it is still a matter for experiment. I have seen Potatoes grown from *parings*, which had found their way, through the swill-pail, to the manure-heap, and thence to a hotbed, where they produced tubers. The same result has been obtained, when it was not a matter of accident. It seems really a simple question, and one that need not remain undecided, to engage the attention of horticulturists year after year. We know that as in the grapevine, the cutting of a single eye, or the budding of a single bud, grows readily, and produces for years; so in the Potato, each eye or sprout will grow, and produce abundantly, when cut from the tuber, and planted separately. The eye, then, is a perfect germ, containing in itself all that is necessary to growth. Each tuber has many eyes, as a long grapevine cutting has many buds. When these eyes start to grow, their rootlets find a little food stored for them in the tuber, and when they have exhausted this, they must depend upon the earth to support them. It is true that the feebler rootlets may at first find their most suitable nourishment in the tuber, before they are able to select for themselves food in the soil, but beyond this the tuber is of no value; and, as you see, we can eat our Potatoes and have them too. Of course the crop will be in proportion to the number of eyes planted.

Whether small or large Potatoes are best, may depend somewhat on the variety, but in any case those should be used for seed which are the most mature. As in trees, and other plants, the best ripened buds, namely, those from the middle of the stem or branch, are always found to grow and bear quicker than others, so it is with the tubers of the potato.

The Potatoes that we shall plant for early forcing are, Hill's Early, Early White, Chenangoes, and Jackson White.

In our climate it is never safe to plant out-of-doors in March, any thing that can be injured by frost, but we may reduce the covering from about the cold frames and lighten it over the Tulips, etc. so as gradually to harden them.

You will find the Parsnips and Oyster plants which you covered over and left in the ground, last autumn, in fine condition for the table now, and the Horseradish may also be dug.

Many kinds of vegetables which are rare in this country, might be cultivated to great advantage. The choice of vegetables for culture seems to be to a great extent, a matter of locality, some nations growing a few varieties in abundance, which others care but little about. For a notable example, take the Salad tribe; the French depend upon Salads for a relish to every meal; the English use them but little, and we still less. In the Netherlands, Artichokes, Cardoons, and some other vegetables, are more in favor than either in France or England.

All these vegetables are good food, and especially valuable as affording a variety which is wholesome for all classes, and particularly beneficial to the poor, to whom vegetables afford a large amount of cheap and nutritious food.

A description of the method of cultivating and using a few of them, may interest some persons, and to aid in introducing them to general attention, I have condensed the following directions from some English treatises: Artichokes are cooked and eaten in various ways; the blossom, bud, or head, just before it expands, is eaten as a Salad, and, also pickled. The scales of the calyx, with the fleshy adherent portion, are pulled off, dipped in salt, oil, and vinegar, and eaten. The button, which is the top of the receptacle which holds the imperfect seed, is sometimes eaten in the same way, sometimes fried in butter, sometimes used in fricassee and ragout, and sometimes pickled. The head may be quartered, and, after the chaffy down and seeds attached are removed, used as a Salad or pickled.

Some cultivators, as soon as the leaves are well developed, and the flower stem beginning to grow, that is, the first of June, cut all level with the earth; a new and vigorous growth of leaves follows, which, in the autumn, is held together, and hilled like Celery to blanch. It is then covered with a little litter, and in six weeks the blanching process will be over, and it may be cooked with drawn butter, or in various other ways, which are described in cookery books. In this state it is called Artichoke Chard.

The Jerusalem Artichoke is another species of plant, is good food for cattle and hogs, and, if cultivated for this purpose will yield large and profitable crops, and some persons think, is superior to the common Potato for the table.

There are several varieties of the Artichokes, some of which, produced by French gardeners, have very large heads. The globe is the one most used as food in England, and the best for a novice in culture to try. Others are the oval, or conical, the dwarf, globe, etc.

The seed of the Artichoke seldom ripens in England, but freely on the continent of Europe, and on our own, in favorable and warm exposures. The bed may be made from seed, or slips, or eyes, or from dividing the tubers themselves.

The suckers, or slips, are taken from the old roots as soon as they have formed some roots. The best way to take them, is to remove a little of the earth from the old tuber, and thus seeing the exact position of the slip, to cut off a small piece of the tuber with it. The suckers should be taken when from 12 to 15 inches high, with care not to injure the leaves; plant them in rows 4 feet apart, sets 2 feet apart; water till they are well established. The new sets will produce heads the first season, but not so early, or so large as the old ones. Keep the ground well stirred, then cut out all the suckers that rise in the spring, except the three or four best. Cut the crop when matured, as it weakens the plant to allow it to flower, and, when the head is cut, remove the stem down to the root.

In the autumn, when the heads are all gone, cover the bed with horse manure and tan. Early in the spring dig it in carefully, so as not to injure the crowns of the plants, and also dig plenty of manure into the alleys. The Artichoke is a gross feeder, and the roots run deep, so that the ground should be well enriched before making the bed. Salt in large quantities, and wood-ashes are found to contribute largely to the growth and development of these plants.

If you wish to save any of the heads for future use, cut off with them, 3 or 4 feet of stem; set them in a dark cellar in damp sand, and every day draw them out, and cut off a small bit of the stem; they will thus continue to absorb moisture for a long time.

You may divide the old roots if you choose, instead of taking off suckers; this can be done any time after the buds have fairly begun to grow. But it is thought by many that such plants never thrive as well as the suckers.

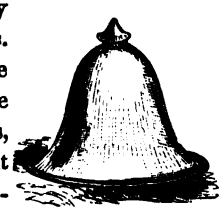
The Jerusalem Artichoke, *Helianthus tuberosus*, is cut into eyes for planting, or set like Potatoes, and planted in well-manured ridges, 3 feet apart, and 8 inches between the sets, covered 3 inches deep; cultivated through the season, and dug either in the fall of the same year, or the spring of the year ensuing. They are so hardy that they would endure our winters with no, or but a slight, covering. In digging, only the largest tubers are selected for use, the others being returned to the earth for the next year's crop, and a field once planted, will keep itself in bearing for several years, and will yield as abundantly as Potatoes. Many persons in Europe use them for the table constantly and with great relish.

Cardoons are much prized on the continent of Europe, and somewhat used in England. The footstalk, as well as the midrib of the leaves, is used for stewing, soups, and even Salads, in autumn and winter. They require blanching, to make them tender, and to remove bitterness. Of course the longer the stems the better, the more rapidly grown the more tender, and the better blanched the more attractive they become. For cooking, the solid part of the stem is cut into lengths of 6 inches, and boiled in pure fresh water until tender; then remove the slime and strings which will cover the pieces, wash them clean, put in fresh cold water until wanted, then eat with white sauce, etc., as Artichokes.

This plant is a perennial in the south of Europe, but an annual elsewhere; it is sown every year in hotbeds in March, and out of doors in May. They would not be sure to do well in our climate, unless, like Celery, started in a hotbed. Sow in thumb-pots, or in bits of sod. Two ounces of seed will sow a bed of 32 square feet. Plants in pots may be set 14 inches apart in the rows, which should be 4 or 5 feet apart. The beds must be well manured before the plants are set out, which they should be like Celery, when 18 inches high. Tie them to stakes 3 feet high, to prevent the leaves from breaking. Earth up at the same time, and continue to earth gradually as the leaves grow. Water should be supplied abundantly, and always, if possible, enriched with manure. They will be ready for use in the autumn and through the winter, like Celery; treat it in the same manner, to protect it from cold weather.

Endive is a salad plant of the Chicory family, like the Lettuce. It is sown in July or August, for winter use. Sow the seeds in beds, broadcast. Stimulate the growth of the plants as much as possible by liquid manure; when 2½ inches high, prick out small kinds in rich soil, 4 inches apart; water till they begin to grow.

An early crop may be sown in May, and pricked out amongst Peas, Cabbage, etc.; but few should be grown at a time, as the warm weather stimulates the production of flower and seed stems. Large kinds are to be planted 10 to 12 inches apart, in rich soil, in rows, 12 to 15 inches apart. As it is to grow late, the bed should slope to the south, to get the late sun. The Endive is to be blanched to make it perfect. As it blanches with some rapidity, do not prepare more than 6 or 8 days' supply at a time. Begin at the end of the row, and holding the leaves close together; tie a strand of matting around them, at the same time heaping up the earth. When the weather is cold, or not favorable for blanching in this way, use a blanching-pot. Invert a flower-pot over the plant, covering the hole in the bottom of the pot with a stone. An Endive pot is better. The knob at the top renders it easy to handle, and its flare encloses all the leaves. When planted late, Endive comes into use just before winter, and with care may be made a winter Salad. Tie up the leaves, raise the plant with a ball of earth, and set it out in a dry and cool place, like the conserv-



ative pit. If it is to be depended upon for Salad, a cold pit or frame should be constructed on purpose. It bears a good deal of cold, and is a valuable adjunct to a winter table. It may be eaten boiled, if desired, as may Lettuce also, but must be blanched in either case.

Succory, another plant of the same family, and indeed the type of the family, is also very valuable, both as a Salad and for its roots, which are used to adulterate coffee, and for other purposes. The seeds of Succory are sowed in June, in rich earth; when the plants come up, thin in the rows 6 inches apart. By the beginning of October, the roots will be well grown; they are then taken up and packed away for use. It is a perennial, and, like Carrots and Beets, it has stowed away in itself the material for a growth of leaves. If the blanched leaves are wanted in the early winter, set the roots as thickly as possible in a hotbed frame; pack sand amongst them. A few weeks before they are wanted, lay over their crowns 6 or 8 inches of loam, and a foot of manure. The leaves soon shoot into this earth, and become white and crisp, and ready for use. They may also be packed horizontally in boxes, covered with earth, and set in a warm cellar; before spring they will be found to have grown, and to be beautifully blanched. Or a cask of any kind may be bored with holes 1½ inches in diameter, and 3 inches apart; insert roots all round, horizontally; cover with earth, and make a new boring and a new layer of roots; continue till the cask is full. Fill several in the same way, and set them in a cold place. When you want the Salad, remove one cask at a time into a warm place, and follow in a week or two by another; the temperature to be from 40° to 60°. The leaves are to be cut when 7 to 8 inches long, taking a thin slice of the crown. To be eaten with oil, vinegar, and salt. Three handfuls will make a good Salad.

Dandelions are grown for our markets; the seed is sown in May, the plants tended till winter, when they are covered up, and they start very early in the spring, giving larger and better Salad than the wild plants. It is eaten abroad, blanched like Succory.

Mustard is more generally used for Salad than any other of this family of plants. The varieties are numerous, but all are cultivated in the same manner. The plant is used when in the cotyledon state; the two first leaves thrown up by the seed. Sow it every three or four days, and set in such places as will insure the most rapid growth,

Some London gardeners have the floors of hothouses covered with tan, and sprinkle the seed on every other day, thus keeping a constant supply. The plants are cut when 3 inches high, tied in bunches, rinsed, and put on the table. Soaking in water injures all Salads of this family. The seed may be sown, for private use, in shallow boxes, and set in a warm but shaded place.

Cresses are various in kind; the Water and Winter Cress are the ordinary kinds. Water Cress may be got by sowing the seed in any moderately still running water, or by laying branches of the plant on the surface, which will mature and spread their seed. They should be gathered young and eaten at once.

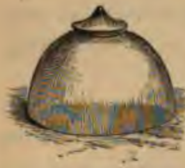
Winter Cress is grown from seed sown in drills, in August; half an ounce of seed will sow 20 feet of drill. As the plants grow, pick off the outside leaves for use, cut the flower stems down as they appear. A very slight protection will carry through the winter, the plants being thinned out in the autumn to prevent damping off.

Sea-kale is a Salad much used in Europe, and very valuable in all scorbutic diseases. The blanched shoots, and the midribs of the leaves are the parts eaten, and when ready for food, they are cooked like Cardoons. It may be grown from seed or from cuttings of the root. Seed should be sown late in April, in drills 2 inches deep, and 6 or 8 inches apart. Two ounces of seed will sow a bed of 32 square feet, broad-cast, or in drills a foot apart. The seed is very apt to be imperfect, but this may be easily ascertained by cutting them across; the good ones will be plump and solid.

When the seed vegetates, keep it clear, and when large enough, thin the plants to a foot apart; the plants removed, may be transplanted; only one bud should be allowed to grow, although several will appear, particularly on plants which come from cuttings of the root. All summer, and through the fall, the plants are kept well hoed; before winter cut them all over, and cover with straw or manure.

The young plants have very few fibrous roots, and a long tap root. They are, therefore, easily set with a long wooden dibble, 3½ feet long with a handle at the top, and a cross piece as a guage, from 9 to 12 inches from its point, but made so as to shift for shorter

roots than this, which is their average length. The lo part should be 3½ inches in diameter, tapering to 2 inc at an obtuse point. The holes should be made by one m guided by a line, and followed by another man with roots, which may be rapidly set in the holes, the soil fi in by a pressure of the foot. The young plants left cove in the fall, will start to grow very early in the spring may be forced. Before forcing, remove the leaves and ter, then salt the bed well, and syringe, or water wit caustic lime-water, to kill slugs, snails, etc. Cover crowns of the plants with an inch or two of fine sand; over



tops of the plants, set Sea-kale pots, wh differ from the Cardoon pots, only in havin cover. Cover around the pots enough ferm ing material, as horse manure, to raise the t perature of the bed to about 60°. In six seven weeks, the pots will be full of the pl The covers are necessary to enable us to amine the growth and health of the plants. Various other trivances are resorted to, but none is so good as this. Boxes ered with laths, and all similar arrangements admit the gases of manure into the plants and injure them.

The plants to be forced in the hotbed, are taken up in the tumn, and kept cool and dry till the time for forcing. Open a bed frame, and fill as usual with manure; then cover with eno earth to allow the roots to be set within 2 inches of their de cut across the length of the bed, a trench, into which pack the r as thick as possible; cut another trench 5 inches from the and so on, until the bed is full. Cover the crowns with six in of straw; over the beds, nail hoops covered with mats or canv and cover the whole with straw. In this way an enormous quan may be forced at once. Five well-grown heads are an ample ply for a family at one time. The roots may also be force directed for Cardoons.

Whoever has a glass house of any kind, has opportunity to r an unlimited supply of winter vegetables. Mustard may be s on the floor; Sea-kale and Cardoons may be forced and blanched under tables, and along the flues, and Lettuce and Endive forced under the sashes.

Borecole is another vegetable for winter and spring, much esteemed wherever the winters are moderate. It is a Cabbage-like plant, but does not head like a Cabbage, nor blossom like the Cauliflower. The crown, or centre of the plant is cut out in November, and continues in use through the winter, and if well protected by branches and litter, the stump will yield an abundance of delicate shoots in the spring. In character and treatment it is like the Cabbage.

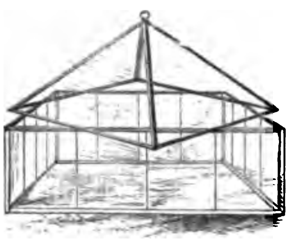
Broccoli is the last of these vegetables, not in common use, which I shall mention at present. It is used in winter and spring, when Cauliflower is not easily obtained, and the best varieties can hardly be distinguished from Cauliflower by the taste. Broccoli is grown from seed. Sow the seed in lines two feet apart, in holes two inches apart. Drop three seeds in each hole; when they come up, thin out all but the best plant. For early use, sow the first of May; for autumn, last of May; for winter, last of June.

Do not transplant unless necessary, as it induces the plant to button, *i.e.*, run up prematurely in small flower-stems and buds; as the plants grow, tread the earth hard about their roots. The first of November dig a trench through the warmest part of the garden; take up all the plants which are expected to blossom in the early spring, and plant them out against the sloping bank of earth above the trench; then cover the roots up to the lower leaves with earth. The plants will root in this position, and yet not grow much before spring. As winter comes on, cover the tops with litter, not deeply; remove it to give light and air, whenever the weather will permit. But be sure so to shelter the heads of the plants that the rain and snow will be shed off them, as otherwise they will rot.

The full-grown plants may be set in a cold pit, or preserved, as I have hitherto directed, for Celery. It is somewhat doubtful whether plants preserved in trenches would always survive the weather in this climate, as they would be deprived of light and air in the severest season, but in moderate weather their success is certain, and in the Middle or Southern States they would need no litter over their heads.

Cauliflowers may be readily protected and forced, where there is a good conservative pit, or a greenhouse. The seed should be sown in seedbeds, the middle of August. As soon as well grown, prick them out 4 inches apart, in a cold frame; when well started cool and check growth as much as possible. Cover at the approach of winter; give light and air when possible, and towards spring put on the sashes, and induce growth. When the weather allows, transplant to a warm spot, and cover with a bell-glass, like the Endive pot, except in its material.

The cut shows a still better protection. The bottom is a quadrilateral of strong glass, set in an iron sash, four panes each side. An iron rebated edge is added to the top, into which a pyramidal cover is fitted of glass, in an iron frame. This cover can be removed at pleasure. By partly turning it we may give air, without too great exposure. If planted near a wall or close fence, they may be protected by mats or covers. For late summer use they may be sown in the hotbed this month, and in the open ground early in May; they will blossom in September.



They are easy to grow, needing only rich soil and good culture; if they button, it is from poor soil or poor seed. The flower is often 9 inches in diameter, but this size is no proof of goodness; 2 or 3 inches is the best size, and the perfection of a flower is shown in its creamy color and smooth texture. When the flower has opened enough to look bunchy or warty, much of its value is gone. It should be cut just below the flower, and all but the innermost leaves removed. If an early frost threatens, cut with a long stem, and hang up, heads down, in a cool, dark shed or cellar, and they may be preserved for some time.

CHAPTER XLIX.

ORCHARD.

Lose no time in finishing pruning, as there will soon be other work to occupy the attention of the men. As you prune, be on the lookout for the eggs of insects. Caterpillar eggs of various kinds will be found glued to the forks of twigs, and canker worms to the twigs themselves. If the trees were not well manured in the fall, cart out into the orchard now an abundance of manure, and leave it in convenient piles about the field for ready use, and just as soon as the frost will allow, dig it in.

It may seem strange to my readers that I have so often directed that manure should be left in piles in the open fields, when it is one of the principles of good farming that manure should be kept under cover, to prevent the evaporation of the gases, and to avoid the washing of rain and snow. I have not enlarged on the method of making manure, as it is so generally well understood.

Manure should be mixed daily with meadow mud, sand, loam, or any similar material; this absorbs the liquid portions of the manure, and the gases, and preserves them for the use of plants. I have directed that the manure heap should at times be sprinkled with weak sulphuric acid. This acid combines with the volatile gas of ammonia, one of the most valuable constituents of the manure, and changes it into the sulphate of ammonia, which is not a volatile gas, but a salt, in a solid form, and soluble in water.

Manure which has been well mixed with loam, can be affected but little by evaporation in winter, when the cold weather reduces any possible fermentation, and in every way discourages evaporation.

It cannot be denied that rain will wash the pile, but this washing will be less in winter, for then the manure is frozen, and yields less to the washing. And if the piles are made large, the loss will be slight, as the surface only will be affected, the great mass remaining uninjured, and even this apparent loss is not total, as it will fertilize the neighboring grass.

It is true that it is better whenever it is possible, to keep the manure under cover, but generally the room is needed for other purposes, and besides, the spring work is often hurried at the last, and it is a great saving of time to have it all ready on the spot where it is to be used. There is also some land too soft to cart upon in an unfrozen state.

Canker Worms.—Towards the last of this month, if the weather is mild, and certainly in April, the canker worms will begin to come out of the ground, to ascend the trees, and lay their eggs. Now is the time to be after them, and if every farmer will carefully attend to his trees, this nuisance can be effectually destroyed, and with a combination of farmers for this purpose, the whole race of canker worms could be exterminated, and that of caterpillars reduced to a small remnant. But in every neighborhood there are always some slack or careless men, who will never unite with others for any good purpose, and their negligence results in injury to themselves and their neighbors.

The canker worm can be destroyed only by care. The male is a miller, and flies where he choses,—whilst the female crawls. The egg being laid on the twigs of a tree, hatches, and the insect eats its fill, and after a time lowers itself into the ground, where it is transformed into a male or female worm. As soon as the frost is out of the soil in the spring, or during the mild weather in October and November, they come to the surface, the females crawl, and the males fly, to the nearest tree. Up the tree they go, and on their passage the females are sought and fertilized by the male. Having ascended the tree, they lay their eggs and die. The method of their destruction is simple.

Surround the stem of the tree with some trap into which they may fall, or in which they may stick. The simplest plan is to tie tight round the but of a tree, a piece of tarred paper. Smear the paper with common coal tar, or some of the patent canker worm destroyers. They are all liquid, and a combination of tar and grease, which will remain for a long time soft in the air. The females crawl into it, and stick there. By renewing the preparation every few days during the season of their emergence, they may all be caught. Some of the eggs may not have hatched, either in the tree or on the ground, and will keep over till the next season, so that the work must be repeated every fall and spring for three years. At the end of that time the worms will be thoroughly exterminated, and it will be many years before another horde can arrive at the same place.

There are various canker worm traps, each of which has its merits, and once applied, some of them need no farther care for the season; but I should discountenance all which are bound tight round the tree for more than a few months at a time, as they will surely prevent its expansion and growth, and do serious harm. The cheap plan that I have described is harmless and efficient; more expensive and less unsightly methods may be adopted by those who prefer them.

This protection against the attacks of canker-worms and caterpillars, brings us directly to the general subject of the removal of insects and their eggs from the surface of trees.

The most common practice among gardeners and amateurs is, in the spring of each year to go round with a triangular scraper, to *curry down* all the trees in the orchard and ornamental grounds, whose rough bark seems to harbor insects. After being scraped as smooth and round as possible, the trees are covered with a wash of lime, mud, or cement, to cover the torn bark, and farther to eradicate the insects. This practice is nearly universal, and supported by very illogical reasoning.

You will remember that I have before directed that the trees and vines cultivated under glass, should be washed with soft soap, sulphur, etc., before vegetation begins, and also that some of them should sometimes be bathed in spirits of tar, to remove the eggs and the young of thrips, red spiders, etc.

This direction was given, because the eggs of all these insects are laid upon the outside of the bark, or in its crevices, and may be thus destroyed, and because the insects themselves are destructive to the trees when under glass, *but not when out of doors.*

This sound horticultural practice, together with the strength of a certain *authority*, has led to scraping and washing.

Those who have the charge of the trees on Boston Common annually scrape every Elm, and other rough-barked tree, and then plaster them. This treatment of ornamental trees seems to have originated in the false reasoning of some Boston theorist, and has spread far and wide, from the weight of the great example, among the smaller towns. The reasoning seems to be that it would not be done in Boston if it were not right; and that if it is right for Boston, it is right for every place. The conclusion would be well enough, if the premises were correct; but it is neither right for Boston trees nor any other trees, and it cannot be proved that any tree out of a fruithouse was ever benefited by such application.

This wholesale denial may seem rash to those who advocate scraping, but I believe it to be incontrovertible. The good effects of the practice in the fruithouse, have joined with a misapprehension about the meaning of a common natural phenomenon to encourage the tree-scraping. This phenomenon is the abundance of Lichens and Mosses of various kinds on all diseased trees, whether in cultivated grounds or not. These parasites being the constant accompaniments of disease in trees, have been supposed to be the cause of the disease, when in fact they are merely the consequence. It would be as reasonable to assume that the hurried pulse, and hot, red skin of scarlet fever are the cause of the disease, and to practise for their removal accordingly. They are the symptoms and consequences of the fever, which depart with it; and the same is true of the parasites, of those at least which are at all harmful. But let us take up this question methodically, and examine separately each of the supposed benefits of the scraping process. Its advocates claim that it removes from trees destructive insects and injurious parasites.

First, the insects. Many nests of eggs, and sometimes insects themselves, may be found in the rough bark of any tree in the spring, and scraping and washing would probably kill them. But examination of these eggs has proved again and again that they are the eggs and larvæ of spiders, and other insects, not known to be materially injurious to vegetation. The insects which really make the bark a screen for attacks on the tree are tree-borers and wood-wasps, which go through the bark at once into the wood, and can only be killed with a wire, as before directed, and another borer, which goes under the bark, and cannot be reached till the entire thickness of bark is removed. The woolly-aphis and bark-louse lay eggs on the bark, near the roots, and in the forks of the branches, but never accumulate in sufficient numbers to harm the tree, and certainly need not be scraped for where they do not exist. All other insects that really injure trees, such as canker-worms and caterpillars, lay their eggs on the *twigs*, and in the forks of the *small branches*, or on and under the *leaves*; in these situations it is, of course, impossible to reach them by scraping.

I do not give this more in detail, because I think it foolish to write at length about things with regard to which any candid reader may satisfy himself by a slight investigation.

The insects so injurious to trees and vines under glass, almost never attack a tree or vine in the open air, unless under some peculiar circumstances, which would not be affected by scraping and washing.

Lay it down, then, as a rule in your horticultural practice, that no tree is to be thus treated for the removal or prevention of insects.

Second, parasites. Driven from the untenable ground that scraping saves the tree from destructive insects, our opponents fall back with confidence on the assertion that no more certain means can be contrived to remove parasites.

The bark of every tree is the home of different Lichens, Mosses, Liverworts, which may be included under the name of parasites, and, moreover, different trees support different and peculiar species, which as surely mark the variety of tree as do the fruit and flower. Now what is the value of the bark to the tree?

We have already settled that the inside bark alone is actively engaged in supporting the tree, that the outside bark is dead and almost entirely disconnected with the inner and sap-transmitting layer; that it grows thicker as the tree grows older, till in some trees, like the Cork Oak, White Oak, Shell-bark Hickory, it becomes so useless as to be thrown off by the action of the elements, in strips and fragments of various sizes. The innumerable parasites which live upon the bark, are all nourished by roots of some kind, — whether real roots or a root surface to the under side of the frond, — but of all the multitude only a very small number ever penetrate — by roots or otherwise — to the inner and living sap-bark, and none of these are found to injure healthy trees, on which they never largely spread. The only parasites which penetrate to the inner bark (like the *usnea barbata*) make their appearance on trees that have begun to deteriorate, and as the tree grows more unhealthy, they increase in number. They are the hasty pulse and red skin of the fever patient. Will it cure the sick tree to scrape them off?

The currying process, then, is inefficient as regards the removal or prevention of destructive insects, and there is no need of it to remove parasites. It does no good. Let us see whether it does no harm.

The outer bark serves a useful purpose to the tree, though it carries no sap which the parasite can intercept and appropriate; it is a clothing for protection against heat and cold, both to those trees on which it grows rough and loose, and to those where it becomes closer, harder, more condensed with each successive season, as is the case with the Smooth-barked Hickories, the Maples, and Lindens. The rough bark is like the wool of sheep, the smoother, denser bark, like the skin of men. If any farther illustration is needed, it may be found in the fabrics we select for our winter clothing, thick, non-conducting materials. This half-dead, outer bark protects the inner bark and wood against heat and cold; prevents the early spring sun from overheating them; protects the sap that has begun to stir from the night frost, which would freeze it, and so burst the sap vessels; and is equally and for the same reason useful in the fall.

Now scrape a tree all over, reducing the thickness of the bark appreciably, and just so much do you reduce its clothing, nature's shield, just so much do you expose the tree to injury.

Again, this outer bark is a protection against excessive evaporation. We have already considered the pores by which leaves absorb and exhale moisture. In a similar way young or tender bark takes in or gives out moisture, the degree differing with local circumstances and the habits of the plant. The Sunflower, and all plants which grow in constantly wet places, evaporate largely through their skin and bark, and the microscope shows that they do this by means of the breathing pores of which the outer layer or epidermis of their skin is full. The Cactus, and other plants which grow where there are alternate floods and droughts, have very few of these breathing pores in their epidermis; they evaporate but slowly. To use a common phrase, their outer bark or skin is close grained, that of the former class loose grained.

The same difference is found in the outer bark of the young and old plants of any species, to correspond to the activity of evaporation (as of all other processes) in early life, and its gradual diminution, and to the increase of leaves.

Obviously it is not intended by nature that there should be much evaporation from the bark of trees. Their inner bark is of open texture, and will evaporate freely if exposed; so it is covered by a layer which evaporates almost nothing. Trees transplanted from the deep forest, even if they have an abundance of roots and the best care, into the open land, are very liable to die, and the few that live are years in getting strength, and making any appreciable growth. These trees are in all respects like those grown in open land, excepting that having been protected by the surrounding forest, they have never needed to acquire that closeness — or thickness — and hardness of outer bark which alone can defend a tree in the open land against heat and cold, drying wind and sun. The forest tree, never visited by searching winds and scorching sun, evaporates more of its waste moisture through the bark than the tree in the field; it must, for it needs to perspire more than it can do through its somewhat scanty leaves, bathed in the moist forest air; accordingly the pores of its bark are adjusted and used for perspiration. When this tree is removed to open land, where the air is dry, the sun hot, the wind free, it evaporates too much through its bark, and must make a new bark to meet the emergency.

A tree whose protecting bark has been scraped off, so that its tender inner bark is exposed, will evaporate moisture like the transplanted forest tree, and its consequent suffering will be in proportion to the extent of the scraping.

To the scraping succeeds the wash, sometimes of mud, with no particular character, and doing no harm except by its disgusting unsightliness; sometimes of alkalies. Dip your hand in a vessel of lime or potash water! Even if you remove it at once it feels slippery; the alkali has eaten away some of it, turned it into soap. Keep it there long enough, and it will be reduced to soft soap. Substitute for your hand a piece of wood; it will soon be rotted.

The advocates of scraping, not content with cutting off a large part of the bark, which nature provides, follow with an alkaline wash, to rot more; they say that this wash is to neutralize the acids in the bark, which nourish parasites. What did nature put the acid there for? To be removed by men? If so, why are not the trees in woods and forests, in places unvisited by men, destitute of acids, as they cannot be relieved of them, and must, therefore, be predestined to ruin? How foolish such a theory! As we have seen, parasites do no harm, and we have no excuse for robbing them of their food.

Lichens and Moss a Benefit. — So much for the harm done to the tree by this process, for the loss which may result to your pocket. Another loss is certain to result, that of the exquisite beauty which dwells in the parasites.

Not even the leaves, or the tracery of the branches, or the grand simplicity of the stems contribute more to the beauty of the tree, than these parasites, by their color and form.

Visit the noblest trees you know, and carefully examine them in detail, to determine the elements of their beauty, which combined give the tree its general effect and charm, form and color; color of leaves, of wood, of bark; color not merely positive and single, the same at all times, but changing, varying, sometimes brilliant, sometimes dull, but always harmonious and attractive. When flooded with sunlight, the local color of bark and parasites is lost in general light and shade. Then the irregular cracks and crevices in the bark, the roughness and variety of surface, seem the charm

VIEW OF THE HUDSON RIVER AND CATSKILL MTS., FROM HYDE PARK

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... the same stem seems ...
... The ... of one kind of Lichen ...
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Lichen ...
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... may study them best on ...
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... with Ferns; ...
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... as well one as the other ... and ...
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... if all ... and
... why do men spend time and money
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of the stem, and make themselves felt. On a cloudy day, or after a rain, the same stem seems ablaze with a color and beauty of its own. The grays of one kind of Lichen are but a background to set forth and relieve the purples, yellows, and oranges of others; the variety and subtle shading of color bewitch the eye. It seems in one spot, or on one side, as if the sun were shining, or rather as if the Lichen were gazing like the moon on the sun, which is veiled from us, and reproducing for us his glory. This color is no definite and definable thing, which may be seen and appreciated by all alike; to catch its full charm one needs a discerning and cultivated eye, and the more that eye is exercised, the finer our sense of color becomes, the greater our admiration and love for its exquisite beauty, until we are so lost in it as to be in danger of merging the greater in the less, worshipping the beauty of color, to the exclusion of the other charms of the tree. This love grows with exercise, and new fields of pleasure open before it, till those who indulge it really see colors in the clouds, the air, the earth, in the Mosses, Lichens, and leaves, unseen and unimagined by the common crowd. They never walk alone or unoccupied, they have sunlight in the cloudiest day, and the common sunlight has for them more than a common glory.

The forms of this class of vegetation are as varied and bewitching as its colors. You may study them best on a rock covered — as rocks often are — with Lichens, starred with Liverworts, fringed with Mosses, and garlanded with Ferns; it will give you hours of delight, and put you to the blush for having been so long ignorant of, or dead to, their value and charms.

Scrape a tree or a rock (as well one as the other), and you ruthlessly remove all this beauty, and despise and ruin that which the Creator delighted to honor, without getting even the poor satisfaction of a money return. We are the worst of iconoclasts; we destroy all this beauty upon the mere suspicion that it is injurious, and we rudely trample under our feet that which was provided to feed and develop our minds.

The question then naturally arises, if all natural analogies and facts are against this practice, why do men spend time and money upon it? Do no benefits arise?

The argument that "what is sauce for the goose, is sauce for the gander," is at the bottom of this mistake, leading to the application to ornamental trees, of the processes that have been *thought* beneficial to fruit trees, forgetting the fact that the finest specimens of ornamental trees are those discovered by explorers in places before unvisited, the spontaneous growth of unscraped, unwashed nature.

But what is the fact with regard to fruit trees? Has even this argument, poor as it is, any ground to start from?

I maintain that no diseased tree of any kind, has ever been bettered by mere scraping and washing. The first thing that a wise horticulturist does to such a tree, is to prune it, cutting out carefully, all decayed and worthless wood; next, he digs about it, and manures it.

The pruning, especially if he cuts off the top of the tree as well as the dead branches, will give the remaining wood all the sap that before feebly nourished the whole, and, accordingly, the roots become invigorated, the branches start with a new growth, larger and healthy leaves burst out, which in turn, make the sap better, and develop new roots, the tree grows and flourishes, and, no longer affording food to those parasites that fed on its decay, they gradually fall away, together with its old, rough bark. The digging and manuring hasten this process, and a horticultural victory is achieved. And this, without the labor and expense of scraping, and with no risk of injury to the delicate inner bark, by exposing it to sun and wind and frost.

In conclusion, let me recapitulate: —

1st, *Insects.* — No insects which harbor in the outer bark of trees, and can be removed by scraping and washing, are really injurious to the tree. All injurious insects either go below the bark, and into the wood, or are hatched from eggs laid on the twigs and small branches.

2d, *Parasites.* — No parasite, injurious to the tree, will fix upon it, unless it has become enfeebled by age or disease, and the tree cannot be cured by their violent removal. All other parasites are put on the bark by nature, to make it more beautiful, and it is a violation of the laws of good taste to remove them.

3d. — No tree has ever been with certainty benefited by scraping and washing, and it is an expensive process, and likely to injure the tree by exposing the delicate inner bark.

4th. — Any practice in horticulture, or agriculture, which violates nature's laws, without undeniable advantage, is bad gardening, and bad farming, and a discredit to those who practise it.

The month of March is so near the growing season, that the demands of the orchard for the year to come must be well considered. We have on our place no new orcharding to plant, no trees to replace, as our orchards are all young or in their prime, but were we about making a new plantation, too much care and attention could hardly be paid, at this season, to a careful selection of the best kinds of trees. If you are planning the cultivation of fruit, remember the point continually urged; it is not so much the quantity of fruit that is to be sought, as its quality; its size, color, delicacy of flavor. Grow those fruits which will ripen at such times as the market is generally bare of fruit. Every neighborhood is overstocked with fruit in the late summer and early autumn, and consequently such fruit is of small value, and much of it really does not pay for its raising.

Winter apples come into the same category; the large profits of the earliest orchards induced the planting of many more, until they have become so common, that in good Apple years they are hardly profitable.

I do not mean to discourage the planting of orchards, but only to point out the necessity of a judicious selection of fruit. Those Apples which keep late will always command better prices than others, and of course the same is true of the earliest ones.

There are other kinds of fruit culture much more profitable than that of Apples. I mean the Peach and the Pear. It is true that in New England the Peach-tree has deteriorated very much of late years, and it is thought by many that it is not worth while to cultivate it; but a little observation, as we have before seen, of the causes of their degeneration, may show how it may be prevented.

In the first place, many cultivators have been too grasping, and have grown grass in their Peach-orchards, which has of course drawn off nourishment from the trees.

Secondly, they have left them unpruned, and allowed them to remain unchecked, except by the frost, so that the unripened wood has staid on the tree, weakening it the next year, and injuring the new wood and the fruit.

Thirdly, they have let the tree bear as much fruit as it would, and this always renders it small and imperfect.

In the neighborhood of Boston, however, persons who have Peach-orchards of well-selected varieties, and well taken care of, have for several years past made a profit of several hundred dollars an acre, without any extra expense.

Pears, however, offer a more certain return than Peaches, as the latter are often injured by late frosts in the spring. There is a great variety of Pears, but few kinds are really valuable, and the value of these varies very much with latitude and longitude.

As we have said before, the latest fruit is most certainly remunerative. Common Iron Pears, which grow abundantly in hedge-rows, are as valuable in the spring as the most delicate kinds in summer and autumn. But there are better winter Pears than the Iron, as for instance, the Easter Buerre, which is fit for the table in March, when it sells for very great prices.

The great profit from the growth of Pears, arises not only from their large price, but from the abundant production of fruit to the acre. Alternating two dwarfs with one standard, in the row, the trees being 12 feet apart, the standards will be 36 feet from each other. Then place the rows 20 feet apart, and set the trees so that the standards of the second row will each come opposite the middle of the space between the standards of the first row, and of course the middle of the space between two dwarfs, and so on. This arrangement will allow 221 trees to the acre, and of these, one-third will be standards.

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These trees ought always to yield, after well growing, at least two dozen Pears to the tree, which will never be worth less than 50 cents a dozen, and often one or two dollars. At the lowest price, the fruit will bring $221. This ought to be the receipts within four years of their setting out. Apples will not bear two barrels per tree, worth $1 net a barrel, for ten or fifteen years.

But if the trees are planted in the improperly called Quincunx manner, as shown on page 107 of Thos. W. Field's Pear Culture, and 10 feet apart in the rows, and the rows 10 feet apart, not less than 473 trees can be easily, properly and profitably grown to the acre; 8 feet apart as I have said, will suffice in rich land for Pears on the Quince stock, and 12 feet is enough for all kinds. Pears demand, as a *siné quà non*, a deep, friable, rich, well-drained soil, and constant care and culture, when they will certainly pay the cultivator large profits.

Some may doubt whether this culture is as profitable as I say, because it is not more general. It is in this as in all new enterprises; the timidly conservative, the lazy and procrastinating, and the self-complacently shrewd have not embarked; these last, with preternatural sagacity, predict that the thing will be overdone and the market overstocked, forgetting as they peer into the millstone, that population increases quite as fast as fruit. But the thing has been tried by many, and its success demonstrated, and my statement is founded on their experience.

Pears will often bear much more than this calculation allows, and may be much more closely planted, and in the course of 10 or 15 years the standards will grow two or three bushels of Pears apiece, worth from three to twelve dollars a bushel according to the fruit.

The selection of Pears to suit any given soil, is rather a difficult matter; it is a singular kind of fruit, and often a man's land will bring but one or two kinds to perfection, in which case he should devote himself exclusively to these, and give them a name and reputation.

Other kinds of fruit-culture, as Grapes, Cranberries, etc., might be recommended, but I leave the consideration of them to another time.

I wish especially to impress upon the farmer, that the early spring is the unoccupied time, when he should decide on the kind of fruit that he will cultivate, that when the season for work comes he may proceed with judgment and dispatch.

Towards the last of March begin to graft, and continue through April. Scions cut after the buds begin to swell will not do well.

CHAPTER L.

THE FARM.

Few persons can understand the immense importance of the farming interest. The dullest mind is impressed with the cost and value of manufactories, of ships, and warehouses; no one goes into a large city without wondering at the variety of occupations, the number of inhabitants, and asking how they all live; and yet, in comparison with the agricultural interest, all other trades and occupations are a drop in the bucket. To the farmers fall the duty of feeding the world, and although floods of fine words are poured out yearly by the orators of agricultural societies, and by aspiring politicians, in praise of this occupation, few persons ever rise to the comprehension of its real magnitude.

The value of the eggs of the domestic fowls of this country alone is from $30,000,000 to $40,000,000, and the value of the Grass crop is greater than that of any other crop, being worth, in the shape of hay, to live and slaughtered animals, $500,000,000. Small as may be the contribution of each person, to this aggregate, it is a contribution, and would be missed in some way, were it to fail. The connection of supply and demand is very plain, and since the demand of food to support life is so constant, and great, it is of immense importance that no means should be left untried, to increase the amount and quality of the crop, without materially increasing its cost. To illustrate the waste and loss, which may result from the want or the neglect of such improvements, take the single item of horned cattle.

Suppose a certain number of farmers in this country, to grow yearly, 100,000 cattle for fattening. These cattle are ill-selected in some respects; instead of the small bones, and little offal, of the Short-horns, or the Devon stock, they have coarse bones and unnecessary-waste portions to the extent of 50 pounds, to put it at a figure small enough; the average value per pound, of the animals' carcases, we will call six cents; then the loss, per animal, is $3, or $300,000 on the whole number. We have seen that there is no need of this coarseness; care in selection when breeding would have avoided it. But this $300,000 is not the only loss. The coarser in nature, structure, bones, an animal, the more food he requires to gain a given weight. The greater amount of food necessary to fatten these coarse animals, than if they were fine, was not less than $2 an animal, or $200,000 more. A common stock farmer will have 50 head of cattle at a time, and, for the 100,000 cattle, 2,000 farmers thus lost $250 dollars apiece, $5 a head on their animals. This calculation is much too small, for almost every New England stock farmer knows that his cattle have much more than 50 pounds of unnecessary waste, which does not exist in the choicest cattle. But it shows how important small things are to the farmer, and also, how exact a science farming is, giving as much opportunity for head work, as for hand work; and, when we consider the great aggregate of agricultural products, it becomes apparent how large gains slip through their hands.

It may seem of little consequence whether the profits of a man, who cultivates his farm with no thought of any thing outside its boundaries, are great or small; but this is a mistake, and is felt to be one, where farming is acknowledged as one of the sciences. As our agriculture advances, we feel the value of small gains more strongly. While our stock roams over large pastures, and our hay crop is too large to be consumed, or sold, we care but little about a few pounds of waste in any animal, but just as soon as we begin to feed our stock on purchased provisions, and to be restricted in our range of profit to the difference between the cost of food and the market price of the fattened animal, the disadvantage of coarseness in limb and material is forced upon us, and we seek to avoid it.

STALL FEEDING.—The second kind of stock farming is characterized by stall feeding the animals to be fattened; in it, pasturage is of little consequence, as the animal is but rarely turned out, and only for air and exercise. It is because of the rude state of our general agriculture, that stall-feeding is so little practised among us.

Among farmers determined to get the largest possible return from their land, it will always be practised. I do not mean to say that our common farmers have no stall-fed cattle, for almost every one of them has some pair of oxen, some old cow, some calf which is fed on Roots, Hay, Meal, etc., through the winter, to increase its weight; but there is no general practise of this sort, it being considered unprofitable.

This second kind of stock farming will prevail most in level, alluvial countries, where land is too valuable to be given up to pasture. The crops of such a farm will be decided by the kind of stock kept. Sheep of all ages may be grown on it, both for wool and mutton, as the sheep fats at 18 months to 2 or 3 years of age, and the food eaten by the young animal is no loss. But if it is to fatten neat cattle, there will be no young creatures; those which have been grown in a pasture country, and have reached the best age to fatten, will be bought, and the process hurried forward as fast as possible. *The kind of stock, decides the food, the food the crop, and thus the whole arrangement of the farm depends directly on the stock.*

It seems almost impossible to our country farmers that there can be any profit in fattening cattle, unless most of the fat is acquired in pastures, thus costing nothing, as they think; and yet the best experience has shown that the profit of fattening falls to the stall-feeding farmer much more than to the pasture-feeding farmer.

Let us take a single animal as our example, and ascertain what is the proper treatment for it, and then we may conclusively reason for a number.

Our farmer in the fall buys an ox; if he be shrewd, he will select one in good condition, and growing, because an animal never lays fat on the outside, where it shows, till there is some accumulation within, so that good condition externally is a proof of the same internally. But there are other marks which he regards in making his selection; he feels the hide, taking it up in his fingers; if it slides easily over the bones, is pliable, he knows that the creature is inclined to fat; he looks at its eyes, for if they are mild and gentle, the creature will be quiet and make fat faster. He rejects every animal with large bones, coarse hair, general unwieldiness, as he knows these indicate an internal structure that must be supported, but is worth little. Besides these marks, there are others which he cannot describe, but knows to be important.

Having bought his beast, he drives it slowly home. I assume that this man is a wise and growing farmer. He begins to feed with Hay, like his neighbors, and finding no gain in this, he adds some Meal. He calculates the weight and value of the Hay and Meal, and the cost of care. He weighs the creature occasionally, to see exactly what he gains. Dissatisfied with the experiment, which he finds, as his neighbors prophesied, a costly one, he turns to the books. They tell him that oil meal, rape-cake, and other food, have been found equal to or better than corn meal, for fattening, and cheaper; he accordingly tries it, feeds as before, and weighs his animal, noting the gain or loss.

As he reads farther, he finds that Turnips and other Roots are excellent aids to meal; he draws upon his stock of Roots, and feeds, noticing the gain as before. Further inquiry informs him that the Turnips boiled with the Meal, have been found by some more fattening than when raw. Again he tries the experiment, continuing to weigh and notice the result, charging as before, the cost of Meal, Hay, Turnips, interest on cost of animal and tools, wear and tear, labor and fuel. From time to time he compares his records with those of others; he learns that warmth is beneficial as well in building as in food, and so by degrees he learns the best and cheapest food for fattening. Whether the result of his experiments is like that of the English and European experiments or not, he makes note of it.

When the animal is fattened, he sells it, and then makes up his final account of profit and loss. In whatever way the balance turns, he knows that his experiments have cost him something, so to make quite sure he begins anew. This time he is careful to buy animals of small bones and little waste; he puts them into the stall, and feeds by that plan which his experience has decided to be the best, and if any prophecy may be founded on the facts of universal experience, he will gain a fair profit by the operation, and this profit will have arisen from abandoning the exclusive use of Hay and Corn, according to the common country practice, and by the use of other kinds of food. And in addition to this pecuniary profit, he gets a great deal of very valuable and highly enriched manure.

The results of such experiments as this in England have had a great influence in revolutionizing agriculture. From the fact that animals fattened faster when fed on Turnips and other Roots, in addition to Meal and Hay, than when kept on Meal and Hay alone, and that the process was hastened still more when the Roots were given as the main food, and Meal and Hay in less proportion; attention was turned to the general culture of Roots, and they were found to yield enormously, in comparison to the amount of land occupied, and the cost of production. This crop then furnished the greatest amount of food for stock, which returned a manure richer than that resulting from Hay-feeding, to be the food for future crops.

It also appeared that Root crops made the land better in the cheapest way, and their culture soon took the place of the clumsy method by which exhausted land had formerly been brought again into bearing.

However fertile land may be, however much it may be improved by draining and irrigation, constant cropping will reduce its fertility, till at last it is not worth cultivating, and no crop does this sooner than Grain. But Grain, together with the products of flocks and herds, which fed on the natural pasture of the farm, was the main reliance of the farmers of the old style; and of this they could take but a few crops before their land was exhausted. To restore it, they resorted to what is called a "bare fallow," that is, the field was left uncultivated for awhile, to be slowly fertilized by sun, wind, and rain. If during this "bare fallow" the ground was kept clear of weeds and frequently ploughed, it gained enough to grow another Corn, or "white crop," as it is usually called. The fallow system was improved by the aid of manuring, which, of course, hastened the process of restoring fertility.

Farmers were early aware that this impoverishment of land, where one crop had been grown for successive years, was because its supply of the peculiar food of those crops was exhausted, and that it could be enriched again only by cultivating it with some other crop, or by the naked fallow. It seems the simplest way, to cultivate a crop which would not require the same food as the previous crop, but could thrive on some of the materials still left in the soil; and it may seem incredible to us that men should so long have groped on the threshold of the discovery of this principle, the full application of which has wrought so marvellous a change in agriculture; but the proper practice of the rotation of crops has not been introduced into our country, and we are now where the farmers of the "bare fallow" period were in England.

To return: at that time Roots were cultivated only for family use or for occasional sale, never for fodder crops; Grass and Grain were the crops of that day. The wastefulness of this course will appear more plainly, if we consider for a moment the difference between the demand and the return of different crops. The production of seed, is the aim of the life of all plants, and is accomplished either directly, as in the Grain crop, or indirectly, by storing partially elaborated material in some convenient place, to be completed and ripened as seed in another year, as in the case of Turnips, etc.

Now the Grain draws on the soil more largely than the Turnip, for two reasons: it has less time in which to do its work, for it must prepare the ripe seed (which may be regarded as the concentrated extract of the plant) in a single year; and it has but little means of drawing from any source except the soil. Its slender stem and narrow leaves are not adapted to absorb much nourishment from the air; it must be fed through the root, and impoverishes the soil proportionately. But the Turnip, which lays up a store in the root, has twice as long to prepare its seed, and can go through the slower process of obtaining a large amount of its food from the air. Accordingly it is furnished with the means for doing this, as may be seen in any Root plant, or in other plants with a similar plan of growth. The surface of leaves exposed to the air is large, compared with the roots, and experiment has repeatedly demonstrated that they draw on the atmosphere much more largely than on the earth.

This difference in the demands of the Root and Grain crops points them out as fit successors to each other, and this grows plainer the more we consider the difference between the food necessary to elaborate seed, and that capable of giving the largest bulk of leaves and roots. Could farmers ever be induced to consider their crops in this abstract way, they would save trouble, time, and expense.

This great principle of rotation of crops was dimly recognized in the substitution of Grass for Grain on the exhausted fields, and in due time of a fallow for the Grass; but in this way there was great loss of time and acreage. So long as farmers believe that Hay and Grain alone are sufficient to produce good beef and mutton, so long they are indifferent to the difference between the Root and Grain crops, for it is wasteful to grow crops for which one has no use, merely because the land will produce them. But when it was discovered that Roots of all kinds were not only good food, but the best food for cattle, those farmers who believed in the discovery cultivated Roots, and found not only that their value as food was incontestible, but that with a given expenditure in manure and labor, Roots gave a larger return in value than any other crop. This was the turning-point, the rising tide-wave of improved agriculture. The new crop was an improvement in every respect; it restored fertility better than the fallow, gave an immense amount of fodder, and ensured a corresponding increase in manure, from the greater number of cattle which could be fed from the farm.

Under the old system — the same pursued in New England at the present day — there was a large and a small white crop, one large yield of Hay, then smaller and smaller, then good pasture, then poor. This rotation gave a change from better to worse. The new practice demonstrated that there need be no "worse;" it showed that a Root crop should fallow the sod, and should be followed by Grain; that again by Grain, or Grass and Clover; that by pasture and Roots. At first it was made a point that a white crop should never be taken two years in succession, and after going through Roots and Grass, it was found, on returning to the white crop, that the ground was so much richer than before, that a number of bushels was taken previously unheard of in the neighborhood. A succession of rotations had the same result, until the poorest land has become rich; some land too rich, and it has at last been necessary to take two white crops in succession, to check the waste power of the soil, which produced so heavy a burden of straw that the grain suffered.

Do not think that the mere introduction of Roots effected this wonder of converting worthless into fertile lands. Draining and irrigating were used to improve and stimulate; as the process went on, it was found that the stock did not give manure enough to satisfy the farmer; other manure was sought and found in guano, and in artificial manure. Oil meal, and similar food, before mentioned, was resorted to to supply certain elements which were wanting in Turnips. Cattle no longer roamed over meagre land, but if pastured at all, fed on rich Clover or Grass aftermath, and being soon filled, lay down to digest in quiet, and so got more nourishment from their food.

The farmer did not care to grow the cattle in their young and unprofitable years, but bought them at a fair price from hill pastures, just as they reached the age for fattening. The pasture farmer in his turn studied to increase the size and rapidity of growth of his young cattle, that they might the sooner be ready for market, and might bring the highest price. And thus a wheel was set in motion, which touched all the agricultural interests; the more crops, the more labor; the more labor the more outlay of capital; and this led to the invention of labor-saving machines, which again gave the farmer power to grow greater crops. It is not at all necessary to enlarge on these mutual relations and their progress; it is enough to put you in the way to see how largely the agriculture of another country has been benefited by the intelligent introduction of what is called rotation of crops.

Here I shall be met by the assertion, with which the indifferent or obstinate American farmer, answers all arguments drawn from the rise and progress of British agriculture; viz., that the cost of labor here, forbids the cultivation of the more troublesome crops. Let the cost of labor be what it may, there is no truth in this assertion. The question is not of the *cost*, but of the *net profit;* and the most costly crop may yet be the most profitable. In truth, it is not to the cost, but to the *trouble*, that these farmers object. Crops which require much labor and watching, do not suit the happy-go-lucky man, whose method of getting a fair crop of grain from unexhausted land is very simple. He cuts off and burns the wood, ploughs rudely, and harrows in the seed, leaving the stumps standing, the water-courses undrained, the rocks unremoved; he gives the crop no further attention, till it is fit to cut. Year after year this process is repeated, till the land refuses to yield enough to pay for the labor; then a scanty dressing of manure is given, or perhaps some rude attempts at drainage are made, or the plough runs deeper, and the land is held a little longer under cultivation.

Our New England farmers are wont to deride the practice of the men who have reduced Virginia, Western New York, and other States, from unbounded fertility to sterility, or something scarcely better, by bad and exhausting farming; yet our average farming differs from this only in degree, not in kind.

It is not enough to do a little better than you have done; if you are to be the *best farmer*, you must entirely remodel and reform your practice. To cultivate an acre of ground thoroughly is a costly process, and demands a liberal outlay of time and money.

If it is wet, it must be drained, and poor draining is exceedingly foolish. The cost of digging the drain is the same, whether it is to be laid with tiles or stones; and this main expense is out of all proportion to any difference between the cost of these two materials, and must, besides, be incurred anew whenever any repairs are made. A tile drain will last from 60 to 100 years, a covered stone drain will last equally long, a blind drain but a few years, a brush drain a still shorter time, and an open drain is always out of order. Besides the ultimate loss of the cost of the open drain, which is to be met when they are remade at the end of about 15 years, is the loss of land for culture where they are. When properly made they occupy about one-eleventh of the acre, so that if the crop is Hay, assuming the net value to be $12 for the growth of 2 tons to the acre, they will displace $1.09 worth of hay, which in the 15 years at interest, with annual loss, would equal $25.18. The cost of the drains would be at least $48.20, which with repairs and interest in 15 years, would be $196.48 per acre, and at that time might be reckoned as a loss, as they would have to be remade.

If, instead of this open drain, you lay a tile drain, it will cost to complete the work, about $50 per acre, which in 15 years will amount to $126.24. At the end of 15 years the drains are as good as at first, and in comparison with the open drain, there is an absolute profit of $126.24 to begin again with. In 15 years more this profit, aside from that of culture, will amount to $317.69, and if 10 acres are reclaimed instead of 1, this profit in 10 years will be $3,176.90, merely by the substitution of the better drain, while the profit of the culture is yet to be estimated.

This calculation has been based on the largest cost of the drain, and the lowest price of Hay. The drain can be well laid for much less, and the price of Hay rarely goes down so low in New England. But there are many better crops than Hay, — Corn, Wheat, Rye, or better still, Roots. It would be easy to grow upon land thus drained, crops which would not otherwise have grown on it at all, and which will pay at least $10 extra profit; which would be 60 per cent on the cost of the improvement, or in 15 years with interest $936.48. An enormous sum, certainly, as the return from a single acre improved; and this is no romantic theory, but so plain a fact in business, that the English Government have established a large fund to be loaned at low interest, to land-owners, to enable and induce them to make improvements in drainage. Many farmers borrowed thousands of dollars from this fund, and gained an ample return.

Indeed, one reason why our farmers are so far behind the times in these matters, is, that they are without the capital sufficient to make these improvements, or, at least, they think they are; for they cannot spare the few hundreds that they "lay up" in bank stock, or mortgage bonds, that give them 6 per cent, and do not see that the same money invested in their farms, would pay ten times as much, and even more; for this $50 cost is mostly for labor, which may, in many cases, be done by the farmer himself.

Farmers cannot believe, when they see a drain full of water, that a little two inch hole, with or without loose stones, could carry that all off. The outlet is the important thing; give a drain fall enough, and 2 inches will discharge an enormous quantity of water in a day. And by cutting the drain 3 or 4 feet deep, the springs can be cut off, and the subterranean waters stopped and carried off before they get to the surface. Such drainage would double the value of thousands of acres in New England, which are now but half cultivated, because they are too wet in spring and fall.

There is an argument against making valuable permanent improvements, which has great weight with farmers, and is even quoted by those who have considerable intelligence, as being conclusive; viz., that for the sum necessary to thoroughly drain an acre, one can buy another acre as good as the first. So he can, and be just one acre poorer than before.

You farm to grow rich; by buying more land you grow poor. In the case of the two acres, you must pay taxes on both, you must manure both; you must plough and plant, hoe and harvest, two acres instead of one. To plough 10 inches deep will cost, per acre, $3, beside wear and tear of tools, say 25 cents ($3.25); to sow with Corn, at least 50 cents ($3.75); to hoe twice, $2 ($5.75); to cultivate, $2 ($7.75); to thoroughly manure with barnyard manure, $20 per acre ($27.75); to harvest, $4 ($31.75), or more according to the crop; making together, an expense of not less than $33 per acre. Allowing $20 profit per acre, there would be from the two acres, a profit of $40, or $33 less than from the one reclaimed acre, which, paying the cost of cultivation, would yield $40 profit per acre. It may seem unfair that I should allow $40 as the profit of a well-drained acre, and only $20 as the profit for the unimproved acre purchased. A moment's thought will show that it is not unfair; the very fact of having drained a field well, will induce you to cultivate it twice as well,—indeed, it implies some accessories of good culture. The stones used to fill in the drain ditch, are gathered from the surface of the field, much to its improvement; and, what is a more conclusive argument, if the unimproved acre can yield $40 net profit, it cannot be bought for $71. Thus there will be the difference between $40 and $7, or in 15 years, as before, the sum of $730.81.

There will be another benefit from thoroughly cultivating what we have; if we apply thorough drainage, etc., to an acre of our unproductive pasture, we can put the whole $40 into our pocket, beside raising the value of the property we now have, in place of increasing our barren acres. The drawback to profit in agriculture is the cost of culture, and this is undeniably halved by confining ourselves to the one acre.

The draining lightens and deepens the soil; the manure from above, is met by the accumulated manure from below; the roots of the crop are fed in the warm earth and manure above, during the first of the season, and are cooled, fed, and stimulated, by the subsoil in hot, dry summer, and early autumn. Unquestionably, we shall need but half the manure necessary for two acres; we can keep fewer men, do the work quicker, be less exposed to the danger of early and late frosts, have less care and anxiety.

But, as I have said, this is but the beginning of good culture. In our anxiety to get the most from our one acre, we shall plough deep. The value of deep ploughing is almost self-evident; plants accustomed to find their food in six inches of earth, and to live or starve, as that food was sufficient, or insufficient, because an impassable barrier met them at that depth, now have twelve inches in which to find food, — the accumulated food of ages; and you have thus added another acre of land six inches deep, to your farm, and so situated that the plants cannot fail to get the full benefit of it.

Next comes sowing the seed. Be it what it may, enough is better than too much; first, it costs less; second, it is more quickly sowed; third, it needs less thinning when up; fourth, it is more easily kept clean. To sow the seed of Turnips, or other Roots, by hand, is a long and tedious process, and wastes much time and seed, but with a seed-sower, a man will sow several acres a day. I will not, therefore, charge the improved acre with the cost and interest on the cost of the seed-sower; both will be saved in two crops.

Suppose that instead of such small seed, you plant Indian Corn, or smaller Grain.

Indian Corn may be rapidly deposited from some of the new corn-sowers, at just the same distance from hill to hill, with the same number of corns in each hill, and all the rows straight, at a large saving of seed and time, more than enough to pay the cost of the sower in one season's culture. How long it would be necessary to talk to New England farmers, to satisfy them that all small

Grains are vastly more economically sowed by the use of grain-drills, whilst the yield is increased, I do not know; but in England the drill has been used by the most intelligent farmers, who find a saving of from 1 to 2 pecks of seed to the acre (50 cents to $1), and from 50 to 150 per cent in the cost of sowing. The seed is all evenly sowed, and therefore comes up quicker, and loses less from birds, that are ready to pick up badly covered grains; the plants grow better from all having the same room; all the heads fill out alike, from abundance of air and light, and a fair share of soil; and lastly, and chiefly, the field can be *weeded.* How horror-stricken would our farmers be, if asked to weed a wheatfield?

I do not say, that with the price of labor here, we could make much money by weeding Wheat by hand, although in England, at the cost of 1 to 2 dollars per acre, a gain of 2 to 3 bushels of Wheat, has been made; or $4 to $6 by weeding; and when weeded by horse-hoes, at a cost of 75 cents to $1 per acre, the same gain is made. Weeding has the advantage of removing all the weeds, which exhaust the soil in proportion to their number; it stirs the earth, and gives the roots a better chance to push, and induces the Wheat to tiller, or produce more stalks, and consequently more heads and more straw. And it removes the weeds for all time, helping to bring the land to a condition of perfect cleanliness. Under this method seed is sown 7 to 9 inches apart, and yet the yield per acre is equal to and greater than the yield under the system of sowing broadcast, and covering all the land. So far has this been carried, that in special experiments, and in the general practice of some farmers, it has been shown that by throwing a field into ridges 3 feet wide, and 3 feet apart, and sowing only the alternate ridges, and cultivating with care and cleanliness, the yield is as great in the average as when drilled 7 to 9 inches apart, or sown broadcast.

But some Western farmer will say: "'Tis all very well to cultivate an acre of Wheat this way; it could not be done in my fields of 200 or 300 acres." One English gentleman, whom I propose to refer to presently, has 500 acres of Wheat, which are sowed by drill and weeded, and he, as I shall show you, has grown rich by farming.

To pass on to the Turnips. Suppose them sowed by a seed-sower, they must next be thinned. If they are in rows 2 feet to 30 inches apart, they may be cut into gaps of 12 inches, by two blows of a 6 inch, or three blows of a 4 inch hoe, and thus the single plants left; these, losing their accustomed support, will fall over, but in a day or two will recover. Practice will enable the laborer to readily single his Turnips, cutting away all but the one he wants left. Before singling begins, the rows should be scuffled, or cleaned with the horse-hoe or cultivator. Next, as the Turnips begin to grow, hoe them. The benefit of hoeing to the crop is enormous; it increases the yield some hundred bushels to the acre, and yet, strange as it may seem, it was years before the body of English farmers could be induced to grow Turnips at all, and years more before those who did grow them could be induced to hoe them. Earnest agriculturists labored till they were heart-sick, to persuade the mass of farmers to cultivate their Turnips properly, and one of them tells how for years his neighbors came and looked over the wall, and sneered at him while thus wasting his time, as they held hoeing Turnips to be. But our farmer must hoe.

I have rudely blocked out the treatment of the improved acre in the common crops. Thus cultivated for successive years, with a judicious use of the crops, it will make the farmer rich. The practice is the same for many acres as for one, and to perfect success in either, a careful system of rotation of crops is necessary. Irrigation may also be necessary, but it has been sufficiently advocated on in a previous month.

Our model farmer in New England will therefore grow rich if he perseveres, for the ratio of profit when the crop is harvested is the same, whether here or in England. Farmers who do not like to confess their unwillingness to adopt improvements, fall back upon the high price of labor, as an excuse for not growing Root crops. This is the weakest of reasons. Labor and watchfulness and judicious rotation of crops are the things necessary to success in all cases; and in all countries where the same object is sought, the means must be similar. If to grow a fat ox be the aim of two farmers, with one of whom labor is cheap, with the other dear, there is no difference in their desire for profit; each wishes the largest possible. Each wished to feed his ox on the most fattening food; which has been ascertained to be both Grain and Roots. Now, what is the relative cost of producing each of these crops? In view of the ultimate value of each, Grain is the more costly of the two; Turnips give the largest return, whether to the man who pays high, or to him who pays low wages. This being the case, it is all important that the man who pays the most for labor, should grow the best crop. If Corn cost $32 an acre, with $20 profit, and Turnips cost $42, with $60 profit, it does not matter that the latter cost a third more, if they pay three times as well at that cost.

In carrying out these several estimates, I have set a fixed value upon the crops we raise, and allowed 90 cents a bushel for Corn, and $8 for stover and 50 bushels of Corn to the acre. I have allowed 20 cents a bushel as the value of Sweeds Turnips, or Mangold Wurzel, to feed out. Some farmer might take exceptions to my reasoning in this wise: Turnips are not worth as much as that to sell in my town; there is no market for them. They are worth that to feed out, and I propose that you take land which will yield 1½ tons of Hay to the acre, and cultivate it well in Sweeds or Mangold, they will certainly yield you, one year with another, 20 to 25 tons to the acre. Careful experiments, tried very many times, have shown that to feed out one part of Hay, is equal to five of Turnips. Thus from your land you now get out 1½ tons of Hay, but for home consumption, to make beef, mutton, wool, or milk, by Root culture, that which is equivalent to 5 tons of hay. The cost of the 1½ tons of hay was about $12 an acre, and the profit $10; the cost of the Turnips $40, the profit, on the Hay basis, $30, and really much more; the average of 20 estimates by New England farmers, of the cost of an acre of Ruta-Bagas, or Mangolds, is $40. See Coleman's reports. The profit, relative to cost, is the same, but the money in pocket four times as great at the end of the year.

Besides, I have shown how this difference between the price of American and of English labor may be nearly done away, by employing machinery to do the bulk of the work. The cost of tile draining has nothing to do with this point, remember; we start upon our outlay as fixed capital. Ploughing, harrowing, sowing, cultivating, may be done by horse power.

The Grain may be harvested by horse power; and by machinery in the barn, we may thresh and sort our Grain, cut our fodder and Roots, and feed them out, so that all the labor will be reduced to the lowest cost.

Perhaps all this is met by the old objection of want of capital to invest. Let me once and for all reply: take your farm as you find it; make the best of it, and invest every cent of profit not needed for your family, in improvements; and be assured, each new investment will pay well. The poorer a man is, the less can he afford to farm slovenly. If you are so poor that you must carry out your manure in a wheelbarrow, and dig it in with a spade, spread it thickly over a small surface, dig 12 instead of 6 inches deep, cultivate with scrupulous care, and you will find the return most satisfactory. Be not deceived by that most specious and ruinous of theories, that you make more money by spreading the manure of one acre over two, and cultivating two acres in the time before allowed for one; for though the crop of the two acres may be double the crop of one of them, each yields but half what it should. One acre would have given you as much as both these, if it had received all the manure and proper culture, and at a much less cost.

Suppose your farm has six fields, and you have decided to begin a rotation. If the land is poor, I advise at first a 6 years rotation, something as follows: —

FIELDS.

Year.	No. 1.	No. 2.	No. 3.	No. 4	No. 5.	No. 6.
1st	Wheat.	Turnips.	Spring Grain and Grass.	Grass 1st year.	Grass 2d year or Pasture.	Potatoes.
2d	Turnips	Spring Grain and Grass.	Grass 1st year	Grass 2d year or Pasture.	Potatoes.	Wheat.
3d	Spring Grain and Grass.	Grass 1st year.	Grass 2d year or Pasture.	Potatoes.	Wheat.	Turnips.
4th	Grass 1st year	Grass 2d year or Pasture.	Potatoes.	Wheat.	Turnips.	Spring Grain and Grass.
5th	Grass 2d year or Pasture.	Potatoes.	Wheat.	Turnips.	Spring Grain and Grass.	Grass 1st year.
6th	Potatoes.	Wheat.	Turnips.	Spring Grain and Grass.	Grass.	Grass 2d year or Pasture
1st	Wheat.	Turnips.	Spring Grain and Grass.	Grass.	Pasture.	Potatoes.

If your farm is large, and each field contains many acres, you may introduce a variety of crops; and if your land is strong, you may take two white crops in succession. Thus: in place of Potatoes and Pasture, you may have Indian Corn and leave out the Pasture; or you may have half Turnips and half Potatoes; or half Potatoes and half Indian Corn, etc., etc.; or you may grow Flax, Hemp, Tobacco, etc.

By this course you will ensure the largest crops, and will keep your weeds well down for each crop. The hoed Potatoes or Indian Corn, will hold the land clean for the Wheat, which will then need less weeding; the Turnips will clean it well for the spring Grain, and that well cleaned will ensure 3 or 4 tons of Grass to the acre the first year, and as much the second, unless you pasture it, which, in my opinion, is but a slovenly kind of farming.

As you continue to grow crops to fatten your stall-fed animals, you will verify what has already been said about the advantage of adding meal to the Turnips and Hay, the economy of buying oil-meal rather than growing Corn, the consequent increase of manure for the Turnips, which, with Potatoes and Indian Corn, should be the dunged crops. You will find that by drilling in some guano or other artificial manure with the seed of your Turnips or your Grain, you will drive the Roots ahead of the fly, and get a fine early growth, and you will give the Grain an early set, which will increase the yield from $5 to $10 an acre. This increase will be clear profit, so much more capital to put into other improvements, which shall give a like increase, and so on without limit.

You see that this farmer I am portraying, is no mere Hodge, a tiller of the soil, a peasant. He is a careful reasoner, a chemist, an anatomist; a merchant who studies the markets of the world, to guide him in his purchases of manure and feed, and in his sales of crops; an anatomist in his familiarity with the structure of stock, by which his treatment of them is guided; a practical chemist, because he must learn the constituent elements of his crops and soils, and of the manures with which he feeds the plants; without this he is still a bungler. How great this subject of manures is, we shall show in a future month.

It may seem rather late in the day to advocate the cultivation of Turnips, now that they are becoming diseased and are less used in England; but it does not follow that they will deteriorate here; the very opposite result may follow, as the English seed direct has never given as much satisfaction here as home-grown seed. And besides, there are other Roots: the Mangold Wurzel, the Carrot and Parsnip, which are even better than the Turnip, and what I have said holds true of them.

Our farmers feel that in these improvements they are entering an unknown country, and they are afraid to hazard their hard-won earnings on these new ventures. They think they get their money too hard to waste or risk it; they know that in the old way they can make a living; may they not lose all by this change?

What foolish, cowardly drivelling, to come from a race of men famed for their courage and enterprise! men who, for a mere chance of bettering their condition, will sell off at a low price, and emigrate to a new country, where they can get new land only at the price of all the hardships of a pioneer's life. What inconsistency to risk so much for new land in the West, while they dare not risk a dollar for the new land, the new farm, under their feet, unworn virgin soil, that only waits to be called upon, to be stimulated by the caresses of the sun and the soothing of the rain, to give crops which will burst your barns and swell your purse! Are you afraid to risk labor in a business in which Englishmen have invested thousands of dollars, with a sure profit? Be not deceived about the "ratio of labor!" the proportion of profit is the same here as in England; if you spend less, or invest less, you get less; and more, as you invest more to develop the resources of your farm. Remembering this,—remembering that 60 years ago the most profitable and fertile farms in England were where yours now are, read these statements of the men who have tried the experiments, and made the money.

"Mr. Rodwell, in Suffolk, sunk $25,000 in mere marling 820 acres of land, with *a lease* of only 28 years, and during the 28 years of his occupancy, his produce was $150,000 greater than in the 28 years which preceded his improvements." This land was *hired*, and this money spent, as an investment of capital. Think of it, farmers of New England.

This practice of marling, applied to clay lands, it is said by Arthur Young, a distinguished agricultural writer of the early part of the last century, "has turned 300,000 or 400,000 acres of waste into gardens, and rents rose from between 10 to 40 cents, to $3 and $4 per acre. Many of the tenants realized a capital larger than the reputed value of the property."

"A Mr. Mallet made a fortune in 30 years, upon a farm of 1,500 acres, and bought land of his own, of the value of $8,500 a year. A more remarkable example, even, than that of the Scotch proprietor mentioned by Dr. Cartwright, who, being compelled to sell his estate, hired it on a lease, and afterwards repurchased it with the profits he derived from his tenantry."

By drainage alone, "hundreds and thousands of acres, formerly condemned to remain for pasture, or to grow at long intervals uncertain crops of Corn and Beans, have been laid dry, and rendered fertile, and brought into regular rotation, in which Roots find their place. Sheep stock thrive where previously a few dairy cows starved, the produce has been trebled, the rental raised, and the demand for labor increased in proportion. In the neighborhood of Yorkshire manufactories, moorland, not worth a shilling (25 cents) an acre, has been converted into dairy farms worth £2 ($10) per acre."

"A secured public loan of £4,000,000 was granted in 1856, and it has been estimated that in the ten previous years upwards of £16,000,000 was invested by the nation, and by private companies and individuals, in thorough drainage. A Mr. Nelson, one of the late Lord Tarborough's tenants, used to say that he did not care who knew that he had made £80,000 by employing bones (as a manure), before other people knew the use of them."

"The pecuniary gains of agricultural progress, are not to be estimated by the mere saving in wages, horse labor, seed or manure. Thorough draining not only diminishes the cost of ploughing, but it renders it possible to grow great crops of Roots, of Mangold Wurzel, from 30 to 35 tons to the acre, and of Turnips from 20 to 25 tons; ten times more live stock is thus fed on the land, than it maintained before; the Corn crop follows the Roots in due course, without farther manuring, and is made certain in addition, even in wet seasons.

"Under high farming, the manual labor employed is both increased and concentrated. A greater number of men are required per acre, and a lesser number in proportion to the produce. With mechanical assistance, the crops are less dependent on the seasons, and each operation is more quickly performed."

"With improved breeding, the stock is increased in quantity, more early matured, and gives better and finer animals. Four-year old horned sheep are replaced by mutton grown in 18 months. The aged cows, and worn-out oxen, which form the staple of the continental meat market, lose from 15 to 20 per cent more in cooking, than our well-fattened oxen and heifers, to say nothing of the difference in the flesh. At every stage, the farmer who farms for money profit — not like the backwoodsman, the metayer, or peasant proprietor, merely to feed his family — loses by rude implements, ignorant cultivation, and coarse-bred live stock. At every stage of progress the modern English farm becomes more like a manufactory, producing on a limited surface, enormous quantities of food for man, turning Peruvian guano into Corn, bones from the Pampas into Roots, Russian Oil-cake into Egyptian Beans, and Syrian Locust-pods into beef and mutton."

"The gain to the farmer and the landlord, is, we repeat, the most insignificant part of the benefit; the agriculturist is the manufacturer of food for the nation, and upon his skill, under Providence, it depends whether plenty or scarcity prevails in the land."

"Mr. John Hudson, of Castle-acre, entered upon his now celebrated farm, in 1822. It consists of self-drained, light, Suffolk soil." "At that period the only portable manure was rape cake, which cost £13 a ton, and did not produce any visible effects for months. The whole live stock consisted of 200 sheep, and 40 cattle of the old Norfolk breed. He adopted what was then the new, now the old, and what is destined to become obsolete, four course Norfolk system; that is to say, 250 acres pasture, 200 Wheat, 300 Barley, or in dear years, 600 Wheat, 300 Roots, and 300 seeds, the rest being gardens and coverts. On these 1,200 acres he at present maintains 10 dairy cows, 36 cart horses, a flock of 400 breeding ewes, and fattens and sells 250 Short-horns, Herefords, Devons, or Scots, and 3000 South Down sheep. The crop of Sweeds (Turnips) average from 25 to 30 tons, and of Mangolds 30 to 35 tons per acre. His Wheat had in 1855, averaged for the 5 previous years, 48 bushels per acre, and Barley 56 bushels. Of the seeds, the Clover is mowed for Hay, the Trefoil and White Clover are fed down by sheep, and there are no bare fallows. The purchased food given to the cattle in the strawyards and sheds, and to the sheep in the field, consisting of Oil-cake, Meal, and Beans, costs £2,000 a year. The greater part of the Oil-cake is changed to manure, which it enriches in quality, as well as increases in quantity. But the direct expenditure in artificial manures, guano, nitrate of soda, and super phosphate of lime, amounts, in addition, to £1,000 a year; wages absorb £2,500 to £3,000 a year. Seven or eight wagon loads per acre, of farmyard manure, are ploughed into the land for Roots, besides above 24 shillings per acre of super phosphate of lime, drilled in with the Turnip seed, while Wheat has a top dressing of 1 cwt. guano, ½ cwt. nitrate soda, and 2 cwt. salt mixed with earth and ashes. *No weeds are grown.* The Turnips are taken up in November, and a troop of boys and girls under the charge of an experienced man, traverse the ground, forking out, and burning every particle of Twitch (Grass) and Thistle. The same troop is called in during the progress of the Root crop, whenever occasion requires, and immediately after harvest, they go over the stubbles, with their little three-pronged forks, exterminating the slightest vestige of a weed. The expenses of clearing are kept down to a shilling an acre (this is in England; it would cost at least 80 cents here), which proves that by stopping the evil at the source, and never allowing the enemy to get ahead, land may be kept wholly weeded, more cheaply than half weeded."

"The farmer who saw a thief, daily stealing from his dung-heap, would soon call in the aid of a policeman. The weeds are an army of scattered thieves, and if the pilferings of each are small in amount, the aggregate is immense."

"He who allows himself to be daily robbed of his crops, and the community to the same extent of food, and all the while looks helplessly on, is not only a bad farmer, but in effect, though not in design, a bad citizen also."

"At Sedlington, where there is a strong clay to deal with, and more good grass land than at Castleacre, it is not necessary to purchase so much food to feed, to keep live stock for manure. But there were about 150 cattle, and 1,000 sheep sold fat, besides a choice breeding flock of Devons, the result of 20 years' care. By these sheep the light land is consolidated and enriched. If they are store sheep, they are allowed to gnaw the Turnips on the ground for part of the year. If they are young, and to be fatted for market (this would be American practice), they are drawn, topped, tailed, and sliced, with a portable machine. Thus feeding by day, and penned successively over every part of the field at night, they fertilize and compress, as effectually as any roller, the light, blowing sand, and prepare soil which would scarcely feed a family of rabbits, for luxuriant Corn crops. The cattle, consisting of two-year old Devons, Herefords, and Short-horns, or three-year old Scots, or Anglesea runts, purchased at fairs, according to the supply and market price, in spring and summer, are run on the inferior pasture till winter, then taken into the yards or stalls, fed with Hay, Sweeds, Mangolds, Ground-cake, Linseed or Barley meal, and allowed an unlimited supply of clean water. When the spring comes, they are put on the best Grass, and sent off to market as soon as they become ripe, having left behind them a store of manure, which is the capital from which every thing else must spring." "Under the old system [the same as our New England system], 300 acres were poor pasture; now, under the rotation system, the strong clay feeds four times as much live stock as before, and bears Wheat, at least twice in four years."

"According to the latest experience, the most profitable system in its present light condition, would be to devote the farmyard dung to growing Clover, to eat down the Clover with folded sheep, and then to use the ground fertilized by the roots of the Clover, without home-made manure, for cereal crops, assisted by a top-dressing of guano, to be followed by Roots, nourished with superphosphate of lime. No land is here lost by unnecessary fences, no force is wasted on ill-bred live stock, no fertility is consumed by weeds, no-time or labor is thrown away."

A comparison instituted by Young, between two neighboring counties, applies well to this country and England.

"A lazy desire to creep with sluggish monotony along an established path, and a feeling of impatience at being pushed into a novel track, helped to maintain hereditary prejudices, and truants invented fanciful excuses for not doing what was plainly advantageous to be done, because they preferred present sloth to future profit.

"They were like a man who had lain upon one side, till he shrunk from the trouble of turning over to the other, though when the process was performed the new posture might be easier than the old. But once roused and put in motion, and the inherent reluctance to stir overcome, the gain in interest as well as pocket, was felt to be very great."

No one reading these English experiences, and many more like them, can help the burning shame flushing his face, that our people should be still standing on the frontier of the great realm of Agriculture, — should hardly have taken a step into it, while other nations have marched far in and appropriated enormous wealth.

Talk as you please about the difference in price of labor, it is indisputable, 1st, that if it is profitable to farm at all, to grow any crops, to keep any cattle, it is more profitable to grow and keep the best, than the mediocre kinds; 2nd, if but a given return can be got from one acre at a given expense, it is better to increase the expense double or treble, if, by so doing, the profit can be doubled or trebled, even much more if it can be quadrupled or quintupled, as it unquestionably can; and no man not stiff with lying on one side will deny it.

3d, Cattle, whether American or English, are the same in constituent elements and conditions, and are nourished alike by the same food. Any kind of feeding which is profitable in England, will bear a proportionate profit here, and those crops which grow here with a merely nominal profit — say Corn — can hardly be turned into beef with much profit, any more than in England, while those crops which give enormous profits in both countries (Roots), and are of great value as food for stock there, are proportionately so here. Yet with all the light shed on Root culture abroad, our agricultural newspapers contain every season accounts of some man's little experiment with one-half acre of Roots, and of the wonderful profit therefrom; and to-day any man who has two acres in Roots, is a wonder to his neighborhood, and the wiseacres dubiously shake their heads, while Englishmen have 300 acres in Roots.

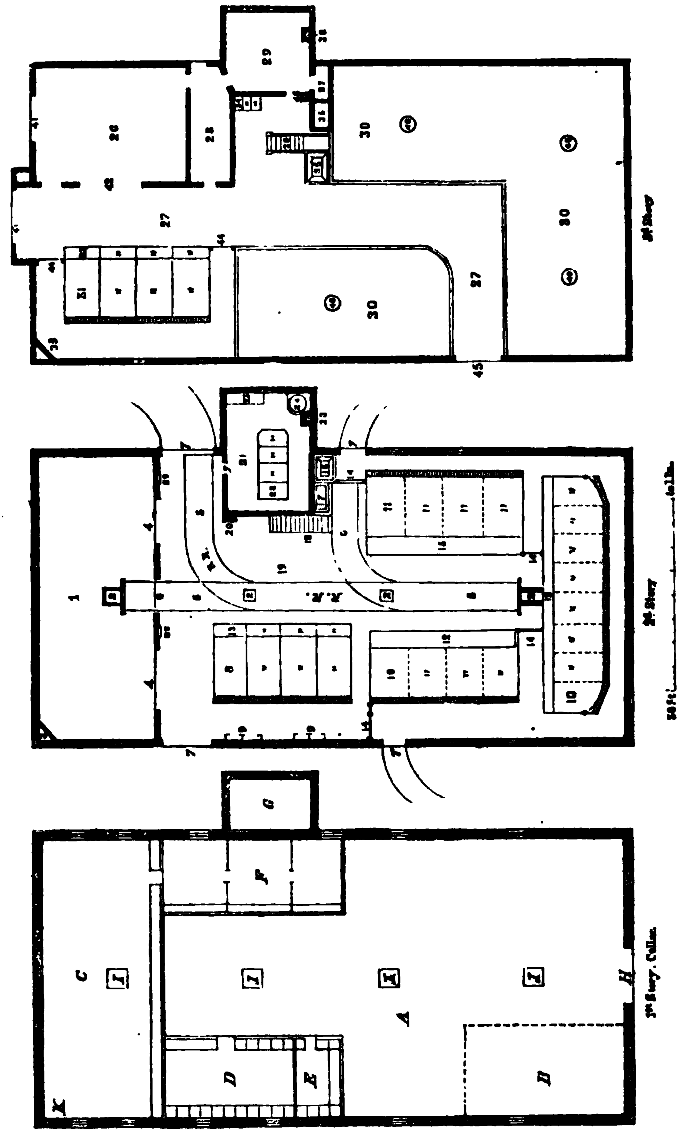
4th, Reasoning and experience has proved that rotation of crops is the life of successful farming,—unless in some special case, as Onions,—and yet how many of our so-called good farmers can show a creditable and long-continued rotation, or assure you that they really believe in such a thing? A few men have ventured into draining, rotation of crops, Root culture, with the same awkward caution with which a boy ventures on skates for the first time, always expecting a fall, and probably getting falls, all of which, however, instead of being credited to ignorance or carelessness (where they belong), are debited to the new system of culture.

Remember that we must have done with child's play and doubting, we who are to be really improved farmers, and that we must not be dismayed by a few mishaps. Running and walking, like a man, is unquestionably more agreeable and valuable than creeping like a child; but the child learns, slowly and feebly, to walk, and so must we. And let us entreat our agricultural editors, instead of devoting much time and space to the questions whether large or small potatoes are best for seed, whether free martins give milk, whether Ethan Allen trotted in 2.40 or 2.39, whether labor in England costs one-half or one-fourth as much as labor here, whether milk should be measured in a beer or a wine measure, to enter at once into the great question behind all these, and to show the people how a kindred race, by applying thought and capital to farming, have brought sands like those of Plymouth County, in Massachusetts, hard clays, like many about Boston, rocky and sterrile lands, like much of New England, which is so impoverished as to make a man the poorer the more he has of it, to a fertility fully equal to the virgin soil of the West, capable of yielding 40 bushels of Wheat to the acre, whitened with countless flocks of sheep, rich with herds of fat cattle.

We must balance our want of cheap labor by the invention and adoption of machinery. Already steam has been applied in such ways, that for a first cost of $300, with the waste brush of the farm for fuel, much of the work about the farm steading, which now occupies the time of many men, may be done by machinery. Mowing-machines, horse-rakes, improved tools, and last, and greatest, the steam-plough, are now ready to give us aid and strength, and to take much drudgery off our hands.

The same spirit which has thus far in this book set the mental benefits of any occupation above all its other benefits, and which has urged the charms of nature, and the nobleness of the pursuit, as chief inducements to agriculture, encourages all agricultural improvements, which make the life more profitable; as I well know that the better a man's business pays him, the more time and inclination will he have for self-culture.

As soon as the frost begins to leave the ground, open the irrigation drains, and let the water flow evenly over the Grass. After the Grass starts, flow for a few days at a time, and then withdraw for the same length of time, and again return; by intermitting the flow of water in this way, the yield of Grass is increased, and the Grass is sweeter. Cart out the manure, and spread the piles previously carted out. We shall hire two men for the season, and give each his regular work at once; let one man always drive the horses, another the oxen, and do not commit them to either man indifferently, for one accustomed to the speed of horses is unfitted for sluggish oxen. As before, you, or the farmer and his boy, should do all the milking and feeding. Let the work be regularly planned and carried forward, so that each man cannot fail to know his duty. I do not mean that the farmer should make his plans and business known to all his men, as that is sure to introduce confusion and cause mischief; but it is a great advantage that each laborer should know his own work in advance, and should be made, if possible, to understand its importance and relation to the general whole. He thus gets a feeling of his own importance as he awakens to a sense of personal responsibility. In the plan of our barn, which is described on the next page, I have endeavored to arrange every detail for convenience and true economy, and although some things preferred may at first seem far fetched, and perhaps even cumbersome, I think a trial of them will surely prove their merits.


3d Story
2d Story
1st Story. Cellar.

Description of our Barn.—Our barn has often been referred to, but never yet described. I will give its description now, to enable you better to understand some previous directions, and others yet to come. It is on a side-hill, which slopes so rapidly that we are enabled to enter all three stories with teams. This is very advantageous, as it simplifies and eases work.

First Story, or Cellar.—The lower story is the cellar. A marks the space devoted to manure, and I shows where the muck falls to from above. This muck is, of course, mixed with the manure as we please. B is a space devoted to the storing of carts, and similar articles. C, hog-pen. D, hen-house, for general uses and laying. E, setting-room. F, pens for breeding-sows. G, foundation of story above. H, door into cellar. K, where the manure comes into the hog-pen from the carriage horses, two stories higher. The manure and urine of the cattle from the story above, shoots into the cellar through traps, like Browns patent coal-hole covers, which remove danger of cattle getting their legs through them.

Second Story.—The second story is entered by teams at 7 7, and may be left and entered by animals and men by 7′ 7′, also. 1 is the root cellar, already described. 2, muck traps. 3, the box through which the manure of the carriage horses, in the third story, passes into the cellar. 4, the doors which admit carts into the root cellar, 9 feet wide. 5, the railway. This is the most convenient thing possible; the rails are sunk into the floor, so as not to interfere with walking, and of course save a great deal of labor. 6, the flap which admits the car into the root cellar. 8, horse stalls, 5′ by 9′, with mangers and water, as before shown. 9, boxes to hold the cart harnesses. 10, cow stalls. 11, stalls for oxen. 12, cow mangers, and water-troughs, as described. 13, horse mangers. 14, spring doors, which shut the cattle out of the barn floor. 15, ox mangers. 16, mash-tub; there empties into it cut hay from above. 17, water-trough and ball-cock. 18, stairs up to chamber, and down to cellar. 19, empty space for carts, wagons, or wheelbarrows. 20, swill spouts, leading to cellar. 21, grain and tool room. 22, meal chests. 23, work bench. 24, boiler. 25, chimney Windows on all sides, to give abundant light and air. The floor of the third story, over the heads of the cattle, is pierced with holes, which convey air up through the haymows, to the ventilator on the roof, and thus not only cool the hay, but ventilate the second story.

Third Story.—26, carriage-room. 27, floor of barn. 28, harness-room. 29, man's room. 30, hay bays. 31, stalls of carriage horses. 32, mangers, and water. 33, manure trap, leads to cellar. 34, meal-chest; 35, mash-tub. 36, water and ball-cock. 37, closet. 38, chimney in harness-room. 39, stairs to second story. 40, ventilators through hay. 41, entrance doors. 42, sliding doors to carriage-room. 44, spring doors, to keep horses off the floor. 45, door of exit for unloaded teams, over a plank bridge, built on posts.

CHAPTER LI.

GREENHOUSE AND CONSERVATORY.

APRIL. Many days in April are so warm as to enable us to dispense with fire heat and to demand that every opening for fresh air should be made the most of.

The plants are in a glorious condition in consequence of having been properly attended to during the winter, and the fragrance and beauty of the flowers, stir the most stolid heart.

Continue to propagate by cuttings, etc., and also sow in pots and pans the seeds of annuals and perennials not yet started. Plant any roots of Auriculas and Ranunculuses, which you may have in thumb pots, ready to be transferred to the garden as the season advances; set Tuberoses also in pots; by giving them an early start you will get them into blossom in the garden before the autumn frosts can harm them.

Bring the Dahlia roots into the house and lay them under the stagings, where the warmth and moisture will stimulate the tubers a little and cause the buds to start, so that you may sooner cut them to pieces and get them ready either to plant in the open ground or to start in the hotbed.

You may remove to the back side of the house and the cold frames those plants which are fairly out of blossom, and which you do not care to have grow much before next winter.

Open the cold frames and pits, remove gradually all the dung linings and leaves, but retain the shutters. There will hardly be weather cold enough to require other protection than sashes and shutters. On every fair day let in light and air by removing the shutters early in the morning. The gradual admission of sun will soon start the plants and we may expect by judicious management to get them a little forward for planting out. Water occasionally, as you see cause, and with tepid water; but be careful not to get too much moisture in dark weather, as it may cause "damping off."

Remove the sashes from the Daisies and Violets all day in moderate weather; they will give you abundance of flowers throughout the month. Beds of Auricula and Ranunculus prepared in the fall will need constant attention; Pansies too, whether in pots, in the frames, or in beds by themselves, should be well cared for; give air and water; late in the month they will be in full blossom.

The manure removed from about the beds should be carted either to a pit into which it may be dumped, mixed with some loam, or to the barnyard. Having lain exposed to the weather all winter, it has lost most of its value; and although a good fertilizer if dug in, it is not nearly so valuable as fresh manure; but if returned to the yard or the cellar to absorb the urine of the cattle, its value will be restored; or if leaves and loam are mixed with it, and the whole packed in a pit, by the fall it will have decomposed into a compost, fit for almost any purpose.

Do not be alarmed if in spite of ventilation the sun raises the temperature of the houses at mid-day to 90° or 100°; only give plenty of moisture to the air by repeated syringings, and by setting evaporating pans on the flues.

Those who are not familiar with the spring and summer bloom of the flower-garden and shrubbery, should not delay making themselves acquainted with it, as the season will soon be upon them and should not find them unprepared.

The choicest plants and flowers may be readily grown in the garden, if a little care is taken to start them in the greenhouse and hotbeds.

Repot any plants which seem to need it, and gradually remove all half-hardy plants out of blossom to the cold frames and pits, that Pelargoniums, Azaleas, Cinerarias, Fuchsias, etc., may have more room.

We have occasionally very cold weather, even in April; be on the watch for it, and do not let your houses be caught by it unprotected. By letting the canvas-cover down over the glass early in the afternoon of a warm day, you may enclose a great deal of the sun's heat, and save fires.

It might be supposed that the house itself would afford considerable protection against cold; but a glasshouse radiates heat very rapidly, and the large amount of moisture in the air is in itself dangerous. This radiation may, however, be prevented by a very slight cover. At a time when in the outer air water will freeze hard and in the greenhouse all tender plants will die, a common canvas will entirely protect them from danger.

Do not be tempted by any warm days to remove into the open air, for a permanency, any plants which have wintered in the houses; the ground is still cold, and severe frosts are sure to come. Keep the plants that were purposely frozen up in the autumn, frozen as long as possible. Keep them on the north sides of the house, and try to prevent even the tops from thawing, and when you find that they are about to thaw, carry them into the shade, and do not let the sun shine on them for some days. By burying them in the earth, the frost may be gradually removed, and with less danger to the plants.

CHAPTER LII.

GRAPERY

CONTINUE the temperature in the forcing-house as last month, at 60° to 70° at night, 70° to 75° by day, in cloudy weather, 80° to 90° in sunshine; admit all the air possible, and supply abundant moisture.

Continue to thin. Before the end of the mohth, all the vines should have been thinned the first time, and some the second, and even the third time.

Cut back the laterals above the bunches to one eye, and repeat the cutting as they start afresh, and also cut out any shoots which make head between the bunches and the main cane, as they only abstract the food of the bunches, without corresponding benefit. The thinning process, after the first time, depends very much upon judgment; the kind of vine, size of berry, earliness of ripening must all influence thinning. As the berries swell, the shoulders of the bunches should be supported by tying them to the cane or branches above.

The vegetables in the forcing-house should be now fit for use, and the Strawberries for picking. The vines will soon cover all the glass with their leaves, and exclude the light so much that but few vegetables will thrive. The Mushrooms will be producing abundantly. Water with tepid water from time to time. Endive and the blanched vegetables do not need direct light, and will continue to improve as yet.

The retarding-house must be kept as cold as possible; cover with canvas during sunshine, and let in all the air that is safe. No fire heat will be necessary in bright weather, but must be used if there should chance to come a very cold and cloudy interval.

The vines in the cold grapery, on the contrary, need all the sunlight they can get; give aeration through the ventilators, and some other air during bright weather. Follow the same degrees of temperature given for the first month of forcing-house. The difficulty to be anticipated is that of keeping the temperature as uniform as by fire heat. The first of the month, if the manure spread on the borders in March was active, the vines will have swollen their buds considerably, and by the middle and last of the month will begin to break. Follow the forcing-house treatment exactly. The vegetables in the cold grapery will be thriving finely; the abundant light, heat, and moisture will give sufficient stimulation.

From this time to the end of summer the work of the houses is no less pressing, but is to be taken in connection with the outside work, and there is great danger that it will be neglected. The fascination of the various out-of-door occupations tends to make the gardener forgetful. The houses should be syringed very often, on sunshiny days, and the thermometer and hygrometer carefully consulted, as too great heat and dryness on the tender foliage may do almost irreparable mischief. The grapevines outside the house, on espaliers, which were wrapped up in straw, should be examined towards the last of the month. Loosen their coverings, and fork into the border plenty of strong manure, which may give the roots an early start; but take care not to injure the roots of the vines with the fork. The figs on the espaliers also should be examined, and receive some manure about the roots. Those which were laid down in the earth will not need any attention for the present. The espaliered fruit otherwise needs nothing, unless it be to examine the fastenings, and if any be found broken by winter, to repair them. In your examination, remove any eggs you may see glued to the twigs, and note carefully those shoots which seem likely to die the coming season, from frost-blight, and cut them out — from the Pears, Cherries, and Plums, before the sap gets into active circulation — from the Peaches, Nectarines, and Apricots after the leaves have expanded a little.

CHAPTER LIII.

FLOWER-GARDEN.

THE flower-garden begins again to assert its importance, and resumes its place in our interest. The Snowdrops are all in blossom, the earliest Crocuses show their heads, and we know that the other bulbs will soon follow. Here and there a last year's Pansy opens its eyes to the spring sunshine, whilst in sheltered spots in the shubbery, the Forsythia will soon be glowing with yellow flowers.

The blossoming time of all plants varies a little with the season, but less than is usually supposed, and it is doubtful if the greatest variation amounts to ten days. Sanguinaria and Rue anemone are the earliest wild flowers, and if planted in any of the beds or borders, will be in blossom almost as soon as the Snowdrop. Before the month is old, the Snowdrops will be replaced by Crocuses, Daffodils, Narcissuses, and in the most favored situations, by the earliest Hyacinths.

The litter should be carefully removed from all the beds, a little at a time, to harden the bulbs. If the garden was left in proper condition in the autumn, there will be need of but little spring cleaning. Rake up any dead leaves that may have blown in, and be ready by the first of May to begin real work. Make all your selections of seeds early, and decide how you will plant the beds, that when the time for planting comes, you need not be delayed. If you mean to employ others to advise and direct your work, see to it now, when you can be sure of getting just such persons as you prefer, and when they are at liberty to devote ample time to your service.

If your garden is still a grass plot, or a ploughed field, have a plan made. Make it yourself if you can, as I have directed for the village garden; if you cannot, employ some one to do it for you.

Some details with regard to the making of plans, I will give at another time.

Overhaul the seeds that you have on hand, and all the garden ornaments, tools, etc., that were packed away in the autumn. You repaired them then, so now you have only to decide what you will add to your stock.

If you have no greenhouse or hotbed, make a hotbed now. (For directions see pages 480.)

Plant in the bed the seeds of all those annuals which blossom late in the summer and fall, and need to be hurried; also, all those which you wish to have in succession. Seeds of annuals should be lightly covered with earth, more or less, according to their size. Some seeds, like those of the Ipomea, are enclosed in a horny shell, which prevents germination for a long time. All such seeds should be soaked in scalding water, for several hours, or a day, before planting. When you purchase seeds, you can always learn of the seller whether any peculiar treatment is necessary.

Towards the last of the month, set in the hotbeds Dahlias, Maderia vines, Gladiolus, and all other tubers to be blossomed in the garden; the start thus given will insure a longer and more satisfactory bloom.

Such manuals as Breck's Book of Flowers, Buist's Flower-Garden Directory, etc., give minute details on this subject, for which there is no room here, and I would rather induce you to seek out and read such books, than try to supply their place.

Every year some new plants and flowers are produced for admiration, and some gardeners get the largest part of their profits from the sale of these novelties. I think it is well to try them as far as is consistent with economy, but by no means to the neglect of old and deserving favorites.

It is with flowers as it is with trees, if you would be successful, you must have a large stock of patience. There will be innumerable annoyances and disappointments, through the season, but care, attention, and patience, will bring a bountiful reward in spite of them all.

As the warm days come on, you will feel your enthusiasm kindling within you, and your imagination will give you delightful visions of vegetables, flowers, and plants, in marvellous abundance, crowding every inch of your land. You will lay out magnificent plans, and set to work with eagerness, and at first, all will go well. It is very charming to get up early, on a bright spring morning, to dig and plant in the unwonted light of the dawning day, and with the delicious melody of the early birds filling the air; and you will snatch a few minutes each evening from business, for your garden work, and as the shades of night shut down, and send you in from your employment, you will feel injured, and will wish that the fabled "curtain of night," were a real one, of which you had the string, which you would certainly keep drawn up. Reluctantly, and with many a backward glance at the smooth beds, dotted with stakes, so prophetic to your eye of future glories, you return to the house, where you descant in glowing terms, to your wife or friends, on the topic that absorbs your thoughts. Perhaps, in your ardor, you plant several weeks too early, and those seeds that escape death from rotting in the ground, meet it from the frosty air. Still you are not discouraged, and replant with wonderful perseverance. So in spite of ups and downs, you work on through the spring months, while the weather is cool, and your whole frame retains the bracing effect of the winter. But the work thus begun, must be continued with unabated zeal, through the heats of June and July, if you would not lose all your past labor, and see your hopes choked, by the fast growing weeds that lay concealed in the upturned clods, that looked so innocent when you planted them with seeds of your own choosing, little thinking of the unwelcome companions that had pre-occupied the ground.

Do not, then, in your first spring enthusiasm, lay out too much work. Be contented to do less than you would, now, that you may not have to do more than you can by and by

In a flower-garden there is a great deal of beauty to be procured from grass and shrubs, and such flowers as need but little time and care; and it is wiser to plant the seeds of those flowers which you know will grow easily, and cover the ground, to the exclusion of weeds, than to try experiments in new and delicate varieties.

To cover the ground, plant in masses such annuals as Mignonette, Sweet Alyssum, Gillia, Candytuft, Cacalia, Escholtzia, Coreopsis, Portulacca, etc., and among them, in less profusion, set those that grow up straight, and occupy but little room, as Aster, Gillyflower, Zinia, Mourning Bride, Antirhinum, etc.

A perfect flower-bed, in full growth, shows nothing but leaves and flowers; from the turf to the top of the group there is an unbroken though varying surface, of different forms and colors, so harmonized and contrasted as to give constant delight to the eye. This result is best obtained by mingling various kinds of annuals with the bedding-out plants, which having been started in the greenhouse or hotbed, are turned out of their pots and planted in the beds, and which constantly increase in blossoms and beauty, till cut off by winter frosts.

Plan your garden, then, with a view to its permanent improvement and advantage, and if your spring enthusiasm does not exhaust itself before the trying time comes to prove it, if your courage, prudently husbanded, continues through frosts and gloom, and the discouragement of weeds, and droughts, unabated, your spring visions will become a rich summer and autumn reality.

There will be a long time in the spring when the flower-garden is dependent on bulbs for its beauty, and even after other flowers come forward, these bulbs, and their cousins-german, the tuberous rooted plants, continue to hold an important place.

I will give a brief account of the best bulbs, and their culture.

The careful and wise gardener always seeks first the best native plants, as they are more hardy, reliable, and easy of culture than foreigners. Three varieties of tuberous roots, but little cultivated, though of great beauty, are Ranunculus, Anemone, and Auricula. They are all natives of much milder climates than ours.

The Auricula is of the same family with the English Cowslip and the common Polyanthus; it is more tender than the latter, and averse to both heat and cold, especially the former. It should be planted in cool, moist situations, away from the drippings from trees, shrubs, or buildings. It must be protected during the winter and early spring, but as it starts early in the season, the covering must be lightened and removed as soon as possible.

The Ranunculus is an Asiatic, of the Buttercup family; our winters are too cold for it, and our summers too hot. To cultivate it successfully in the open ground, make a deep, rich bed in the autumn, in a place sheltered from severe cold, and yet shaded from the midday sun of spring. As early as possible, in the spring, uncover the bed and dig it over; remove an inch or two of earth, and set the claw-like roots over the bed, six inches apart each way; then cover with half an inch of soil. If the weather continues cold, cover with a moderate depth of litter, Pine-branches, or other shelter. As the plants grow, be sure they have enough water, but do not saturate them. The plant, after flowering, will soon ripen its roots, when the leaves will turn yellow. The tubers should be taken up, and laid away in a dry place, till the next spring or for winter forcing.

The Anemone is of the same family, and is very beautiful. It is not so difficult of culture as the Ranunculus. Plant in rich, well-drained beds, in autumn, and cover with a garden-frame and litter. In the early spring replace the litter with sashes, and stimulate to an early growth; blossoms will appear in June.

Many summer bulbs, not usually cultivated, may be started now in hotbeds or pots, set in protected places. The Tiger-flower is singularly gorgeous, and is a very full bloomer. It will do well planted in the open ground in May.

Snowdrops may be successfully moved, immediately after flowering, before the leaves die; or as soon after as possible.

There are many varieties of the Iris, or Flower-de-luce. Some of these are so common as to be quite despised; others are much admired. The Iris Susiana blossoms early, and is dwarf; the roots need to be taken up in summer, and replanted in the fall. The Grand white Iris, large and showy, is I think very handsome, and not to be replaced by newer plants. So, too, with many of the rich blue and purple varieties.

The number and variety of Lilies is very great. White Lilies are to be planted in the early autumn, or they will not blossom the next year. They should be moved just before making their fall growth of leaves.

The common Lilies are all easily grown. The Japan Lily is rare and beautiful, and needs as careful treatment as the Hyacinth. The bulbs need not be taken into the house in winter. It may be started in pots in the spring, and turned into the border in May. Two very beautiful Lilies are natives; L. Superbum, and Canadensis. These throw up tall stalks, surmounted by a crown of from three to seven flowers, very beautiful, and much improved by cultivation; they grow abundantly in the woods and fields.

Peonies are very numerous; their tubers should be transplanted in the autumn or early spring; nearly all are hardy. The Tree Peony needs a little protection. The old red Peony, the ornament of every village garden, is very fine, and were it not so common, its splendid color would make it a favorite.

The white, pink, variegated, and fragrant Peonies are the most generally cultivated, and if a good variety is selected, will be in blossom from May to the last of July, The Tree Peonies often grow to a great size, and a large plant full of blossoms is a beautiful sight.

Tulips are too well known to need more than a mention; directions for forming beds were given in September.

The Amaryllis is a beautiful summer-flowering Lily, and its crimson flowers should be found in every garden. It is tender, and should be started early, to blossom to perfection; although planted in May, it will blossom well and late.

The Gladiolus family is numerous and beautiful, and blossoms for a long time.

The Solomon's Seal is a beautiful plant, tuberous rooted, and a native. It may be taken from the woods, and with a few years culture will be much improved.

The Fall Crocus should be planted in the spring. It blossoms with purple flowers in October, and is very pretty and desirable, but rare.

Dahlias are flowers very much admired, and are of various colors. New varieties are brought forward every season by their enthusiastic admirers. The best plants may be purchased by the dozen in the spring at a moderate price. They are tender, and must be taken up in the autumn after the frost comes. Directions have already been given.

Another almost tuberous rooted plant, which has been a great favorite for the last few years, is the Dielytra. It is a native of this country, and there are many varieties. D. eximia is the one generally grown in gardens. It grows rapidly, blossoms early and long; the flowers are curious in form, beautiful in color, and graceful in arrangement; the foliage is no less pleasing than the flowers. D. canadensis is a native of the woods, rather rare, easily cultivated and very fragrant. D. cucullata has white and yellow blossoms, is small, and is native, improved by cultivation.

Another plant of the same family which is very charming, is the Corydalis, aurea and glanca; generally found about rocks, and easily grown from seeds.

Adlumia cirrhosa is a perennnial of the same species. It is a very pretty vine, and should have a place in every garden.

Fumitory, the last of this family of American plants, is an annual, rather pretty, and grows abundantly from the seeds.

The Squill, — Scilla esculenta, — has a pretty blossom; has a bulb like the Onion, and is sometimes eaten for it by the Indians. Planted in the Fall, it blossoms in May.

"The Hemerocallis, or Day-Lily, may be planted in the autumn or spring, and is propagated by divisions of the roots; it is a species of Funkia."

The White Day-Lily is very beautiful; it blossoms for about two months, and its flowers are very fragrant. The blue is a coarser, and less desirable flower, not fragrant. There are many other varieties.

I have appended this list to my remarks on the necessity of having no more garden than can be well taken care of, that you may see the possibility of a great variety of flowers in a small space, most of which need but little looking after. These plants combined with bedding-out plants, and well-selected annuals, will give plenty of flowers from the middle of April to the last of October. Refer to the flower-garden, August; see beds L and P. The blossoms begin with Crocus and Snowdrops, followed by Hyacinths, Tulips, Narcissus, Daffodils, Polyanthus, Iris, Pansies, Squills, Dielytras, Lilies, Amaryllis, Gladiolus, Day-Lilies, Tiger Flowers, Tuberoses, Fall Crocuses, blended with Mignonette and Sweet Alyssum on the borders, after June; with Gillia, Heliotrope, Creeping Lantana, Tall Lantana, Globe Amaranth Escholtzia. These two beds, well managed, will give at any time a large bunch of flowers, and from July to October, you can cut them in abundance. In planting *d* we have kept the tall bulbs at the back, placing the smaller ones in front. In P, the tall ones are in the middle of the large swells, and slope down to smaller on the edge; and the same arrangement is made with the other plants. Mignonette, Sweet Alyssum, Gillia, and Creeping Lantana have gone from the front of the bed back to the middle, and among the other plants next to them and amongst them, are Verbenas; inside in P, are Heliotropes and Lantanas, which are at the back of *d*.

Cover the surface of the beds with a good dressing of fine guano, and rake it carefully with a fine-toothed narrow rake, the first of May, and then along the edge and as fast as we please, the seeds of the annuals are sown broadcast and thin, and then raked in. They soon come up and cover the decaying leaves of the bulbs, which as the leaves decay, may either be removed altogether, or only lose their dead leaves. The middle of May the other plants are carefully set, and by attention the change is prevented from being disagreeable. I do not mean that there will be no time without flowers, as it is impossible to make the gradation unbroken, but the nakedness need not be long apparent.

The seeds of the annuals should be sown early; the guano will stimulate a quick and vigorous growth. When the pot plants are set out, remember that they have been accustomed to abundant heat and moisture, and that you transplant them to the cold, open ground often covered for days together with cold and dark clouds, and watered only with cold water. If you want quick growth, put under and around each, as far as the ball of earth will allow, a quantity of steaming horse manure, and water for some days with quite warm water; but do not manure and neglect to water, as the manure will dry up to the great injury of the plant. If such care is taken, your bed will be a wonder to careless cultivators for the next six months.

Let me repeat some remarks that I made in September. The good gardener will never be in his garden without strings, knife and sticks, and will always be ready to cut down dead stalks and leaves, and tie up drooping or top heavy plants.

Patience, neatness, and order are your watchwords, and should be inscribed over the entrance to your garden.

CHAPTER LIV.

ORCHARD.

If the ground was not well thawed last month, begin now, as soon as it opens, to dig in manure in the orchard, together with the proportion of the salt and lime mixture described in the fall. Wood ashes, potash, soda, or lime, spread over the surface of the orchard, are very beneficial to the trees: they all seem in their caustic state, to kill the eggs and larvæ of insects, and are also of direct use to the trees. No vegetable physiologist has yet determined why it is that *salts* (lime, soda, potash, etc.) are of use to vegetation; they (particularly potash and soda) are found in great quantities in all vegetable tissues, and seem essential to their development. Land destitute of these salts, is sterile, and can be induced to bear crops only by application of some of them as manure. At times they are most powerful aids to vegetation; some crops are more dependent on them than others, as for instance, Clover. White Clover may be brought up on any land where no White Clover seed has been sown, and the plant not seen for years, by dressing it with wood ashes, or potash. Red Clover may be grown on land previously unable to bear it, by a liberal dressing of sulphate of lime. Leaves and bark of trees are full of these salts, and it is from the ashes of burned wood and leaves, that the potash and soda are obtained. These few facts establish conclusively, their importance to vegetation, but how they contribute to its welfare, is a mystery.

These salts are generally found in the tissues of plants, in a crystalized form, and deposited in the cells as foreign matter, not contributing at all to the composition of the woody and cellular tissue, which is called vegetable matter. Some of them are found in much greater excess than others; fruit trees when burned, give in their ash a great amount of potash, less soda, and but little lime. Yet it is the application of lime to the soil which stimulates the trees, and enables them to assimilate the potash and soda they need. I shall not enter into chemical details, but simply say that the lime enters into combination with the particles of the soil, and, by chemical interchange, the potash, or soda, is set free, and its place is taken by a corresponding amount of lime. The salts, thus set free, are dissolved by water, absorbed by the plants, and found in their tissues. Therefore, you will be almost certain of benefiting your trees by giving them a liberal dressing of lime.

When the orchard is dug over and pruned, see that the fences about it are in good order, that no animal may get in and browse the young twigs.

Though it is spring, and long before the time when baskets, ladders, and hooks are wanted, use some wet day of leisure to look over these implements, and repair damages. By doing this now, you will remember all summer what your deficiencies are, and be on the watch to repair them.

By the last of this month, the caterpillars will begin to build their nests. The webs will be seen — very small, at first — in the forks of the twigs, and smaller branches. Provide yourself with a caterpillar brush, or a bit of sponge; fasten it to a long, light fishing rod; get a few pounds of crude potash, and a butter firkin; nail a strip of wood across the top of the firkin, for a handle; put into it a pound of potash to a gallon of water. In the early morning, the caterpillars are all in the nests; they rarely start out for food before the sun is a few hours high. Go through the orchard with your brush and bucket, and wherever you see any sign of a nest, dip the brush, or sponge, into the firkin, and sop it on to the nest, rubbing it round the fork of the branch.

The Wire caterpillar brush is used without potash with the idea that the stiff wires will crush and destroy all the worms, but the alkali water is more effective; it will burn up not only the worms, but the unhatched eggs. More effectual than either, where the nest is accessable, is a more disagreeable, and I might almost say disgusting, process; cover the hand with a stout buckskin glove, and rub the nest and its inhabitants into a paste; you will thus insure the total destruction of the insects and eggs.

This work will consume a deal of time during the last of April, and the month of May. There are at least three broods of worms, all of which must be cut off, if you would have trees with perfect leaves, and a full crop of fruit. The lazy man, who neglects this work, or the man who thinks he cannot afford it, are equally foolish, and will surely find that their neglect not only permanently injures the trees, but destroys the fruit for the ensuing year. Careful watching, and washing for a few years, will materially reduce the number of worms. Some, however, will escape and lay their eggs, unless they are removed by another insect destroyer, the birds.

That farmer who allows any one to kill the birds about his place, because they eat his Cherries, Strawberries, and Peas, "saves at the spigot to lose at the bung." Only a few days ago I read a communication, in one of our agricultural papers, favoring the destruction of birds, on the ground that they not only eat fruit when ripe, but at other seasons eat the seeds of Red Cedar, Blackberry, etc., which are voided afterwards, undigested, about their roosting-places, in pastures, etc., where they take root and spring up, to choke the pasture, and annoy man and beast.

Before calculating the benefit, let us look into the mischief done by birds. Suppose we had 100 acres of pasture-land (enough to ruin us!) entirely free from Cedar, Bramble, and other plants whose seeds are food for birds. The birds begin to resort thither, and sow the seeds of fruit eaten elsewhere. Suppose that in one season they thoroughly sow an acre with troublesome plants,—though the supposition is absurd,—they will not germinate till the following spring, or become perceptible until the second year. In the spring of this year a man with a sharp bush scythe will cut over and virtually destroy every plant in a day or two;—cost $2! But all the birds on the 100 acres will not sow so much.

What are the benefits?

First consider the amount of land nearly or quite worthless for pasture, which birds plant, as with Red Cedar, the most valuable tree in New England for post-and-rail fences, a tree which might be cultivated with profit. Hedgerows and old stone walls are thus sowed with Cedar and Blackberry, and as one rides through the country he may see them on all sides, not in the middle of the fields, but along the edges, where as they grow large they give shade to the cattle, timber to use, fruit to preserve. Were there no other benefit from the birds, this would compensate for the cost of cutting down brush. For the fruit eaten, the beauty and song of birds more than compensates.

But how immense a balance is left. Careful experiments have shown that every robin consumes, during the summer, 15 lbs. of worms. A robin, fed for experiment, consumed, on an average, beside bread-crumbs, bits of beef, gravel, and water, 20 dwts. of worms a day. If the birds were wild, the beef and bread-crumbs would be replaced by seeds and earthworms, by caterpillars, canker-worms, larvæ of various kinds. And at liberty, the consumption would of course, be greater than in confinement; but at 20 dwts. a day during the six months when robins frequent cultivated land, one of them would eat *fifteen lbs.* (Troy weight) of worms. Think of that every farmer and gardener who complains of the robin, or of any bird, for all eat in proportion! The thousand birds which surround your farm and homestead during the year, welcoming morning and evening with their songs, eat 15,000 lbs. of worms. How many canker-worms, caterpillars, spiders, etc., would go to make up that amount? It is nothing less than insanity to prevent such destruction of vermin, because it involves a little labor with a scythe, to mow the bushes or brambles they have sowed, or the loss of a few quarts of Cherries. Even the common crow is useful in the same way. It is not to be denied that he pulls up a great deal of Corn, and gives a great deal of trouble, but he does it not for mischief, but in his efforts to assist the farmer. Every one knows the injury done to Corn, and other crops, by the wire or cut-worm; many specifics are recommended, all of some service; it is in the pursuit of these grubs that crows and blackbirds pull up the young plants, at whose roots instinct teaches them that their prey lies; and it will be found that the fields most haunted by crows, are most infested by the worm. I mention this to show the real habits of the crow, not to prove that we may not lose more by their hunting after the worms, than by the ravages of the worm if left unhurt.

Robins, crows, and blackbirds are not the only consumers of worms. A distinguished American naturalist told me that one morning he saw several branches of a favorite tree overrun by many hundreds of the coarse, hairy, black and red caterpillars, often seen on willows. He was on the point of going out to remove them, when he saw a male catbird light among and begin to eat them, occasionally flying away with some for its young. The bird continued this all day. By the same hour on the next day there were no caterpillars to be seen on the tree; the bird had cleared it.*

So of other birds; and the millions of pounds of worms eaten by birds, would, if unconsumed, devour every green thing. So long as a country is covered with forest, these insect nuisances are rare, and so are birds; as the land is brought under cultivation the insects increase, and the birds with them. So ready is nature to provide for the wants of civilized life. You rarely see many birds in the deep woods; they are about the homestead and hedgerows, and the murderous guns of idle men and boys do incalculable mischief to farmers and horticulturists.

The last work in the orchard for this month is grafting, which may be done through all the month of May.

* Rev. Thos. Hill, Waltham, Mass.

CHAPTER LV.

KITCHEN-GARDEN.

THE work of the kitchen-garden begins now in good earnest, and from this time till winter will keep the gardener busy.

The hotbeds and cold frames require constant attention. Dig over all the open ground, particularly that which was manured last fall with strong manure. You will find it pretty well rotted. Any that remains undecomposed must be shaken to pieces, and thoroughly mixed with the earth.

Make beds for Radishes in the warmest exposures. If your garden is protected by a fence, sow early, otherwise defer sowing till late in the month. Among the radishes set Lettuce plants and early Cabbages, from the cold frames and hotbeds, as soon as the weather permits and the plants are ready for removal.

Sow Peas in warm exposures very early, as they will not be injured by frost.

Make ridges for early Potatoes, as described last month. Prick out Cabbage plants for the cold frames as soon as you find settled weather. Choice heads of Lettuce, Cabbage, and similar vegetables, may be covered at night with the boxes already described. But the great occupation for this month will be with the hotbeds and digging the ground. Make out a list of the seeds you want, and the quantity of each, the first of the month, and buy early while the assortments at the stores are large and various. Melon seeds are said to be much improved by age, and by being carried for some weeks in a body-pocket, before planting. It has never been stated what the advantage of this practice is, but general opinion pronounces in its favor, and there is, therefore, probably some benefit in it. Few things puzzle amateurs more than the arrangement of good lists of seeds, in kinds and quantity. It is equally troublesome and unprofitable to have too much or too little, and the former error is very common for fear of the latter. Some kinds of seed each gardener does better to grow for himself, but in most cases it is best to buy, if he can be sure of the quality, as by getting seed grown on different soil from his own, he secures something of the benefit of rotation of crops. It is undeniable, that seed grown year after year deteriorates, even with the best care and selection. Judicious selection has as much to do with the improvement of seed as any thing else. For instance, a Wheat grower wishes the earliest kind, the largest head, with the greatest number of kernels and most plumpness, and a stiff and not superabundant straw. If his Wheat is such as he likes, he goes through his fields in July, and finds some heads, perhaps only one, much earlier ripe than the rest; some superior in plumpness or other respects. Perhaps one head unites all these good qualities. He marks it, and, when it is ripe, cuts and saves it. He will manure and dig well a little spot and sow these seeds early, so that the plants shall be well grown before winter. The next year he will keep these plants well weeded, and will certainly get several heads much better, in all respects, than the rest. These he will gather and sow. The next year he will get not less than 100 heads, which will give him 2,500 plants for the fourth year. At the least calculation, he will find among these 3,000 perfect heads, bearing, many thousand perfect kernels, "allowing 63 pounds to the bushel, for wheat, 86 grains will weigh a dram, or, at any rate, 87; the bushel will then contain 701,568 grains." *

Our cultivator will have obtained at least one-tenth of a bushel of a new and improved variety of seed, and another year's care will give him three bushels better still, and of course he may continue the improvement as long as he pleases. The same care will produce the same result of course with any kind of seed, and every cultivator should make a point of improving one or two kinds; not many, as it takes too much time and trouble. However, the experiment, as I have stated it, is far more elaborate than will be found necessary in practice. Let me quote two accounts.

"B. King, January 22, 1841, Sussex, England. Planted 3

* Stephen's Book of the Farm, p. 438.

grains of Wheat, 1 grain, the shoots of which were divided from each other and transplanted twice, yielded, in 1842, 3 pounds, 12¾ ounces of grain. The third grain was divided three times, and yielded 7 pounds 15½ ounces. The number of roots from this grain was 173; of ears, 3,272; of grains, 97,028. Half an ounce contained 382 grains. This, according to the Horsham experiment, was enough, the second year, to plant two-thirds of an acre."

"Mr. Jones, of Cambridgeshire, in 1838, got from 30 grains of Wheat 14¾ ounces; in 1839, 14¾ ounces sowed, gave 1¼ bushels; in 1840, 1¼ bushels sowed, gave 45 bushels; in 1841, 45 bushels sowed, gave 539 bushels."

In improving seed, only one species of any family should be cultivated in the same near neighborhood, because of the tendency of plants in the same family to mix seeds. Remember that the earliest healthily ripened fruit gives seed which will next year produce fruit still earlier; and a wise gardener, if he depends upon his own seed, will keep his earliest fruit for that purpose rather than sell it, even at an extra price. But, as I said, land gets tired of growing the same seed, year after year; so that the farmer often finds it for his advantage to buy seed from a neighbor.

As it is troublesome to select seed and estimate the quantity required, I will give the calculation for a garden of an acre, made by a distinguished cultivator. Some plants which we usually grow are omitted, and some uncommon sorts added. And it must be observed that the amount of seed for an acre is not to be multiplied by 20 to obtain the amount of seed for 20 acres; because, in a small garden, allowance must be made for the inferior plants, which are cast aside when seedlings are pricked out; whereas, in cultivation on a larger scale, no such transplanting is done, but good plants and poor are allowed to grow together.

"The list I give is for succession crops, and but one single planting for one acre:—

Peas,	36 quarts.	French or Kidney Beans,	4 quarts.
Beans,	10 "	Scarlet Runners,	2 "
Early Cabbage,	8 ounces.	Parsnips,	4 ounces.
Savory,	4 "	Salsify,	2 "
Brussels Sprouts,	3 "	Skerrit,	2 "

Cauliflowers,	4 ounces.	Endive,	4 ounces.
Varieties of Broccoli	8 "	Lettuce,	4 "
Borecoles,	4 "	Radish,	3 pints.
Red Cabbage,	2 "	(if none were forced.)	
Drumheads,	2 "	Mustard,	1 1-2 quarts.
Kohl Rabi,	2 "	Cress,	1 1-2 "
Onions,	12 "	(if neither are forced.)	
Carrots,	8 "	Parsley,	4 ounces,
White Turnips,	16 "	2 curled, 2 plain.	
Yellow Turnips,	6 "	Early Potatoes,	1 1-2 bushels.
Celery,	2 "	Late "	3 "
Spinach,	8 quarts.	Jerusalem Artichokes,	1 peck.
Red Beets,	4 ounces.	Garlic	8 ounces.
Yellow Beets,	2 "	Shallots,	2 pounds.
Leeks,	4 ounces.		

Add to the above 2 drams of long green Cucumber, 2 drams of short, prickly Cucumber, 2 drams of best Muskmelons, 1 ounce of Watermelon, 4 drams of best Cantelope melon, 2 drams of Summer Squash, 2 ounce of Marrow Squash, 2 ounce of Crookneck, 4 quarts of Stowell's Evergreen Corn, 2 drams of Tomato, 1 quart of Black Beans, and other seeds in like proportions. Your list made out, your seed purchased, you are ready to plant at the earliest date, and you must plant early and late in order to have succession crops.

Do not imagine that because the seed is provided in ample quantities, that thick sowing is advocated; thin sowing is almost always better, in order to give room for the young plants to expand their leaves and roots.

Never buy cheap seeds. The best seeds are worth the best price, and no cultivator can afford any other. For if the seed is bad, all the expense and labor of ploughing, manuring, sowing and cultivating are lost. Cheap seeds are refuse or damaged, or else of some worthless variety.

The importance of absolutely pure seed cannot be over estimated. We talk of the number of weed seeds in the soil; we sow more every year, than we imagine. Prof. Buckman, of England, in some late investigations, found that "in a pint of Clover seeds there were 7,000 weed seeds; in a pint of Grass seeds 12,600 weed seeds; in a pint of Broad Clover 39,440 weed seeds; and 2 pints of Scotch Clover yielded severally 25,560 and 70,400." All other seeds are similar, and the number of weed seeds in Grass seed, Red-top, Herd's Grass, etc., if enumerated, would horrify the most slovenly farmer.

Some seeds are those of parasites, as the Orobanche and Dodder. These are exceedingly minute, and adhere to the seeds of the plants to which they are parasites, so closely as almost to be invisible to the naked eye, and can only be removed by strong pickles. Rust and other similar diseases in grain, are parasitical fungi, and adhere to the seed.

Some kinds of seed, to be relied upon, must be fresh when used, as Carrots; others, like Turnips, are better for keeping a year or two, particularly if good seed of different years is mixed. Before sowing, provide yourself with some guano, or super phosphate of lime, as a top dressing; these manures raked into the surface, will stimulate the young plants into very rapid growth, and will drive plants of the Cabbage family, out of danger of the fly. These plants are very apt to be eaten by a small fly, when in their cotyledon state, but are out of danger just as soon as the rough leaves are formed, which are the second pair. Squashes and Melons also, are very much eaten by bugs and worms, when young; they are aided by guano.

So also, throughout the season, any plants which are slack in growth, or which you are desirous of hastening, may be hurried by a top dressing of guano raked in, or by digging it in round the roots, or by giving it as a liquid manure.

The tools absolutely necessary to a kitchen-garden, however small, are a spade, shovel, hoe, iron-toothed rake, trowel, lifting and manure forks, dibble, wheelbarrow, garden line, watering pot, transplanting tray, or basket. All these tools should have their separate places, and be returned thither every night.

The better class of gardens will need in addition, an edging knife, wooden rake, long-handled shovel, pruning knife, hand-saw, hatchet, long-handled pruner to reach to the topmost boughs of trees, some boxes with glass tops to protect the early plants, some square frames without bottoms, and with tops covered with mosquito netting, which, set over young Melons, etc., will keep off bugs and flies, hotbed frames, cold-pit frames, Sea-kale, Cardoon, and Cauliflower pots and glasses, syringe, wheel hoe.

Provide yourself with a good supply of the best tools, as they will be found much the cheapest in use; and take good care of them, which is the surest way of keeping them a long time. Towards the last of the month, you will need to look after the early nests of caterpillars.

HOTBEDS. — I have not given a day's treatment of the hotbed, but will do so now. In the early morning, as soon as the sun strikes the beds, remove the mats or shutters, if the day is reasonably mild.

Visit the beds about 9 A.M.; if it is bright and the thermometer is rising towards or above 80°, raise the sashes a little; during the forenoon give more air as the bed heats. About the middle of the afternoon, begin to water; use slightly warmed water. Water poured into the beds at this time will soak into them and nourish the plants much more than if applied earlier.

As soon as the watering is over, close the sashes, and when the sun gets off the bed, cover for the night. Keep the temperature of the bed constantly high, but with a moderate degree of moisture. Hotbed plants should never want moisture, but never be surfeited; too much dampness in cloudy weather will produce mildew and decay. To be successful with the beds, there is need of great watchfulness; as the plants increase in size, admit air as freely as is consistent with their growth, to harden them.

CHAPTER LVI.

THE FARM.

FARMING begins in good earnest in April. Soon the cattle will be turned out to pasture; every day you may let them out into the yard, and there will be no harm in occasionally letting the young and the dry cattle scamper for an hour or two over the pastures; the fresh air and exercise will be of service.

You will do well to give each of your men his own tools, a hoe, spade, shovel, scythe, rake, etc.; give it him in good order, and charge it to him; if he breaks or loses it, deduct its value from his wages, and give him another, but let each man keep and use his own tools, and never borrow. Thus much annoyance and dispute will be avoided.

This year's work is pointed out in our rotation.

Field No. 1, Pasture not so good as last year, and to be ploughed up in July, and sowed with Flat Turnips.

Field No. 2 is to have 1 acre Ruta-Baga Turnips, 1 acre Mangold Wurzel, $\frac{3}{4}$ acre Carrots, $\frac{1}{4}$ acre Parsnips, 2 acres Potatoes, to be planted in August with Wheat and White Turnips, sowed in drills or broadcast.

Field No. 3, 2 acres in Winter Wheat and Grass, on which sow 12 lbs. Red, 4 lbs. White, 4 lbs. Yellow Clover; 300 lbs. of plaster, mixed with 150 of guano. Field No. 3 will also have 3 acres in Spring Rye and Grass, or you may instead grow a fodder crop of Sweet Corn or Oats, to be cut in the milk. Sow Millet in July.

No. 4, Grass, to be cut twice, or pastured on aftermath.

The first orchard, which has been growing 20 years, was planted last fall with Rye and Clover. The Rye is to be cut for fodder, and the Clover fed down by pigs when it comes up.

Orchard No. 2, 15 years old, is to be planted with fodder Corn in succession, in rows well manured, and when cut to be followed with flat Turnips, or Rye and Clover, in the same strips for next year's fodder.

So orchard No. 3, 5 years old.

The Pear and Peach orchard is not to be cropped at all, but to be mulched.

The water of irrigation is not to be applied to any lands which are to be tilled, with exceptions already noted, but to grass and grain lands, while the crops are in the growing stage.

If March was too frosty to allow you to spread over the grass land the manure which was carted out last fall, spread it now. This should be done as soon as the frost leaves the ground, in order that the spring rains may wash it into the earth at once. The grass land will be too soft to cart over with comfort, and if the piles of manure were properly placed last fall, there will be no need of any thing but a pair of stout arms and a wheelbarrow.

Sow at the same time Clover seed over the land laid down to grass last fall, at the rate of, at least, 15 lbs. per acre, as just described. It is recommended that this seed be sown on the last snow, in order that it may be readily carried down into the soil as the snow melts, and thus be evenly distributed. This is a good plan when snow comes in April, as is often the case, and the seed is probably more equally distributed than by sowing on the sod, and leaving it to the rain; but to sow when the ground is still hard frozen, is to waste much seed.

Now is the time to sow guano and super-phosphate, as a top-dressing.

The amount of Clover seed, per acre, sowed at this season, is 10 to 20 lbs. The quantity of seed should vary with the soil, and with the other seed sown. I have frequently directed you to sow all crops thinly; but this does not apply to grass seed; the amount of these to the acre should be liberal, as much is eaten by birds and insects, some is poor, and when it germinates it is very desirable that it should come up thick; the coarse parts are thus rendered sweeter and more pliable, and the hay is eaten by the stock with greater relish.

When the seed and guano is all sowed, or the manure spread, roll all the grass land and grain fields carefully, to consolidate the surface, and press into the ground, out of the way of the scythe or mowing-machine, any stones or roots which may have been heaved above the surface by frost.

The first farm work will be preparing land for spring Grain. Reference to the scheme of our 6 years' rotation will show that there is always some spring Grain which is sowed with Grass to follow Roots. With the exception of early Potatoes, Roots are never off the ground in season to allow the sowing of winter Grain; therefore it is always desirable to divide the land for Roots — one portion to be planted with early Potatoes, the other with Turnips, etc.

The spring Grain will vary according to locality. In the Western States Winter Wheat has been nearly abandoned, because it has been so much more severely injured by insects than Spring Wheat. Where this is the case, the farmer may grow upon his fallows such Roots as he pleases, the land not being wanted for Grain till spring. With us in New England, Spring Rye, Oats, and Barley are the usual crops. Spring Rye has in some localities been destroyed by the rust and blight. Wherever such diseases prevail, Oats or Barley must be sowed. They will thrive on much poorer soil than Wheat, and Rye is considered a Grain for poor soils, and is grown year after year, upon land which does not yield crop enough to fairly pay for the labor. But, in truth, no Grain crop is adapted to poor soil; no poor land should be tolerated; the kind of Grain to be grown in any field should be decided by the nature, and not by the quality of the soil. Rye thrives well in loamy and dry gravelly soils; not so well on sandy land, though it will yield a fair crop in any fertile soil, but in rich loam it runs to straw. Oats are adapted to sandy clay, light loam, and good gravel. Barley thrives best in a hazel loam, or on good sandy land, and yields good crops on well drained and worked clay, but under any circumstances needs a well-drained soil. Wheat should be reserved for rich loam or loamy clay; clay of any kind yields good Wheat, if well drained and tilled, but these processes must be thoroughly done; and, indeed, we may say the same of the treatment of the soil for any Grain crop.

Occasionally farmers sow land down to Grass with Indian Corn, or

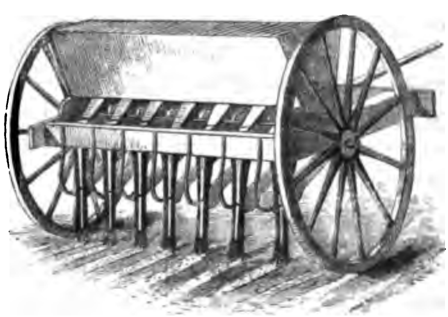
Squashes. Each of the various methods for getting land into Grass has its advocates, and each is best, under certain circumstances.

The following is the method for sowing land with Spring Wheat, to be followed next year by Grass. Plough thoroughly, but not before the land is dry enough to break to pieces under the harrow; plough at least 9 inches deep, and as much more as is possible. As soon as this is done, if the seed is to be broadcasted, sow 200 lbs. of guano, mixed with 200 lbs. of plaster, and double the bulk of good loam, peat, or charcoal to the acre; harrow carefully, and remove all large stones, stalks, and weeds. Pickle the seed, and sow 1½ to 2 bushels to the acre. This is much more than for fall sowing, as the seed will have no time to tiller, and only those stalks will bear seed which vegetate early, and thrive. Follow the Grain with Grass seed, and then give a single light harrowing, followed by the roller, which will leave the seed pressed into the soil, and the soil compact about it. A firm and compact soil is especially important to the Wheat plant, the light crops which it bears on sand and sandy loam being chiefly due to the lightness of these soils. The field will need no other care than occasional weeding, till harvest.

The benefit of the guano sown in the spring is manifold. It gives the seed an early growth, and drives it forward when rains are frequent, and it increases the yield in direct proportion to the amount applied. A cwt. of guano will invariably give double or treble its cost in extra crop. When Grass seed is to be sowed with the Wheat, follow the seed-wheat with at least, Red-top, 1 to 2 bushels, Herd's Grass, ½ bushel, Clover 12 pounds. It is useless and slovenly to draw a brush-harrow over the surface when the land is friable and in good condition, and the seed evenly spread. Grass seeds are much more economically and evenly sowed in the broadcast seed-sower than by hand, and although we do not care to spare our seed, having seen the advantage of its being in excess, the evenness of distribution is of great consequence to the crop.

The use of Wheat as a spring grain will be determined by the latitude. In some parts of our country Wheat will not ripen its seed unless sown in the fall, because it has then this advantage: It grows and tillers, (*i.e.* throws out suckers from the root which take root and send up a seed stem of their own), and covers the ground before winter with a thick sward. In the spring, before the land is fairly thawed, the plants feel the sun and begin to make new roots, slowly but surely, as the frost comes out, and before the land could be ploughed and sowed the new roots are well formed, and the plants ready to grow.

If you select Spring Rye or Oats as the grain, the treatment will be similar in all respects. Rye is sometimes saved from the rust by a pickle. The exact benefit derived from this pickling has never been determined, but it is certain that fields have been saved by pickling the seed, while adjoining fields, with unpickled seed, have suffered. For both Wheat and Rye various pickles are recommended. One method is to fill a tub with weak urine, or other ammoniacal liquid, pour in the seed and immediately take it out, and set it in a sieve to drain; then mix it with caustic lime, or Plaster of Paris, or wood ashes, in sufficient quantity to dry it. To ensure the seed's being covered, roll the mixture in a barrel, or shovel it over repeatedly. In this way the seeds will be prevented from sticking together.* I give a drawing of a drill for sowing seed. The seed and special manure are put into the boxes, and are sowed at the same time, securing a more even deposition of both than is possible in hand sowing. Use 1 bushel per acre. The saving of seed is considerable, and at the same time you are sure that all the seeds are deposited at a uniform depth, which is of very great importance. Careful trials have shown a considerable loss or a gain as the seeds were sowed



too deep, too near the surface, or at the proper depth. It has been

* Other pickles are salt and water, blue vitriol dissolved in water, arsenic, but this last is dangerous. In the place of the lime, in which I directed you to roll the seed, powdered charcoal, or any dry, antiseptic dust, may be used.

calculated by Stephens, that in a crop of 64 bushels to the acre, there is a loss of 33 per cent of the seed when sowed broadcast, of 40 per cent in a crop of 58 bushels to the acre. The proper depth is between 1 and 2 inches — not less than 1 and not more than 2. Spring Rye sown broadcast demands 1½ to 2 bushels, in the drill ¾ to 1 bushel, per acre. The straw of Rye is very much more valuable than any other, owing to its length and stiffness.

Oats are never sown in the fall, but always in the spring. Sow 3 to 4 bushels to the acre, broadcast. It is not so often drilled in as the other Grains, but gains as much by the process as any other. One to two bushels to the acre is enough when a drill is used. The peculiar roots of the oat collect the earth on which they grow into nodules, and the land needs rather more than usual cultivation to reduce it to fine tilth after oats.

Barley sowed like the preceding, requires 2 or 3 bushels to the acre, or 1 in drill. Sow it later than the other grains, but as early as the first of May. Do not roll it unless the land be very light. It may be pickled to advantage. The use of steeps, or pickles, for grain, is asserted to have another value than protection, if the steep is well made. A large number of careful and instructive experiments were tried in this direction by several English and Scotch agriculturists. The seed was analyzed a sufficient number of times to settle definitely its important constituents, and then these constituents were procured in a soluble form, were dissolved in water, and the seed soaked in the liquid until enough was absorbed, in the judgment of the experimenters, to thoroughly manure a given acreage upon which the seed was to be sowed. In the majority of cases the seed so prepared, and the field thus manured, gave large and satisfactory crops, demonstrating to the experimenters the truth of the theory upon which they had acted. But in other cases the experiment proved an entire failure, either because the theory was incorrect or the experiments badly tried. The inventor of this method patented it, and sold preparations for different crops. Undoubtedly there is a good deal in the idea, and I recommend every farmer to try the experiment.* All the Grain crops

* See pp. 155, etc., of Highland Society's Prize Essays for 1845.

are much benefited by weeding. Particular care should be taken to ensure that there are no seeds of mustard or other weeds among your seed-grain. It should be thoroughly examined, and, if need be, winnowed several times before sowing.

Land is in fine condition for all these Grains, after a crop of well-manured Roots, which leave it in the spring light and friable. If the field can be ploughed directly after removing the Roots in the fall and not harrowed, it will be in still better case, and may if necessary, be sowed in the spring without a new ploughing, only breaking down the furrows with a heavy harrow or cultivator.

No Grain should be manured with barnyard manure, as it is too coarse and rank to be easily appropriated by the roots of Grain, which having to elaborate in a few months a highly concentrated seed, needs to find its food in a well-rotted condition in which it is easily assimilated.

It has always been laid down as a principle, that no Grain except Oats should be sown on a lea or old sod. Wheat does best after Clover, the sward being broken up in the spring or early summer, and summer-fallowed, ploughed once or twice and sowed in the fall. The Clover tops and roots thus ploughed in, very soon ferment and decay, and give the Wheat just the food it wants. Some of our Western farmers prefer a Timothy sward to any other preparation for Wheat. Whoever uses the Michigan plough may sow upon the sod just as readily as on stubble or fallow. This plough is shown in the cut. It is double. The front plough cuts the sod in a ribbon, and rolls it under where it is covered with mould to the depth of two or three inches by the large plough which follows.

All lea land is more infested with wire and cut worms than fallow or stubble, and is in that way objectionable; but with this exception there is no sort of reason why the sod should not be used for winter or spring Grain. By adopting this practice, a different rotation may be followed, which is better than the one previously laid down under some circumstances. Well-buried sod is excellent food for Grain, if it is the sward of well-enriched land, it is easily decomposed, and yet firm for the early growth of the plants. Oats grasp the earth and consolidate a foothold better than any other Grain, all of which need a well-rolled soil.

Indian Corn is sometimes used to get land into Grass. It differs from all other Grains in being a hoed crop, and is used very often in the place of Roots, or to follow them on land which will bear two white crops in the rotation. It is sown by the corn-planter or by hand in rows. Different distances are prescribed according to the size of the Corn, straw, or tops, and the traditions of the district; 3 feet each way from hill to hill is about right; the seed should be set 1½ to 2 inches deep, 4 or 5 grains to the hill, 9 to 12 quarts to the acre. For this Grain, either barnyard or special manure may be used either broadcast or in the hill; both methods have their warm advocates. On good land I advise broadcasting the manure before ploughing, and then sowing with the seed some artificial manure in the hill, which is as good as any other manure in the hill to give the Corn an early start; and will hold out long enough to establish the plants so that they can send their roots abroad for the other manure. The time for sowing Corn is from the middle of May to the middle of June. Different varieties of seed obtain in different parts of the country. The Canada Corn may be sowed later than any other, as it ripens earlier, needing but 90 days; other and larger varieties need more time. It is a question whether the Canada Corn will not yield as many pounds per acre as any other; it is smaller, may be sowed closer in both row and hill, and with more grains to the hill.

I should not speak of this grain now out of season as it is, were it not in connection with sowing land to Grass. Cultivate the Corn *flat*. As soon as the Corn is high enough to show the rows distinctly, go over the field and shake a teacupful of ashes over each hill; then send a horse-plough through the rows each way, to furrow, deepen, and loosen the soil; follow this with the hoe, and carefully cut off, or pull up every weed. Do not content yourself with covering them with earth. Such a course is slovenly, and short-sighted; the weeds will soon come up again through the earth. After one good hoeing there need be no other general hoeing. As soon as weeds show again in the rows, send a horse-hoe, or cultivator, through each way, once or twice, enough to break up the surface soil thoroughly, and kill the young weeds, but never plough a second time, as the plough runs deep enough to break the young roots of the Corn. Cultivate or horse-hoe as often as is necessary, till the Corn becomes too large for the horse to go through the rows. If you have been careful and constant in your culture, the weeds will be so much subdued that they will not start again, for the Cornstalks will shut out light from the ground, and without light weeds will not thrive.

In July go over the field with the hoe, and cut and remove any remaining weeds. Then sow the Grass seed broadcast, which is a rather difficult and tedious process, for the sower must stoop lower than the Corn leaves, to spread the seed well over the ground. After sowing, rake the surface thoroughly with wooden rakes, to mix the seed well with the soil. Under the protecting shade of the Corn it will germinate rapidly, Cut the Corn in September as close to the ground as possible, and remove it at once from the field, stooking it along the edges or elsewhere. Immediately after some shower, roll the field thoroughly, so as to make it as level as possible, and press the Corn roots into the soil, where they will soon decay; for the same reasons, roll again before winter, and in the spring.

Prepare land for early Potatoes. The land for this is the pasture, or sward of last year, which is to be got into condition for winter grain. Plough with the Michigan plough, or with the common plough followed by a sub-soil. It is in the Root crop that the deep culture and thorough manuring are to be done, as after that crop is removed, the land lies in grain or sward for 5 years. Potatoes are not, therefore, as good as other Roots, as they are not benefited by much manure. The best crops of best Potatoes are usually grown upon unmanured but rich land. It has been thought by many that manuring has caused the rot, and I am of those who feel that less, rather than more manure should be the rule, for the sake of the tuber. Indian Corn may be planted in rotation in place of Potatoes, if you choose; planting the 90 day Corn in the middle of May, it may be stooked by the 20th of August, or the 1st of September; and afterwards there will be time to sow winter Grain. Before ploughing, cart on manure; the amount of this per acre, will be determined by the stock on hand, as all of it is to be used on this and the other Roots; no other than special manure being needed by the other crops in the rotation. An ample dressing is 10 cords to the acre of very rich manure; this is equal to 4 ox, or 2 horse, cart loads with the side boards on, well trodden and full to the top. Our New England farmers will take their first alarm at this, in their eyes, immense dressing. 20 cords of ordinary compost will be still better; remember that the field is to receive no other than special manure, or top dressing, for 6 years.

Having ploughed in the manure, harrow and furrow out. Run the furrows across the field 3 feet apart each way; drop into each intersection, your Seed Potatoes; the number will depend upon the kind you use, and the traditions of your district. If whole and small, 1 to 3, if cut in pieces, 3 to 4 pieces; lay them in with some care; as the seed is dropped, a man or boy should follow with plaster of Paris, and shake a handful over each hill; another should cover the Potatoes, drawing over them not less than one, nor more than two, inches of earth; the seed having been well covered, the hoe should be pressed down on the hill to consolidate the earth.

I mentioned in September, several varieties of good Potatoes;

add to these, for early culture, Hill's Early, ripens in July; Chenango, in August; Jackson White, also in August; State of Maine, Gilly Flower, and many other varieties variously esteemed.

Potatoes can be planted the last of this month, or the first of May.

Another spring crop, which may be planted upon lea or fallow land, manured or not, is Peas. I do not mean Peas for the table or market, but Peas as a field crop. Prepare the land as just described, and harrow evenly. Sow the seeds, with a seed-sower, in rows 3 to 4 feet apart, using 2 bushels to the acre; set the seeds 3 inches deep in the ground. Treat like Indian Corn during the summer. They will be ripe in July, when pull up and bind; stook till dry, then thresh. The yield will be about 30 to 50 bushels to the acre. Peas are excellent flesh-forming food for cattle or hogs. The straw will be readily eaten, or may be used for litter. This crop can be sown as early as Oats, although early Peas are more open to the attacks of weevil than those sown later. On the other hand, the Pea likes much water, and late-sown crops are liable to be checked by drought.

The field Bean is another crop similar to the Pea, but cannot be sown till the middle or last of May, through fear of the frost; and as they grow quickly, they need not be sown till the middle of June. Plough, harrow, and roll. Sow the Beans in rows 2 feet apart, using 1 bushel to the acre; set the seeds 2 inches apart, and 2 inches deep. Hoe during the season. As soon as the pods are yellow pull them up, tie in bunches, and stack to dry. Thresh them as soon as they are dry. Beans ground are excellent food for cattle, with Turnips. The straw is good for fodder or litter. Both Peas and Beans should be cracked or ground before feeding, in order to render them more digestible.

During wet days, which come often in March and April, the farm hands should be employed in the manure cellar. Let them first clear a space, situated conveniently near, and there begin to make a pile of manure. The manure accumulated during the winter, and packed and trodden by the hogs, is very solid. It may be rendered more manageable by turning it over, and at the same time will become better mixed. After turning, leave it a few days before it is used. During the process of turning, it would be well occasionally to sprinkle the heap with diluted sulphuric acid, or to shake over it Plaster of Paris, charcoal, or peat dust, to absorb the gases which would otherwise escape, and to stop heating or fermentation.

Fermentation, or heating in the manure pile, is the progress of chemical change, which results in the evolution of carbonate of ammonia, evident enough to any one who stands near a pile of heating manure. Other gases are formed in the process, and escape at the same time, but the carb. ammonia predominates, and the pile loses most by its escape. When the acid, or other absorbent, is spread through the heap, these chemical changes are arrested, and whatever gas has been generated is immediately absorbed; no more can form, and consequently fermentation stops.

In the last month (while discussing the rotation of crops) and in the present, I have frequently referred to artificial manures as a means of fertilizing crops, and some readers may not understand why the term "artificial" should be appropriated for any set of manures, when all manures are, to a certain extent, manufactured articles. The term is particularly applied to guano, super-phosphate of lime, poudrette, rape-cake, bone dust, and other fertilizers, which are articles of commerce. Different farmers preferring and using different kinds of artificial manures. Already many thousands of tons of them are used in this country, but seldon with care or accurate knowledge of their value. The use of artificial manures is an indication of the improvement of agriculture, since, generally, only those who are desirous of improvement, will spend money for manure. And the man who is willing to do so, is generally anxious that the land for which he makes the outlay should be in the best condition possible, in other words, that he should get the best return for his investment. Yet there is a class of greedy men, eager to get money, who buy and use these manures without investigation or discrimination, having only a general perception that artificial manure will rapidly increase their crops. Such men will, sooner or later, overdo the thing, and suffer from the careless use of these stimulants, and then they will pronounce this whole class of manures too dangerous to be of any value.

Every reader of American agricultural literature must have been astonished at the differences of opinion about the value of guano. Some men pronounce it the most valuable of manures, the regenerator of soils, the mainspring of agriculture, the great means by which the farmer may improve his condition. Others maintain that it is uncertain in its operation, overstimulating land for a time and then leaving it exhausted and barren, at one time powerful, at another powerless; in short, unreliable and valueless. As with guano, so with all all other manures; no two statements about them are alike.

Curious and inexplicable as this seems at first, it is owing to nothing but greedy haste to get rich by a short cut. Nothing for nothing is the rule everywhere in Nature; and no man grows rich in farming by short cuts, unless it be at the expense of those who follow him. I have said that unlimited patience is the stock in trade of the successful gardener; the same is true of the farmer. The operations of Nature are slow and sure, and not to be hurried; her laws are immutable. If we would succeed, we must study her secrets, and do as she does. Your assertion or mine is of no weight unless based on personal experience both wide and minute, or on similar experience of other men. To hear the talk of our experimental farmers, one would suppose that the round of agricultural experiments and success began with them, whereas the laws which govern agriculture have been discovered by long and patient groping and many trials, and are now matters of record. If you are inclined to make experiments, which require time and money and imperil your crops, endeavor to learn by reading and inquiry, how others have succeeded in similar experiments, and what was the cause of their failure or success. Their experience may enable you to avoid the rocks, the snags, and the whirlpools, the situation of which you must otherwise learn by sad experience.

I will endeavor to show the principles upon which successful manuring is based, and to lay down a plan for future action. To arrive at any definite and consistent plan, we must ask and answer the questions, "Why manure at all?" and "What is manure?"

To take these questions in order. We know that any plant cultivated on an acre of land for many successive years without manure, finally reduces that acre to sterility. It will bear no more of its old crop. The reason for this seems to be, that the constituents of which that crop is composed, are withdrawn to such an extent, that there is not enough left to support new plants; not enough, I mean, in a form adapted to the plants. That the necessary constituents are not wholly exhausted, is proved by the field's being able to produce the same crop again after lying fallow for some time. A large part of the *vegetable* constituents of plants is floating in the air as gas, and rain washes down a portion of them as it falls, making thus a considerable contribution to the crops. But the air does not contain all the elements of plant life, for lime, potash, and soda, technically called "salts," are not volatile, and can neither float in the air nor be supplied by it; yet they are always found in greater or less amount in all plants, and are essential to their life and growth, though we do not know how; and they are all important to the formation of the flesh, bones and blood, of men and animals, who obtain them principally from vegetable fibre where Nature has stored them. They may be formed through the *agency* of the atmosphere. For instance, lime exists as a carbonate in the rocks, and as these crumble into powder under the constant contact of atmospheric gases, the influence of storms and frosts, they spread the Lime over the neighboring soil. But this is a slow process, and we are forced to believe that no soil is ever wholly exhausted of the available form of these salts, whilst it may be wanting in the gases which are necessary to plant life, and in whose absence plants cannot appropriate the salts.

It is not difficult to ascertain the constitution of a soil, and to make a table of the constituents. I shall, in the following pages, give several such tables; do not in reading them be misled as to the quantity of the various constituents contained in the soils mentioned. In some cases the constituents will be given in pounds, in others, in a per centage; to get the number of pounds, will, in such cases, need a little calculation.

I have not quoted the number of tables or the variety of soils I might have, as the number would not strengthen the points to which I wish to attract your attention, and in the tables quoted you will find ample illustration of the value of earth analyses, and of the component parts of soils. The soils of your farm may differ from these analyses materially, but the principle will be the same.

CLAY FROM ZUIDER ZEE.*

	1.	2.	3.	
Insoluble quartz or sand, with alumina and silica.	57.646	51.706	55.372	
Soluble silica,	2.340	2.496	2.286	
Alumina,	1.830	2.900	2.888	
Peroxide iron,	9.038	10 305	11.864	
Protoxide of iron,	.350	.563	.200	
Protoxide of manganese,	.288	.354	.284	
Lime,	4.092	5.096	2.480	145,605 lbs.
Magnesia,	.130	.140	.128	5,404 "
Potash,	1.026	1.430	1.521	54,251 "
Soda,	1.972	2.069	1.937	81,565 "
Ammonia,	.060	.078	.075	2,907 "
Phosphoric acid,	.466	.324	.478	17,289 "
Sulphuric acid,	.896	1.104	.576	35,007 "
Carbonic acid,	6.085	6.940	4.775	229,509 "
Chlorine,	1.240	1.302	1.418	
Humic acid,	2.798	3.991	3.428	
Crenic acid,	.771	.731	.037	
Apocrenic acid,	.107	.160	.152	
Humin, vegetable remains and water, chemically combined,	8.324	7.700	9.340	
Wax and resin,	trace.	trace.	trace.	
Loss,	.542	.611	.753	
	100.00	100.00	100.00	

Soluble matter to an acre.

The number of pounds is obtained as follows: the weight of an acre of good land, 1 foot deep, is given as 4,094,640 pounds, or 94 pounds to the cubic foot. By the use of these numbers, you may get the weight of the percentages of any tables of analysis of top-soils.

This soil is kiln-dried before making the analysis. These are rich soils, and draw their origin from the Rhine country and decayed rocks.

IN ONE IMPOVERISHED SOIL.†

	1	
Silica, quartz, sand, and silicate.	61.576,	= over 2,000 000 pounds.
Alumina,	.450.	
Oxides iron,	.524.	
Oxide managanese,	trace.	
Lime,	.320,	= 13,102 pounds.
Magnesia.	.130.	
Potash and soda,	trace,	= many pounds.

*Text Book of Agriculture, p. 33. †Text Book of Agriculture, p. 35.

Phosphoric acid,	trace,	= many pounds.
Sulphuric acid,	"	"
Chlorine,	"	"
Humic acid,	11.470,	= about 500,000 pounds.
Insoluble humus,	26.530,	= and is a source of, and converted into carbonic acid,
Organic matter, containing nitrogen,	00.000.	
Carbonic acid united to lime,	trace,	= many pounds.
Water,	none.	

When kiln-dried, a *trace* in an analysis of 100 grains, would be many pounds in 4,094,640 pounds.

A BARREN SOIL IN NEW JERSEY.*

2

Organic matter,	4.50,	= 184.258 pounds. Contain perhaps, a little nitrogen; mostly carbon.
Silicates,	87.60,	= over 3,000,000 pounds.
Alumina,	3.65.	
Lime,	.45,	= 10,425 pounds.
Magnesia,	trace.	
Peroxide iron,	1.39.	
Potash,	.01,	= 49 pounds.
Soda,	.08,	= 3,277 pounds.
Chlorine,	.06,	= 2,456 pounds.
Sulphuric acid,	.12,	= 4,913 "
Phosphoric acid, with iron as phosphate,	.03,	= 1,228 pounds.
Carbonic acid,	00	
Moisture,	2.00.	
Loss,	.01.	
	100.00	

Kiln-dried, as before.

These analyses of soils are just as good for my purpose, to show what good and poor soils offer to the crops, as though I had a hundred such. Let us now ascertain what are the constituents of the crops themselves. I will take the crops usually cultivated, and give in tabular form the number of pounds to the acre, of the various constituents which will be removed by these crops. Knowing then, what crops require, and the composition of soils, we have next to ascertain what the air furnishes; we shall then see the elements which are to be supplied by culture, to facilitate the growth of crops.

When we look at the vast amounts of the various constituents

* Text Book of Agriculture, p. 36.

of the soil which exist in every fertile acre of land, it seems impossible that they can be exhausted even in a long course of cropping, or that the small amount we can return as manure, can be of any use. According to Boussingault,* Wheat takes from the soil,

As Wheat,	1,052,	Dry crop in pounds of the ash.	To 1-2 an English acre.
As Straw,	2,558.		
	3,610.		

This reduced to ashes, gives:—

Wheat ashes,	2.4 per cent,	or	25 pounds.
Straw ashes	7 per cent,		179 pounds.

Constituents	In 25 lbs. Wheat ashes.	In 179 lbs. Straw ashes
Phosphoric acid.	12.0	5.0
Sulphuric acid,	0.3	1.5
Chlorine,		1.0
Lime,	0.8	15.0
Magnesia,	4.0	9.0
Potash and soda,	7.0	17.0
Silica,	0.4	121.0
Oxide iron, etc.,	trace.	1.75

The organic matter of an average crop will take from 1½ acres:—of carbon, 2,259 lbs.; of hydrogen, 262 lbs.; of oxygen, 1,923 lbs.; of nitrogen, 52 lbs.; of nitrogen (in the form of ammonia), 63 lbs.

Let me say here, before going further, that ammonia is a compound formed of nitrogen and hydrogen, one equivalent of nitrogen to three of hydrogen, represented in chemical formula as $N\ H^3$.

We see from the table of constituents found in the analysis of the ash, that nitrogen enters more largely into the formation of plants than any one saline element except silica, of which, as we have seen, there is always a preponderance in common soils. As far as analysis and experiment have been able to detect, nitrogen is never taken up by plants in its pure form, but only as ammonia; and although we may manure crops with various kinds of nitrates,—that is to say, preparations in which nitrogen exists *not* as ammonia,—yet before the plants can use it, it is changed into ammonia. Nothing enters the plant through its roots, except dissolved by water; ammonia is readily dissolved in water, and thus carried

* Rural Economy, p 366.

into the plant. That some nitrogen may be carried into the plant from the air, is quite possible, it being a constituent of the atmosphere in connection with hydrogen and oxygen; but investigation does not show that the plant has any power of separating nitrogen from the atmosphere, for its own use, and accordingly it is generally admitted that ammonia is the source of the nitrogen in plants.

I dwell upon this question because upon the importance of ammonia in the economy of plants, depends the value of the different special manures. One class of chemists assert that there is no need of supplying ammonia artificially, but that the value of a manure depends entirely upon the quantity of *salts* (lime, potash, and soda), together with phosphoric acid in it. Another class strenuously maintain that the value of a manure is determined by the ammonia which it can yield to plants, and that the salts are of no consequence so long as there is a fair amount of phosphoric acid with the ammonia.

Let us examine a few more crops before proceeding further.

Analysis by Hemming. — A Rye crop abstracted from one half-acre (English) in *pounds* of — carbon, 2,169; hydrogen, 245; oxygen, 1,868; nitrogen, 34; potash, 25; soda, 1; lime, 10; phosphoric acid, 14; ammonia, 41.

A Turnip crop took from one half-acre (English) in *pounds*: Nitrogen, 159; potash, 166; soda, 5; lime, 102; phosphoric acid, 33.

A crop of Beans took from one-half acre (English) in *pounds*: Nitrogen, 164; potash, 55; soda, 8; lime, 37; phosphoric acid, 29.

Boussingault ascertained that in a rotation of 5 years, the following crops (per one-half English acre) took in pounds:*—

		Dry Crop.	Carbon.	Hydrogen.	Oxygen.	Azote or Nitrogen.	Ash.
1.	Potatoes,	2,828	1,244	164	1,264	42	113
2.	Wheat and Straw,	3,122	1,487	171	1,262	32	270
3.	Clover Hay,	3,693	1,750	185	1,396	78	284
4.	Wheat and Straw,	3,857	1,836	210	1,559	40	210
	Turnips, 2d crop,	3,656	2,832	36	278	11	50
5.	Oats and Straw,	2,151	1,087	125	816	26	99
		19,307	10,236	891	6,575	229	1,026

Boussingault is an advocate of the free use of ammonia as a manure, and values manures in proportion to the amount of ammonia

* Rural Economy, p. 357.

in them, and accordingly in his analyses makes no account of the ash.

Prof. Liebig, on the other hand, values his analyses and manures upon the saline constituents of the ash, and neglects the organic and ammonia-producing qualities. I will give some of the analyses of the ash, of the above crops, taken from Way, that their constituents may be understood.

I gave Boussingault's analysis of the dry crop. In Way's tables the weight of the dry crop is given, and with it the ash; but Way's crops were sometimes taken from twice as much land as Boussingault's, and are sometimes twice, and often several times greater in gross weight than Boussingault's, and consequently the comparison between the ammonia of the one, and the ash of the other, is only approximate.

	Nitrogen, as shown in last table.	Boussingault's Analysis.*		Way's Analysis.†	
	lbs.	Crop, lbs.	Ash. lbs.	Crop, lbs	Ash, lbs.
Potatoes,	42	11,733	113	12,750	423.97
Clover Hay,	78	4,675	284	4,000	213.09
Wheat and Straw,	40	4,977	210	9,068	246.01
Turnips,	11	8,754	50	52,000	600.30
Oats and Straw,	26	2,882	99	5,040	198.90

WAY'S ANALYSIS OF THE FOREGOING.

	Potatoes.	Clover Hay.	Wheat and Straw.	Turnips.	Oats and Straw.
Silica,	16.86	2.11	150.52	14.24	96.80
Phosphoric acid,	47.99		31.54	60.98	22.30
Earthy phosphates,		51.09			
Sulphuric acid.	50.21	1.25	0.44	78.82	5.80
Lime,	29.11	43.21	8.88	107.68	12.00
Magnesia,	25.41	9.75	12.70	21.54	9.10
Peroxide of iron,	1.35		0.56	6.29	2.70
Potash,	195.07	64.31	39.23	201.68	36.50
Soda,	27.53	36.79	2.14	39.21	3.60
Chlorine,	16.64	4.58		38.15	
Salt,	13.80			26.69	6.30
Chloride of potash,				2.00	3.80

A difference will be observed in the number of pounds of crop given in the two quotations of Boussingault's analysis; — the first quotation shows the number of pounds of kiln-dried material, the second of the material in its condition when harvested. The weight of the crops analyzed for the ash by Way and others, is given in its ordinary condition, and to make the table intelligible in its comparison, in the second quotation I have given the crop of

* Rural Economy, p. 357. † Brown's Field Book of Manure, p. 391.

Boussingault, in its harvested condition. Let me now call your attention to the fact that vast as is the amount of soluble minerals in fertile land, the insoluble ingredients are in much greater proportion, being sometimes 60 to 80 per cent. These insoluble materials vary with the locality; they are rocks composed wholly or in part of Lime, Potash, Soda, Magnesia, Silex. Silex, or Flint, gives to the outer coating of straw its hardness, and is as necessary to plants as any other element.

The analyses of "fertile soil" show a considerable and constant amount of ammonia, which should increase rather than decrease in the hands of the good farmer, and yet we have seen that plants annually take from the soil a large quantity of ammonia. Whence do they get it?

Careful analysis of air, of rain and snow-water, shows an appreciable amount of uncombined ammonia in the air, which is washed down by rain and snow and carried into the earth; but a thorough course of experiments just concluded by the best agricultural investigators in England, has proved that the amount annually furnished to the earth in this way is less than the amount taken away annually by ordinary crops. Yet the opponents of special ammoniated manure have pointed to the ammonia of the air as sufficient to supply all the wants of the crops, and have maintained that any other supply of ammonia is unnecessary.

One follower of Liebig gives the number of pounds of ammonia found in the soil of several different acres, varying in amount from 3,000 to 8,000 pounds, and then triumphantly inquires what farmer would ever cart from his manure-yards 8,000 pounds of ammonia to his fields*.

This is most mistaken reasoning. Our tables have just shown that in a single fertile acre, there may be 145,605 pounds of lime, 54,251 pounds of potash, 17,289 pounds of phosphoric acid — all soluble. What farmer would ever think of carting such quantities of these salts out of his yards to his land?

Again, it is said that the value of barnyard manure is dependent, not upon its ammonia, but entirely upon the carbon and salts supplied by it. But the same great authority who asserts that all the

* Prof. Horsford, Cambridge, Mass.

ammonia needed in agriculture may be derived from the washings of the air, shows that at least 200,000 pounds of carbonic acid *per acre* may be supplied from the same atmospheric reservoir. In the eyes of his school then, the value of barnyard manure cannot depend on its carbon. The constituents of barnyard manure are, about 80 per cent water, 18 carbonaceous matter, 2 of salts and ammonia. If then its value lay in its carbon and salts, our farmers would do well to burn their manure and carry out the *ash* only, which would reduce the expense of manuring a field with barnyard manure at least one half. But in fact, this manure, though not in any one's opinion perfect — varying as it does in quality, and never containing all the elements of plants in due proportion — has always been found more generally efficient than any other manure. How it may be improved will be stated hereafter.

To return to the advocates of saline manures. They give a list of instances in which the crops on different pieces of land were doubled and trebled by the application of some saline manures, lime, gypsum, phosphorate of lime, etc.; and from this they reason that these salts are the important special elements in manures, and that their liberal application will result in unbounded crops.

On the other hand, the advocates of ammonia show equally large lists of cases in which the application of that substance produced crops as great as those that followed the saline manures; and from this they infer the importance of ammonia, and the uselessness of any other so-called fertilizer.

I could give lists of experiments on both sides, each list equally conclusive in favor of the manure employed in the experiments set down in it. Both cannot be true, and in their precise application neither is true.

Before defending either side of this argument, we must consider to what use vegetation is devoted. With scarcely an exception, to support animal life. Animals can *thrive* only upon food which contains nitrogen; therefore an analysis which deals only with *ash* of a crop, can furnish no argument applicable to animal economy, for the food of an animal must contain all the elements necessary for animal life. To omit from your analysis that portion of the crop most essential to the result for which the crop is grown, is absurd; yet this is done in every *ash* analysis. The heat necessarily applied to obtain the ash converts nitrogen into volatile ammonia, and sends it off in the form of gas. Such an analysis can only satisfy those who assume that all the nitrogen needed by plants is supplied by the air. This is assuming the whole ground, and if admitted cuts off all further argument. But I do not admit it, or see how any one can admit it.

Let us take the case of an acre of land, sterile, and destitute of various salts, of carbon and ammonia, with nothing but lime in abundance. It would be useless to expect a crop if we applied to this acre once or twice the amount of mineral matter that our crop would need. Even under the best culture, the land could not be so thoroughly worked and exposed to the action of the roots, that the crop could search through the whole acre (4,094,640 pounds of soil) and hit upon just what it wanted. The advocates of the saline theory would not expect it, any more than we; they would expect to supply annually for several years, the saline constituents of the crop in some excess, and in such form as would enable the crops to seize it readily, and would not feel sure of an ample crop until the constant accretions amounted to enough to leave a large balance on hand, on which the crop could draw in time of need; and they would not consider the condition of the land perfectly satisfactory until it was so well stocked with these constituents, that the addition of a year's supply would be necessary only to keep this balance good.

Or again; suppose all the saline constituents to be abundant, except one, and that one an element universally and largely diffused through plants,—potash, for instance. Would our theorist rely upon the disintegration of the thousands of pounds of solid rock in the soil, which might annually crumble enough to supply to an acre of land the few pounds of potash needed by its crop? He would have good reasons for not doing so; he knows that the process of disintegration would be slow, and not most active during the growing season. He knows that it might be more perfectly and surely accomplished in one part of the field than in another, and that accidental causes might altogether check it. These reasons would decide him to apply potash enough, in an assimilable form, to carry one crop, at least, through the season.

Let us now put the case of an acre of land abounding in saline constituents, but destitute of ammonia, from which several crops are to be taken, demanding various amounts of nitrogen. Obviously, the only natural source of nitrogen in this case, is the ammonia in the air, which will be carried into the soil by the rain and snow.

* According to Liebig, the largest annual amount that can be calculated upon from that source is "upwards of 80 lbs. of ammonia, or 65 lbs. of nitrogen; for by the observations of Schubler, the annual fall (of rain) must be 2,520,000 lbs. This is much more nitrogen than is contained in the form of vegetable albumen and gluten in 2,650 lbs. of wood, 2,500 lbs. of Hay, or 200 cwt. of Beet-Root, which are the yearly produce of such a field. But it is less than the straw, roots, and grain of Corn, which might grow on the same surface, would contain." The field here calculated contains 26,910 square feet. To an English acre there would be 158 lbs. per acre of ammonia.

In another place he says: "No conclusion can have a better foundation than this, that it is the ammonia of the atmosphere that furnishes nitrogen to plants."

The amount of ammonia thus supplied comes in the shape of the carbonate, which is the volatile form of ammonia, and when carried into the earth is either still retained as a carbonate, and still volatile, or is fixed by the free or combined sulphuric acid in the soil, and converted into sulphate of ammonia, which is soluble in water, but not volatile. There can be no doubt that some is thus fixed, and a strong argument for the use of gypsum, or sulphate of lime, is that it fixes ammonia, the sulphate of lime yielding its sulphuric acid to the ammonia, taking, in payment, its carbonic acid, and becoming carbonate of lime. How much is thus fixed, of the 158 lbs. to the acre, we do not know; but that which remains as a carbonate is still volatile, and under the warmth of a summer sun undoubtedly re-evaporates into the air, as does the same gas from an unfermented manure pile; whilst during the winter it is scarcely absorbed at all, as at that season the larger part of the rain and snow-water runs off the frozen surface into the natural drainage.

* Agricultural Chemistry, p. 44.

Of the whole amount supplied in rain, etc., not more than two-thirds (105 pounds) can be absorbed, and there is every reason to suppose that a large portion of this is re-evaporated, while of the remainder a considerable proportion in most soils would be carried by the water with which it fell, or by subsequent washings, into the subsoil, where it is below the roots of most annual plants. It is a mistake to look upon an acre of cultivated soil as if it were a bed of charcoal, chloride of calcium, or sulphate of lime, which would filter all water that ran through it. Much of the surface of our soil is full of perceptible holes left by worms, decayed roots, etc., and leading directly to the subsoil, through which a great deal of the water that falls runs rapidly into the subsoil, without any filtration or purification whatever, carrying with it any ammonia it may have. And other large quantities of highly ammoniated rain water, that of thunder-storms, fall so rapidly and forcibly as to be shed from the surface like that which falls in winter.

In all these ways the ammonia ($N H^3$) supplied from the air is wasted (so far as our soil is concerned), till it is evident that but a small amount is retained for the crops.

Again, look at the results obtained by those who use the largest quantities of highly nitrogenized manures. Urine — whether of men or animals — is the most ammoniacal of manures. The following table shows the composition of human urine: —*

Urea,	3.01
Uric acid,	0.10
Indeterminate animal matter and lactic acid, and lactate of ammonia,	1.17
Mucus of the bladder,	0.03
Sulphate of potash,	0.37
Sulphate of soda,	0.32
Phosphate of soda,	0.29
Chloride of sodium,	0.45
Phosphate of ammonia,	0.17
Chloro hydrate of ammonia,	0.15
Phosphate of lime and magnesia,	0.10
Silica,	trace.
Water,	93.30
Loss,	0.54
	100.00

* Brown's Muck Book, p. 318.

In addition to the other solid ingredients, we have 3 per cent. of Urea, which consists of *

Carbon,	20.0
Nitrogen,	6.6
Hydrogen,	46.7
Oxygen,	26.7
	100.0

and is accordingly richer in nitrogen than any other organic manure. When it begins to ferment, it changes into carbonate of ammonia and escapes, giving the pungent smell to fermenting urine. This carbonate of ammonia is so very volatile, that every possible means must be taken to secure it; one of which is to mix large quantities of water with urine, for although urine is mostly water, there must be additions made before the carbonate of ammonia is held. By thus diluting it, and then allowing it to stand for a time, a given amount compared with an amount of undiluted urine, equal to the urine contained in the diluted specimen, and allowed to stand for the same time, is found much the richer in ammonia. Thus, in cow's urine: †

		lbs. solid matter.	lbs. NH^3.
	Recent urine contained	900	226
Same am't	mixed with water and set by for 6 weeks,	850	200
	unmixed " " "	550	30

This excrement, so peculiarly rich in ammonia, is scrupulously saved by some nations, particularly by the Flemish and Chinese, who use it largely in various fermented and unfermented forms, separate, and combined with charcoal, gypsum, etc., and the resulting crops are larger than any which follow the application of any other manure, even in dilution. I say *even in dilution*, because, as plants can take their food only in a diluted form, it might be said that the great returns from the use of urine were in consequence of its being in a liquid form. So powerful a manure is human urine, that one part of it is equal to 13 parts of horse, and 16 of cow, manure.

Other highly nitrogenized manures are guano, rape cake, and poudrette, or night-soil. The crops which follow their application

* Brown, p. 319.

† Brown, p. 321.

to various soils are so enormous, as to excite fears that the soil would be exhausted.

These facts furnish conclusive replies to those who advocate the *exclusive* use of saline manures.

I have followed both sides of the argument thus far, in order to show that there is room for thought in farming, especially in the matter of manures, and that it is a mistake to follow any theory which disregards any of the important elements of vegetable tissue.

We have looked at the constitution of various soils, and at the constitution of several crops. Now take the best soil and cultivate it without manure. For many years the crops will be undiminished, but will ultimately decrease. The land is at first in what is called good heart; the balance is large, and crops can draw on it to any extent without danger of check; but to ensure a continuance of this fertility, and to exactly carry out Nature's laws, we must return to the soil as much of the constituents of the crops as they remove. If we add more of any one thing than is taken away, the proportion of that substance in the soil will increase, and may be neglected in the next manuring; and on the other hand, I repeat what I have before implied, that it is justifiable to pursue a course of cropping and manuring which does not in each individual instance restore the elements removed, but which in the aggregate keeps the balance equal.

We have seen that it is the intention of Nature, by crops of wood and the annual accretion of leaves, by the weathering of rocks, by the deposit of more or less ammonia in rain, to raise land to a high state of fertility; and that if our culture returns only one element — organic or inorganic — it destroys the perfect symmetry and balance, and impoverishes the land surely, even if it be slowly. It is necessary to understand this clearly in order to farm with the best judgment.

The foregoing reasoning answers the question, Why manure at all? We see that unless we restore the elements we take from the soil in crops, we shall ultimately impoverish it; let us now proceed to the farther consideration of the second question.

It is quite possible to attempt to keep one's land "in heart" to ill advantage, and with a present loss greater than any future gain.

Some enthusiasts have believed that by analyzing crops, manures, and soils, agriculture may be reduced to the method and precision of manufacturing, and a large or small crop be secured, just as may be desirable; and this does seem possible when we look at the harmony of parts, and the balance which may be maintained between what we add and what we remove from our fields. Yet the general practice of farmers is blind and headlong, especially in this matter of manuring.

Proverbial as is the folly of carrying coals to Newcastle, our farmers are guilty of it every year; at a great expense they carry manure on to land which needs something quite different. If they reasoned and analyzed a little, they would save both money and time, and gain in crops. Had I given more lists of soil analyses, you would have seen the great difference in soils on the same farm.

I do not believe that farmers ever will or could profitably have the soils of all their fields analyzed, and then proceed to manure according to the deficiencies reported and to the proposed crops. Farmers who have in mind analyses of ordinary land could not persuade themselves to manure at all. Imagine a farmer reading in an analysis of his soil that an acre contains 300,000 pounds of Lime, 50,000 pounds of Potash, 75,050 pounds of Magnesia, 4,000 pounds of ammonia; and that the crop he expects from that acre will use 100 pounds of lime, 500 pounds of potash, 30 of ammonia. Could he believe it necessary to add a little more in the way of manure? he would be the most obstinate of sceptics, and would never put in a pound of manure; it would seem as mean and small as for a millionaire to save his cheese-parings. And yet with these thousands of pounds of rich mineral manure, the little additions of the farmer are necessary to any good crop. Why, it would be hard to say; whether because of its being in a form more easily assimilable, or because of the necessity of keeping the balance good, or as a condition of tenure imposed by nature on landholders, it is *necessary*.

A great error into which men fall in considering analyses of soils, is to suppose that the hundreds of thousands of pounds set down there are all in a condition to be used by plants. They are perhaps locked in solid rocks which are nearly insoluble by water, and from which they can be freed only by the slow work of ages, or by the rapid grinding, wasting, and dissolving of the laboratory. It is the free and easily assimilable elements of a soil which are of value to a crop; none other are of consequence. Remember this when you study an analysis of soil. No fact is better established in geology, than that soils are not necessarily formed from the rocks that underlie them, but may be diluvial drift. A soil overlying phosphatic limestone, may be wanting in both lime and phosphates.

But while it is not necessary or important to have these analyses of our land for our guidance, each man's farming may be much improved by his clearly comprehending the principles of analysis, and the mutual relations between crops, manures, and soils, the general physical character of different fields. He may then apply to each soil that kind of manure which is richest in the elements in which the soil in question is deficient; he will not waste it on a soil compounded in the same proportions as itself.

Soils may be generally divided into sandy, clayey, loamy, carbonaceous, and lime soils; and these again subdivided into coarse and fine, close and open; with a few exceptions we have learned from the analyses of soils made by David A. Wells for the State of Ohio that all loamy soils, with the exception of river bottoms, are nearly identical in their chemical composition.

The difference in fertility arises mainly from the thickness of the strata, and the fineness to which its particles have been reduced by the action of the elements; all diluvial soils are overlaid by a stratum of loam, and in its virgin condition, this soil, wherever it lays, is equally fertile, and will produce equal crops; all crops take from the soil certain salts as we have seen. If the soil is virgin, it will be sufficiently rich in the salts to give a good crop; just in proportion to the cropping it has received without manuring, just so much of the various salts will have been withdrawn, and must be restored in some shape to restore the soil to fertility.

To begin with the *texture* of soils. Some land is hard clay, which (even when well drained) retains moisture for a long time, and whether wet or dry is hard and difficult to work. When wet, it is slippery and tenacious; when dry, it is like a brick. The first improvement to such a soil is to drain it thoroughly, which lightens it, and renders it more pervious to air and warmth; the second is to mix with it such materials as will tend to open it and make it light. Let us compare it to a dough, which is sticky and tenacious when partially mixed. By working into it more flour it becomes closer, but yet lighter and more friable, and by a continuation of the process is brought to an open texture which allows us to do what we please with it. So a clay soil is opened by the application of sand, ashes, peat, or carbonaceous manure, all of which are opposed to the close character of the clay. They separate its particles, and give new channels for the escape of moisture, and the access of light and air.

These clays may abound in or be destitute of lime. A little care, and a few simple experiments, will tell which is the case with yours. If lime is in excess, they are marls, and are valuable as a lime-manure. If lime is absent, or present only in small quantities, its application will be of great benefit; top-dressings of lime, gypsum, and ashes, will produce wonderful effects.

Clays have great power of absorbing ammonia and other gases, and are useful to incorporate with manure and with other soils for that purpose.

But suppose that your land is sandy; all waters and valuable manures rapidly run through it, and the land is sterile. By applications of clay you may counteract the looseness of soil, bind it together, and fertilize it. Some other things will have the same effect, particularly peat, and carbonaceous manures, so that we find these serviceable in two quite different kinds of soil. Peat, however, serves in the sand rather as a sponge, to hold gases and food for plants, than as a binder to the soil, whilst clay answers both purposes. But peat being dark-colored warms the soil, during the growing season, by absorbing all the sun's rays, while it imparts moisture even in dry weather, from its loose texture, which in the afternoon and evening rapidly radiate heat, and by thus cooling the surrounding air condense moisture. A little investigation will show the farmer of what kinds of rocks his sand is composed; if of those rich in potash, and destitute of lime and soda, lime and salt should be supplied, and *vice versâ*. This investigation, the work of a few evenings, will be his first step towards discovering the secrets of nature.

Suppose, now, that the land is gravelly; gravel is a sort of coarse sand, which, however, may be of a clayey nature. It has a coarse texture, through which all water or manure may rapidly leach, and is apt to be formed in large part of quartz pebbles, and of siliceous matter, whilst quite often the stones and sand are cemented together by a fine clay. The reasoning already given may be applied to this soil, and will teach the farmer how it may best be drained, be bound by clay, or loosened and warmed by sand and peat.

If the land is loamy, it may be overloaded with carbonaceous matter, which becomes inert when too abundant. Experiment will teach that the application of some alkali, like lime, potash, soda, or ammonia, will quicken the inert mass, decompose its carbon, and render it exceedingly fertile; or that an admixture of sand will give that openness of texture necessary to enable the roots of plants readily to find the food they need.

Or the land may be peaty, full of carbon and water. Of course the water must be removed to let in warmth and air, to sweeten and lighten the soil. Carbonaceous matter, such as bits of wood, leaves, stems, moss, etc., are the component parts of the soil, and are inert, and produce only a sour vegetation, while they form a sponge for water that almost defies drainage. A little thought renders it apparent that the application and admixture of sand and gravel will alter the texture, and open the soil to the free escape of water, as well as to the admission of sun and air, and that a dressing of caustic lime, or potash, will decay and render available the carbonaceous materials.

This is the mechanical treatment which a very slight examination of the texture of soils leads to, and which can be pursued without recourse either to purchased manures or to special analyses. It is naturally one of the first steps in improving soils, and the farmer who has made it, finds another reach of improvement opening before him.

Up to this time he has relied solely on barnyard manure, but now he finds that the sand, clay, or peat, which he mixes with his soils, does more than improve their texture, that it has a positive value as manure; and so he is led to look into its *chemical* composition.

In a former month, while speaking of stock, I said that the value of their manure is in proportion to the nature of their food. Hitherto our improving farmer has cared little for the elements in his manure; it has all been *dung*, and that was all he thought about it. But now he must consider not only the mechanical texture and the chemical composition of his soils, but also the composition of his manure heap, and the means of improving it; a step which brings him at once to artificial manures. For with the knowledge that without an annual addition of the elements necessary to vegetation, and removed to greater or less extent in every crop, his most fertile land will deteriorate, then comes a sense of the importance of ascertaining whether or not he is "carrying coals to Newcastle." He sees the advisability of purchasing a few pounds of the needed elements in their concentrated form, and incorporating them with his more bulky manure. He understands what chemical *elements* are, and that without them his land cannot be got into good heart, and kept there; and having finally come to *think* upon the subject, he no longer thinks it ridiculous to spread 5 bushels of salt, or plaster, or lime per acre. It is nothing to him that the amount is small; he only asks whether it is enough.

Our farmers have gone on for ages using barnyard manure, and with success, when they applied it in sufficient quantity, because it approaches to the character of a universal manure, in proportion to the nature of the food of the animals that make it. But the wonder is that men do not grow poor by its use when unimproved.

Before we enter on the question of barnyard manure, it should be premised that it is generally more readily taken up by plants, on account of its holding so much water that when fresh it is like liquid manure; and observe that this water of composition is all important to its value; without this the other elements would be almost useless, so few and small in amount are they; yet it is important only in dry seasons, and then only for a limited time. As soon as the earth becomes dry it evaporates, and the manure loses the advantage it possessed. Under a system of irrigation, or in a moist climate, or in an ordinarily wet season, it is easy to compound manures much more beneficial to the crop, and at no greater expense per acre.

It may be said that in admitting the importance of irrigation, etc., to the success of any other than barnyard manure, I admit the superiority of that manure; since we cannot control climate and rain, and must therefore depend on the water of composition.

It is my wish not to deny, but to insist upon, the value of the common manure, and to urge farmers to make all they can; but at the same time I propose to show that we can improve it very much, use it only in part, or wholly do without it.

The first step towards understanding this matter, is to examine an analysis of such manure. Of course, this will vary with the kind of stock kept, the number of each kind, and the nature of their food. I will therefore give a table of the composition of the manure of several species of stock, as well as of the compost. This will enable you to see how money is annually wasted, and how to reform your farmyard economies.

Barnyard manure in its unmixed state, is composed of the droppings of horses, cows, pigs, sheep, hens, pigeons; generally horse, cow, and pig, are the chief makers of manure. To this is sometimes added the excrements of the family. On most farms, cow manure will largely preponderate in a compost. On farms where there are many sheep, their manure is kept separate. It is much richer than that of either horse or cow, one part of it being equal to three parts of the best compost. The simple excrement in a fresh state consists of*

Water,	68.71
Arotized matter,	23.16
Saline matter,	8.13
	100.00

The 8.13 of saline matter is composed of phosphate of lime, magnesia, silicate of potash, common salt, and silex. So powerful is this manure, that "it is said that 1,000 sheep, folded on an acre

* Browne, p. 239.

of ground one day, would manure it sufficiently to feed 1,001 sheep, if their manure could all be saved; so that by this process, land which can the first year feed only 1,000 sheep, may the next year, by their droppings, feed 1,365. Sprengel allows that the manure of 1,400 sheep for one day is equal to manuring highly one acre of land. In France, it is allowed that one sheep manures about 10½ square feet of land per night" (when folded on the land).

* "The manure of the horse is composed of

Water,	75.31
Geine, or organic matter,	20.57
Salts,	4.02
	100.00

"The geine, or organic matter, is composed of

Carbon,	9.56
Hydrogen,	1.26
Oxygen,	9.21
Nitrogen,	.54
	20.57

"The geine (organic matter containing both carbon and nitrogen) is nearly double that in cow manure, and the salts, which are mostly phosphates of lime, magnesia, and soda, are about the same." But its dryness and preponderance of ammonia cause it to heat with great rapidity, and thus to lose much of its value, unless well secured. As a manure to be used alone, as a top-dressing, it is worthless; ploughed in fresh, or made into a careful, compact compost, with loam, peat, etc., it is of great value. When thus composted, the heap should be broad, well trampled, occasionally watered and sprinkled with plaster of Paris.

Cow manure, as I have said, is usually the most abundant kind. Its composition is

Geine.	15.45
Salts,	.95
Water,	83.60
	100.00

* Dana's Muck Book, p. 168.

The organic matter of 100 parts cow dung give *

Nitrogen,	.505
Carbon,	.234
Hydrogen,	.824
Oxygen,	4.818
	6.381

1 part of nitrogen unites with 3 of hydrogen to form one equivalent of ammonia. 100 parts fresh cowdung will afford ⅝ pounds of nearly pure ammonia, or about 2 pounds 2 ounces of carbonate of ammonia.

"Experiments have shown that one cow prepares daily 85.57 pounds of dung, or about 13 pounds geine, 3 ounces phosphate of lime, 1½ ounces gypsum, 1½ ounces carbonate of lime, or per year, 4,800 pounds geine, 71 bone dust, 37 plaster, 37 lime, 25 salt, 15 sulphate potash." † Of the geine, there will be 156 pounds nitrogen, or 189 pounds carbonate of ammonia.

"Cow dung, for several reasons, its universality, its sameness of character, its composition, may be taken as the type of all manures, and all may be valued as they approach to, or depart from it." "A single cow fed on Hay and Potatoes, will yield 31,025 pounds dung, whose composition we have just seen; this would have lime enough for 140 bushels of Rye and its straw, could it all be evenly spread and readily taken up, and also more than enough nitrogen." ‡ I have previously said that it is not known what part ammonia or any other alkali plays in the vegetable economy, but the action of nitrogen in the compost heap is very powerful. It acts upon the geine and renders it soluble; it does the same to the silica, by forming nitric acid with the elements of the air, in connection with ammonia, and this nitric acid decomposes the silicates and produces nitrate of potash.

Having given the composition of the two principal elements of the compost heap, I now give the analysis of a compost of barnyard manure, just before it was applied to the soil.

* Dana, p. 150. † Dana, p. 161. ‡ Dr. Dana's Muck Manual.

Fresh.		Dried at 212° Fahr.	
* Water,	64.96	Carbon,	37.40
Organic,	24.71	Hydrogen,	5.27
Inorganic,	10.32	Oxygen,	25.52
		Nitrogen,	1.76
		Ash,	30.05
Inorganic. Soluble in water.		**Analysis of the ash. Insoluble in water, but soluble in muriatic acid.**	
Potash,	3.22	Silica,	27.01
Soda,	2.73	Phosphate of Lime,	7.11
Lime,	.34	" " Magnesia,	2.26
Magnesia,	.26	" " Iron,	4.68
Sulphuric acid,	3.27	Carbonate of Lime,	9.34
Chlorine,	3.15	" " Magnesia,	1.63
Silica,	.04	Sand,	30.99
	——	Carbon,	0.83
	13.01	Alkali and loss,	3.14

"Thus, 100 pounds well-made barnyard manure gave 65 pounds pure water, 25 inert carbon, 10 per cent inorganic, and .006 ($\frac{3}{8}$ pound) nitrogen; of the 10 per cent ash only 3 per cent are of much value; but the above manure was of extraordinary value in comparison with the ordinary compost heap."

I have recommended all along that manure be formed into compost heaps with various materials,—at the head of which stands peat; 2d, clay, old sod, or decayed vegetable matter; 3d, loam; 4th, sand; 5th, tan, sawdust, etc.

We have already seen how great are the advantages of clay as an application to land. I have said that for sand it seems to be the specific, but its value is relative, and confined to a few varieties of soils, whilst peat can be much more widely applied, and is of more general value. Under the general name of peat, are comprised several varieties, of different value, from that which is rich in vegetable matter, salts of lime, potash, etc., to those pond muds which are little but barren sand. "100 parts of average peat contain †

Water,	85.0
Salts of lime,	.5
Silicates,	.5
Geine,	14.0

* Text Book of Agriculture, pp. 321 and 322. † Dana, p. 245.

"This does not differ much from cow manure, so far as salts, geine, and water are concerned. The salts of lime are about the same, whilst the alumina, oxide of iron, and magnesia in the silicates added to the salts of lime, make the total amount of salts in round numbers, equal to that of the cow dung.

"If the bulks are compared, it will be found that at 90 pounds per bushel, full measure, and 103 bushels being allowed to a cord, each contains and weighs as follows, in pounds: —*

		Weight.	Solu. geine.	Insol. g.	Total. g.	Salts of lime.
	Dung,	9,289	128	1,288	1,416	92
Two kinds.	Peat,	9,216	376	673	1,049	91
	Peat,	9,216	519	529	1,048	81

"The salts and geine of a cord of peat are equal to the manure of one cow for 3 months. It is certainly, a very curious coincidence of results, that nature herself should have prepared a substance whose agricultural value approaches so near cow dung, the type of manures.".

The various analyses submitted, show that the ammonia of manures is held in the carbonaceous matter. Peat has its share, but has lost the power of forming more. This power, or disposition, may be restored by the addition of alkali. "Sufficient alkali to give peat the same value with cow manure, is 2 pounds potash, or 3 pounds soda ash, in 100 pounds. We are now no longer surprised that peat should be the best component of the compost heap, and it becomes clear why cord for cord, peat mixed with other manures, produces a compost, each cord of which is equally valuable with any single cord of the original manure." †

This fact established enables the farmer not only to double the value of his manure heap, by the addition of peat, but to add nearly as much more, because of the power which peat possesses of absorbing gases, holding water, collecting heat, condensing moisture.

It is worthy of more than a passing mention, that nature should have furnished this singular substance with two powers which seem almost inconsistent; the black color of the coarse and stringy fibres absorbs heat which is imparted to the soil, while the same coarse-

* Dana, p.246.† † Dr. Dana's Muck Manual.

ness of fibre, gives it a power of radiation, whereby it cools much more rapidly than the other soil after the sun has gone down, and is enabled thereby to condense and collect the dew, so valuable to vegetation in hot weather.

But, at the same time, it is a fact that compost whether composed exclusively of manure, or of peat, or compounded from both, is at least, 70 per cent water. Therefore of each cord carried on to your land, 6,451 pounds are water—more than three tons! To draw 3 tons ¼ of a mile, costs not less than 50 cts; for 10 cords of manure to an acre then, you spend $5 in carting *water*, which, after all, is often of no value; as when applied to reclaimed meadows, many of which are pure peat and are always too wet, particularly at the seasons when manure is applied.

Of the remaining 30 parts of the compost, at least, 20 are carbonaceous matter, which is of no value to the aforesaid peat land, or to over-rich loams, where vegetable matter collects to the injury of crops, and necessitating the application of alkalies to consume the fibres.

If the compost is to be applied (as it should be) to sandy, calcareous, or clay soils, this carbonaceous matter is valuable, both as carbon and as sponge; if to dry soils, where irrigation is impossible, the 70 per cent of water is valuable so long as it lasts. In short, the value of a barnyard composted manure is limited by the crop to which it is applied; for Turnips, Cabbages, and other crops which unquestionably derive most of their carbonaceous support from the air, it has less value than for quick-growing grain crops. Thus a knowledge of the chemical constituents of our compost guides us in using it.

We have seen that peat is in itself a manure, though an inert one, and that by the application of caustic alkalies to the amount of 20 per cent of the whole amount of manure used, we may fertilize a peaty acre, provided the manure with which the alkali is mixed be carefully spread over the surface.

It may be asked whether this process of converting the muck into manure on the field does not eat up the very soil, and so make it impossible to keep land in good heart. Suppose that it does; we can obviate the difficulty by withholding only the water of composition, and applying the other constituents. Even then the return of the 20 per cent of carbonaceous matter would be entirely unnecessary for any other purpose than as an absorbent or to alter the texture of the soil, for we know that the air supplies to the soil yearly, at least 300,000 pounds carbonic acid per acre, or 1,800,-000 for the six years' rotation; and to add the small amount in our compost to a peat meadow already overloaded with carbon in the face of such a supply from the air, would be mere waste. Besides I do not pretend to say that the original condition of land is always its best condition, and to be kept of the same by annual returns of what the crops abstract. If in any soil one constituent is largely — injuriously — in excess, it should be cropped in such a way as to reduce that excess. This is the best kind of farming. It is from an excess of carbon that peat meadows seem to lose so much of their fertility after a few years' culture; the ashes of the wood, roots, and hassocks burned when they were first cultivated gave the proportion of alkali needed by the peat. This is exhausted in a few years and must be supplied; if by barnyard manure the process is slow and clumsy.

To rich loams the same reasoning will apply; and for light sand, or gravel, or poor clay, I have already said that a composted manure is best.

To the loam and the reclaimed meadow therefore, we need apply only the salts removed by crops, and nitrogen in the form of ammonia.

The amount of these elements furnished to an acre in our manure, is but a small percentage of the stores already in its soil, but it is necessary to prevent its growing poor. Small as the supply is, its effect is always perceptible, whether we give it in the solid or the fluid form; and it seems as though plants were endowed with a reasoning power which led them to use the annual income from the manure or the air before beginning on the accumulated principal. Chemical laws may be explained after study, but this law is inexplicable; that a crop grown on fertile land without manure should be good, and yet be perceptibly increased, if there be incorporated with the upper foot of an acre that weighs 4,094,640 pounds, an amount of some special salt, not exceeding 100 pounds.

There is this limitation of the law to be stated; viz., that for a 6 years' rotation, the aforesaid small dressing must not be applied all at once, but annually; otherwise it will sink into the subsoil, below the easy access of the roots.

Probably the action of these special manures is much like that of the accumulated starch in a seed potato, which feeds the young germ before it is old and sturdy enough to struggle with the rough earth. So these small doses of concentrated food give the plant vigor in its infancy, and carry it rapidly forward to a healthy maturity, when it can compel earth and air to yield it food.

For a 5 years' rotation we must supply 500 pounds of ammonia. This can be purchased in 1½ tons of Peruvian Guano (containing 17 per cent of ammonia) at $60 per ton — ($90). Of guano, which contains a larger proportion of ammonia we need not purchase so much. In this ton and a half there are 704 pounds of phosphates; our 5 years' rotation will need only 213.80 pounds; our supply both of phosphoric acid and phosphates will therefore be ample. We shall need 200 pounds of lime. There is none in the guano, but, as I directed, the guano should be mixed with its weight or bulk of gypsum, which will give 33 per cent of lime, and 46 per cent of sulphuric acid; in one ton of gypsum there are then, not less than 660 pounds of lime, and 920 sulphuric acid, at a cost of $3. The crops of this rotation will require 136.52 pounds sulphuric acid; of magnesia they ask 78.50 pounds, which is not to be found either in our guano or gypsum; therefore we must add 421 pounds of epsom salts ($14) sulphate of magnesia, and of potash 536 pounds, either in the form of ashes or potash of commerce dissolved; of commercial potash it will take 600 pounds ($36), or 2 tons of ashes; 350 pounds of common salt will give all the soda and chlorine we will need.

These should be mixed with their bulk of fine peat, sand, loam, or clay, to incorporate them thoroughly together, and to insure the proper absorption of the ammonia gas, and an equal distribution over the surface. The items are: —

1 1-2 tons Peru. guano,	$90.00
430 pounds epsom salts,	14.78
1 ton gypsum,	3.00
600 pounds potash of commerce,	36.00
350 pounds common salt,	1.25
	$145.03
Cost of mixing and spreading,	5.00
	$150.00

If, instead of guano, we buy 1,500 pounds sulphate of ammonia (at 5 cts = $75), to furnish our ammonia, and for our 213 pounds phosphoric acid, buy 400 pounds phosphatic guano, 80 per cent of which is phosphate of lime, we shall get 286 pounds phosphoric acid for $8, and shall need no gypsum, the sulphuric acid being contained in the sulphate of ammonia, the lime, both in that and in the 400 pounds of phosphatic guano, with these:—

Epsom salts,	430 pounds,	at .06	per pound,	$25.80
Potash,	600 "	"	"	36.00
Common salt,	340 "	.0125	"	4.25
				$66.05
Sulphate of ammonia,				75.00
Phosphatic guano,				8.00
Cost of mixing and spreading 50 bushels loam,				5.00
				$154.05

To apply the same amount of salts and ammonia by barnyard manure, or compost, would require at least, 12 cords of the very best composted manure of which there is any analysis, and this, every farmer knows, would be worth, in the field, spread ready for use, not less than $120, at the ordinary estimate, which omits many items of expense, that would, if considered, raise the cost far higher. Were cow manure used to give the supplies, no less amount than 30 cords would be needed, to furnish the necessary amount of some of the elements. No barnyard preparation, really rich enough to restore the elements abstracted by the foregoing five years, would cost less than $150. Remember that I have said that for some lands these composts are the best manures, though not for all.

The constituents of the crops of the 5 years' rotation are:—

Ammonia,	500 pounds,	equal to	2 cords of	pure	cow dung.
Lime,	213 "	"	3	"	"
Sulph. acid,	136 "				
Magnesia,	78.5 "				
Potash,	536 "	"	35	"	"
Salt,	350 "	"	18	"	"

Fifteen cords of pure, unfermented horse manure, will furnish the necessary constituents, but in both cases the manure *must* be pure and unfermented. To make a manure then, take, —

3 cords cow-manure (which will give ammonia and phosphate),....	$30.00
Buy as before, the other manures,..............................	75.00
	$105.00

Were we to retain the proportions of salts as abstracted by the rotation and tabulated above, it would be absolutely necessary to buy many of them, as no composted manure could supply them in sufficient abundance, excepting at an enormous cost.

The effect of liquid manure is wonderful. 400 gallons of the ammoniacal water of gas-works, caused an increase of from 3 to 10 bushels of wheat, above the results of several other powerful manures with which it was compared. Under the use of urine, there has been even a greater increase than this, but I have no room to give examples.

There is one marked loss in using compost, and a corresponding gain with special manures applied as wanted; viz., some of the elements of the compost heap are very volatile, and if the whole amount were applied at the beginning of 5 years' rotation, a large per centage would necessarily escape by evaporation, before the last crop was removed, while, as we have seen, a similar loss would result, though by a directly opposite process, if the whole amount of salts needed during the rotation, were to be put on at once; the saline elements would wash into the sub-soil, and in a short time would be lost to the roots, and the young crop would be deprived of its simple food, and its valuable stimulus.

A supply of these constituents during the five years, drawn from dung, would be very uncertain, as they are needed in different proportions by different crops. When we supply them by artificial manures, however, we may give the crop each year just what it will want, when it starts to grow, without giving any thing unnecessary.

Refer to the list of the constituent elements of the crops of the 5 years' rotation of Boussingault, p. 499. Potatoes and Turnips received large amounts of potash ; the one 195 lbs., the other 201 lbs., while Wheat takes but 39 lbs., Oats but 36 lbs ; and on the other hand, of ammonia, Turnips require but 32 lbs., Oats, 52 lbs., and Wheat 80 lbs. If the potash had been all supplied at the beginning of the rotation, the Potatoes would have had an abundance, but by the time the Turnips came round, their supply would probably have been in the sub-soil.

In making an estimate of the cost of supplying special manures, it is difficult to present one lower than the cost of dung; but if a man does not want to keep cattle, he can buy artificial cheaper than animal manure. The market price of all these elements is high, owing to the limited demand, and to the fact that purchasers are not acquainted with the best sources of supply. For instance, sulphate of ammonia costs 5 to 8 cents per lb., at the shops; it could be made at gas works, from gas liquors, for very much less. The cost of potash is 5 to 8 cents per lb.; wood ashes could be purchased in the country, or be made from refuse wood in the forests, so as to bring the price much lower, especially as in the wood ashes, are many other things, which we should be obliged to buy. A cord of leached wood ashes (or 100 bushels), contains 50 to 60 lbs. of potash. In 1 cord of leached ashes, dry weight,*

Phosphoric acid	117 lbs.
Silex	146 "
Oxide of iron	17 "
Oxide of manganese	51 "
Magnesia	119 "
Carbonate of lime	3072 "
Potash combined with silica	50 "

Where ashes are bought to make soap, or potash, the refuse is generally considered worthless, but we see that its agricultural value is very great, especially for Grass lands, and for all leguminous plants.

* Dana, p. 144.

When we have a dung heap to work upon, there is a large list of materials which may be added to it. I will give a list of some of the most valuable and accessible, arranged in the order of their value.

No. 1.	No. 2.
Human excrement,	Bone black,
" urine,	Hair,
Guano ammoniated,	Horn shavings,
" phosphatic,	Lime,
Sulphate of ammonia,	Salt (waste or good),
Gas liquor,	Oyster shells,
Burnt bones (ground),	Peat,
" " whole,	Ashes of both kinds,
Blood,	Seeds of oil cake,
Soot,	Native phosphates,
Potash of all kinds.	Soda of all kinds.

No. 3.	No. 4.
Sea mud,	Loam,
Pond mud,	Starch refuse, liquid and solid,
Soaper's waste (Barilla ashes),	Sawdust,
Sea-weed,	Wood chips,
Seeds of all kinds (dead seeds),	Tan (especially Oak),
Gypsum,	Sea water,
Leaves,	Straw or Hay,
Soap suds,	Fern,
Clay,	Crushed Granite.
Marl,	
Green manures, ploughed in.	

Large as is this list, it is not complete; almost all matter, organganized or unorganized, is at some time or place valuable for this purpose. Persons estimate the same kind differently, according to their chemical theory. Liebig, the great advocate for saline manures, says: "No conclusion can, then, have a better foundation, than this: that it is the ammonia of the atmosphere that furnishes nitrogen to plants." Another chemical authority, Dr. Dana, a friend to ammonia, says: "It may be established as the fourth leading principle of agricultural chemistry, that soils contain enough of all the mineral elements to grow any crop." In another place he says: "The nitrogen, then, in dung, is that organic element to which must be attributed its chief enrichment; the nitrogen is the basis both of the production of ammonia and of the formation of nitrates; hence the quantity of nitrogen in manures will form a very good element for the estimation of their value. Manures will be found rich in proportion to their quantity of nitrogen, or their power of forming nitrates. This is the great and first cause of the enriching power of dung." Liebig again says: "When we supply to a soil easily penetrable by the roots of plants, as well as by air and moisture, in the form of *ashes*, the constituents that are removed in the form of crops, the soil will retain all its original favorable state." Of course neither ammonia nor carbonic acid can be supplied in the form of ashes, both being volatile. Liebig says again: "Practice in agriculture has taught us that the amount of vegetable matter on a given surface, increases with the supply of certain substances, which were original constituents of the same surface of the soil, and had been removed from it by means of plants." And again: "In the solid and liquid excrements of men and animals, we restore to our fields the *ashes of the plants* which served to nourish these animals; these ashes consist of certain soluble and insoluble earths, which a fertile soil must yield, for they are indispensable to the growth of cultivated plants;" and farther: "the action of an artificial supply of ammonia, as nitrogen, is limited, like that of humus, the source of carbonic acid, to a gain in point of time; in other words, to the acceleration of the development in a given time, of our cultivated plants."

This grants enough to upset the whole of his reasoning. All we want of our fields is to yield the crops we cultivate in the growing season, and if the ammonia supplied by the atmosphere comes only at that season when it cannot be used, it is of little value; indeed, as a source to depend upon for our supply, of none at all.

Liebig further says: "It is also of importance to know that the rule usually adopted in France and Germany, of estimating the value of a manure according to the amount of its nitrogen, is quite fallacious, and that its value does not stand in proportion to its nitrogen."

We know that the constituents of soils bear a certain relation to the constituents of plants, which cannot be neglected without immediate loss; and if one set of investigators prove the value of nitrogen or ammonia to crops, and another that of the saline elements, it seems to me plain that both are *essential.*

The weakness of the theorizing of Liebig in this direction is summed up by Dr. Dana as follows: —

"It has been proved by Krocker, that rich and even barren soils, at the usual depth of tillage, contain an amount of ammonia exceeding per acre that of any fair crop raised by the aid of the best farmyard manure on the best soil; it is not enough that tons and tons of ammonia are already existent in soil, if that ammonia can only be extracted by chemical processes and human manipulation; no matter how much of this element may be in rain, how much may exist in the soil aided by the inorganic salts, fair average crops may be raised by these natural sources of ammonia. To obtain profitable crops, an excess beyond the natural supply is essential; to keep up this excess and to retain the largest return for the seed sown, nitrogen, in the shape of salts or of readily decomposing organic matter, must be supplied with inorganic salts. The nitrogenous principle gives at once an energy to vegetation enabling it to unfold early and largely those organs (the roots and leaves) by which the earth and air contribute their portion to the growth of plants. Nitrogen gives salts power to do more work in the same time; it is a labor-saving machine, enabling the farmer from the same ground and with the same time and labor to reap larger rewards. Natural vegetation is a low-pressure engine, but it will bear any amount of pressure, so beautifully built is it in all its parts. Inorganic salts are the water, geine the fire which raises the steam to drive this machine, filling the thousand cylinders which are distributed throughout plants. Nitrogen is the regulator of this engine. Nature has everywhere put the machine into the hands of man. She takes man as her apprentice, and her generous hand supplied the daily bread, while man was learning the construction of valves, the working of pistons, the real power of the engine, the sources of the steam. These, even though dimly seen, nature demands should be worked up to full pressure, when the apprentice sets up for himself, and is determined that the sweat of his brow, whilst it feeds his body, shall also purify, enlarge, and strengthen his intellect."

The soil of any fertile acre is so full of the saline constituents that by supplying ammonia and some few salts we may get large crops for many years, but we effectually reduce the stock of all minerals abstracted and not returned, a reduction which must be felt at last.

There is a principle in the chemistry of plants not yet noticed in these pages; viz., substitution. In the absence of the constituent which best supplies a plant's wants, the plant contents itself with that one of the constituents which represents, or which most nearly makes the place good; so lime is a substitute for potash, potash for soda, soda for magnesia.

Again, an *insoluble* form of some one alkali predominates in almost every soil, as potash in granitic soils, lime in calcareous, and can be set free (made soluble) by adding to the soil the alkali which is deficient, to the immediate and evident advantage of the crop; and when the alkali is superabundant — as carbon is in peat — no large return of it need be made in manure.

The natural disintegration of the minerals of a soil is slow, and the process may be hastened by careful and close culture. The more finely the soil is comminuted, the more rapidly the mineral elements are set free, and the less need there seems to be for manure.

Jethro Tull, in the last century, and the Rev. Mr. Smith, of Lois Weedon, in England, at the present time, have maintained that by careful and thorough culture, soil can be kept highly productive for years, and crops of undiminished perfection be taken without manure. The Rev. Mr. Smith has grown large crops of Wheat on the same land for many years without manure, by thoroughly spading the soil and planting in alternate strips a few feet wide; the intermediate strips being in naked fallow, open to the free action of air and moisture. By this culture he has been enabled to get from an acre as large average crops as any in England. But his land must inevitably become all the more thoroughly exhausted in the end; it is impossible that a prolonged course of subtraction should not reduce the minuend, the stock of minerals, etc., in his soil. Our farmers would do well to improve upon a part of his system, instead of adopting it entire. They should return the proper amount of manure, and also reduce and pulverize the soil so thoroughly that all its wealth may be opened to the crop.

Nature has drawn a beautiful circle around agriculture, — an endless chain, quite independent of man's proceedings; let our culture be as various and exhaustive as it may; let the growth and decay of animal life be as great or as small as they may; nothing is added to or taken from the amount of matter in the universe, though it is not always divided in the same proportion between the animal, vegetable, and mineral kingdoms. All that grows supports some other life; the rejected portion of the food of all animals — from the greatest to the least, of each year — is sufficient in amount, if husbanded and applied, to produce food for the year succeeding.

It rests with us to say how much of this constant quantity shall be organized in plants and animals in our neighborhood. We may improve or neglect Nature's kind provision for us; we may get the gain or leave it to others more active and enterprising. If we are anxious to be the best farmers, we shall improve every opportunity; we shall gather up and apply every particle of manure, animal, vegetable, and mineral. In our thorough tillage we shall break the stones, and reduce their mineral manures to a shape more susceptible to the action of the gases and acids stored in the soil, and ready to convert them into food for our crops; and in return, the generous soil will fill our barns and our purses to bursting.

CHAPTER LVII.

GREENHOUSE.

MAY. We are growing tired of the greenhouse, full though it may be with flowers, bright and fragrant. Every time that we enter it, the approach of real, out-of-door spring, the blossoming trees and wild-flowers, have paled its beauty; it looks to us too much like a ball-room after a party is over, and we really wonder how it could have given us so much pleasure during the winter; we are all impatience to get the flowers out of doors, and look at the thermometer and the sky many times a day, to see if the weather is not mild enough.

All the care that the greenhouse now demands, is the supply of sufficient water and air, the cutting of slips and sowing of seeds. We shall hardly need a fire unless there should be a long, cold storm, or a very cold night. Attend constantly to the pots and pans of cuttings and seeds, and gradually withdraw water from the stock plants, which are now to be allowed to fall asleep and to rest till the next season; for dulled as our enthusiasm may be now, it will all revive at the approach of cold weather, and as the chills of the early frosts make themselves felt through the autumn air.

No love is more imperishable than the true love of flowers; it may pass away when we are compelled by sickness or city life to forego their culture, even years may intervene between the times of making and owning one garden and another, but just as soon as the opportunity offers, the true enthusiasm breaks out afresh.

The early days of May are at once the most fascinating and the most tiresome of the year. The warm and balmy mornings bewitch us, and with their promise of pleasure to come, draw us out to long and pleasant walks, or to the delights of culture; but soon come creeping over the landscape the chills of the east wind and the gray mists that so often accompany it, and our enthusiasm and self-gratulation are suddenly nipped.

Fast-day is very frequently, in the eastern part of Massachusetts, the first day on which spring asserts its dominion. Every one knows how often it begins with the delicious warmth of spring, and how as often its end is cold and chilly.

The gardening *furor* of which I spoke last month, will continue unabated during this, and culture will soon begin in earnest.

The time for setting plants into the borders varies very much with different seasons. If the progress of the season has been regular and uninterrupted, it is decidedly warm by the middle of May, and you may set out Verbenas and hardy Geraniums, stock Gilly-flowers, Wall-flowers, Roses, Pelargoniums, etc.; but if you want them to grow, you must surround their roots with some fermenting manure, and water every few days with warm water; not very freely, or the roots will be likely to decay; and you may save the plants from chills and checks, by sheltering them during any long, cold rains. Warm rains and showers are beneficial.

The last of the month, set out Heliotropes, Salvias, Lantanas, Nierembergias, Fuchsias, etc. All the plants with which you propose to enrich the garden.

It will still be necessary to watch against frost, and to cover when there is danger of it. A very slight protection, an inverted pot, or hay cover, or even a Pine branch laid over a plant, will screen it from the spring chills. Transplant into the borders, also, all the annuals that are advanced enough to make it worth while, and give the others every inducement to grow. Be in no hurry to set stock plants out, as a single chill would materially injure them; it will be better to wait till the settled heat of June. Some gardeners recommend giving stock plants a shift now, and adding fresh loam to the tops of the pots. I have given my reason for making these changes later. Those plants which are to make a growth during the summer, such as Euphorbias, Poinsettias, Chrysanthemums, etc., should be pruned and shifted, and be set where they will start, but all that are to repot should be left undisturbed.

Make cuttings of Double Primroses, cut back Heaths, Oranges and Azaleas, before they make their new growth.

Be careful when plants are set in the shade for the summer, to raise them from the earth by slabs of wood or brick, or by thick layers of coal ashes, to keep out earth worms, which would riddle the earth of the pots, letting out the water too rapidly, and reducing the nutritious qualities of the earth.

There are two ways of keeping the stock plants; one is to set them on the north side of a building or fence, or under a canopy of wood with latticed sides, which will keep off the direct rays of the sun, and admit the air freely. Evergreens need no sun, unless for a short time in the morning, but abundance of light; other plants are uninjured by a moderate amount of sun. The other method is to plunge the pots into the earth up to their rims. When this is done, a piece of slate should be set under the pot to prevent the roots of the plants from getting out into the soil. They are very apt to do so, and though they cause the plant to grow rapidly, ultimate injury follows; for when the plant is lifted in the fall, these roots have to be cut off, and the old roots are unable to supply the demands of the new wood. It will be found sometimes of advantage to take old, cankered, pot-bound plants out of their pots, and plant them in a border, more or less shaded, according to the variety, and allow them to grow at will; if so indulged, they will often renew their growth and vigor, forming new roots and tops. It is impossible to foresee and provide for every case which may occur — each must be settled as it comes up, with care and judgment.

The pots of Auriculas should be coming into bloom now, and should be placed in conspicuous places. The mealy petals which contribute so much to their beauty, must be shaded from sun and rain and high winds, which tend to deface and injure them.

During the summer there will be but few flowers in the greenhouses. Fuchsias will be in perfection, and Orchids, and some tropical bulbs. Achimenes and Gloxinias, which were planted in February, will now be well grown, and will blossom some time in June, while those planted later will continue in blossom through the summer.

All tuberous-rooted plants and bulbs, as Oxalis, Ixias, etc., as soon as their leaves have turned yellow, should be removed from the soil and laid aside in a warm, dry place, for two or three months, according to the time when we wish to start them anew.

Pot into small pots, small plants of Polyanthus, of Primula siniensis, and Cineraria, and as soon as warm enough, remove the pots into borders, where they may get some sun, and grow into stocky plants for the autumn. They will need to be shifted once or twice before winter, according to the growth made.

Plant Carnations which have not yet blossomed, in places where they will show well; either among tall-growing plants, or in a bed by themselves.

Carnations for winter may be struck now from cuttings, if this has not been done before. Or you may set old plants in rather sterile places, and layer all their branches. Be careful not to stimulate them so that the layers will blossom before winter. As soon as there is any intimation of the approach of cold weather in the fall, pot the layers. Full directions for culture will be given in July.

Set out in somewhat similar soil the Dwarf Chrysanthemums, which have been under the stage since they blossomed. As they grow, layer the young shoots into small pots; when they have well-rooted, remove from the parent plant, and as soon as they fill the pot with roots, shift into larger pots and better soil; you will in this way get good, stocky plants for winter blossom, and rather better than when made from cuttings.

The greenhouse, even after its principal plants are removed, will have some in blossom all summer; the Orchids, Cape Bulbs, and tuberous-rooted plants just mentioned, Passion Flowers, Wax-plants, Roses, Fuchsias, etc. Take all the plants from the conservative pits as soon as the weather will allow. If you did not start a little growth in the plants by sashes, as I directed, give them all the light and air you can some time before removal. When you have emptied the pits, take off the sashes, clean and paint and lay them aside. So also the frame-work; give all the wood-work a good coat of whitewash or paint, to keep off the hot rays of the sun during the summer.

Frames containing Pansies, Auriculas, Anemones, and Ranunculuses will gradually go out of bloom. As the flowers die and the leaves wither, remove the roots. The Pansies and Daisies may be divided and replanted in the borders, to make a new growth. Pansies can be better grown from seeds than from cuttings, but Daisies should be propagated from cuttings. Set them in northern aspects, as the summer heats are destructive. The frames containing Anemones and Ranunculuses, should have occasional waterings with tepid water, but should be well protected against cold rains which rot the roots, and against high winds which destroy the flowers. Set the Cinerarias out of bloom into cold frames. Give the Camelias completing their growth abundant water and frequent syringings; by shading the Pelargoniums and other flowers their bloom may be saved for a longer time. Fuchsias shifted into large pots and manured with guano water will make a great show hereafter.

CHAPTER LVIII.

CONSERVATORY.

THE Conservatory, like the greenhouse, is getting out of date, and we only go through it now to get at the garden. From its windows we see the flower-beds gay with bulbs, and we cannot but feel the superiority of the out-door beauty; and yet the conservatory is by no means bare of flowers.

If it has been well managed it is as full now as the flower-beds were in the autumn, when the early frost came and cut off Heliotrope and Salvia, and checked the Geraniums and Verbenas. The clusters of rosebuds or La Marque are full and fragrant; the delicate blush on the Saffrano and long, greyhound-like buds of the Yellow Tea, were never more beautiful; while overhead the blossoms of the Passion Flower shine like stars in the sky. The Geraniums are in full blossom, and the Heliotropes fill the air with fragrance; and yet the sweet English Violets among the litter in the garden, the Hyacinths and Tulips of the beds, the Wisteria over the windows, greet us together with the song of birds and the gentle airs of spring, in so attractive a language that we think them more beautiful than the children of the tropics which we have only induced to grow and blossom by extra care. What a mysterious power is exerted over every mind by the spring.

The returning birds, the soft breezes, the swelling buds, the springing Grass, seem to re-invigorate the dullest minds, and every earnest man is braced anew for noble enterprise. In the dreams of early morning, in the reveries of evening, we see the days of our untarnished youth; we recall the many games which the returning warm weather always renewed; we remember the May parties, when every one was eager to find the first blossom; the longing looks sent over the greening fields as we dragged our unwilling legs up the schoolhouse steps, and wished that we were dogs or birds,— any thing but schoolboys,—that we might frolic in the sunshine all day long. We remember the aspirations of our early manhood, how the world all seemed fair and pleasant. We had grown up in the shelter of our pleasant homes, and all we knew of life was its green pastures; and, standing at the gate of our new year, we looked forward to the crops of glory and wealth we were to gather; we trace the footsteps we have made; some through pleasant fields and in gardens rich with all the blossoms of worldly success and pleasure; some through the wintry days of sorrow and disappointment, the wintry fields of poverty, whence we could with difficulty glean a meagre support. We feel how much of beauty and promise, of sorrow and ugliness, is covered by the pleasant spring; and whether successful or not in the struggle hitherto, there is each spring a new start of the blood in our veins, a new uprising of determination to reap a full harvest the coming summer, and to meet the next winter nobler and better men. We look more lovingly on the children we meet, have kinder words for friend and stranger, and there is through every part of our nature an atmosphere partly our own, partly the influx of the external promise, which seems, like the golden hazes around the rising and setting sun, to gladden and warm and animate every thought and impulse.

RESIDENCE OF WASHINGTON IRVING, TARRYTOWN, N. Y.

CHAPTER LIX

FORCING-HOUSE.

THE fruit on the earliest vines will ripen [illegible] middle of the month, and the Black Hamburg [illegible] by the last. As the fruit colors on the [illegible] pans of water from the fires, and give [illegible] for the last time, cutting out every [illegible] Constant care must be taken to keep [illegible] often be obscured for some hours by the [illegible] out with tremendous power. Houses [illegible] are not likely to be overheated by [illegible] they [illegible] attention, as the [illegible] will [illegible] to keep a secretion of [illegible] venti-lated [illegible] exceed [illegible] watched during variable [illegible] house, or a change [illegible] and as-[illegible] but it can [illegible] of June [illegible] quite ripe and [illegible] will be to keep [illegible] and dry.

[illegible] of fruit-trees during [illegible] in the forcing-[illegible] freely given in the [illegible] and also, that [illegible] These will be fully [illegible] the last of May, or [illegible]

[illegible] the fruit of vines and trees [illegible] remove the [illegible] water till it is time to close again in the autumn [illegible] summer, red spiders may make their appearance [illegible] sulphur about the floors, and occasion[illegible]

[illegible] the wood is ripe in the autumn [illegible] Before shutting up in the [illegible] flues and pipes, and make just fire enough

CHAPTER LIX.

FORCING-HOUSE.

The fruit on the earliest vines will ripen from the first to the middle of the month, and the Black Hamburghs will begin to color by the last. As the fruit colors on the principal vines, remove the pans of water from the flues, and give generally less water. Thin for the last time, cutting out every defective or imperfect berry. Constant care must be taken to keep ventilation good; the sun will often be obscured for some hours by the clouds, and then come out with tremendous power. Houses ventilated in the wall, as ours are, are not likely to be overheated by these sudden changes, if they receive reasonable attention, as the ventilators in the front and back will prevent too rapid accretion of heat. But houses not so ventilated are very often injured exceedingly, and should, therefore, be anxiously watched during variable weather. To manage an ill-ventilated house, on a changeable day, taxes the best efforts and assiduity of the gardener, but it can be done. By the middle of June the fruit will be quite ripe, and, after that, the aim will be to keep the house cool and dry.

The treatment of fruit-trees during the summer, in the forcing-house, has been already given in the winter months, and also, that for pot Grapes. These will be fully ripe by the last of May, or first of June.

When all the fruit of vines and trees is cut, remove the sashes, and give but little water till it is time to close again in the autumn. During the summer, red spiders may make their appearance. To expel them, strew sulphur about the floors, and occasionally dust it over the vines.

As soon as the wood is ripe in the autumn, prune and lay down for the winter. Before shutting up in the autumn, strew sulphur over the flues and pipes, and make just fire enough to melt, without igniting it. The fumes will fill the house and kill the insects. After the fumigation, scrub and paint as directed in September.

Before the middle of May all the vegetables should be removed, as they will not thrive, and will injure the ripening fruit.

We here take leave of the forcing-house. I have given directions, which, if followed carefully, will insure good and healthy vines, and full crops of fruit, but the minute culture of the vine demands a book by itself.

I have given a connected description of the culture of fruit and pot Grapes, in another place. Farther directions seem superfluous.

The cold grapery will be during May, in the condition of the forcing-house in March, and early in April. The vines will be in flower during the month, and some will set their fruit, when they must receive their first thinning.

The danger of shanking and shrivelling from ill-balanced heat and moisture, has been already described.

The fruit will go through all the stages of setting, swelling, and thinning during June, will ripen in August, and be in use through September and October.

The treatment of the cold grapery through June, July, and August, is like that of the forcing-house in April, May, June, and July, and needs no farther description, so we may here bid farewell to this branch of our subject.

The fruit-trees will be treated as before directed. Ripe Cherries may be expected in May, Apricots and Nectarines in June and July, and Peaches in July and August; this is the harvest season for glass-houses.

But though the work of these houses is not varied enough to need farther description, it has imperative claims on the gardener. He must expend a great deal of time and thought upon his houses, or his ripe fruit will be destitute of color, size, and beauty, and his vines and trees will be ruined for future crops.

Remember that too much heat, and too much moisture will not benefit the crop; it must be *accelerated, not forced.* A neglect of this fact has ruined many an establishment.

CHAPTER LX.

FLOWER-GARDEN.

CONTINUE the work of April, — digging, preparing borders, and clearing up. Just as soon as the ground is ready, you can sow seeds of the most hardy flowers, such as Mignonette, Sweet Alyssum, Candytuft, Catch-fly, Flos Adonis, Heart's-ease, Larkspur, Lavatera, Lupin, Sweet Pea, Hawkweed, Annual Snapdragon, Zinnia. Sweet Peas should be planted in large masses, at the back of the flower beds, or in hedges along the walks of the kitchen-garden, or elsewhere. Or they may be sown in circles around a bush or some kind of trellis-work, when the size of the other plants warrants it. Beds G, E, may have such groups. Sow Sweet Peas again in June, that they may last till late in the autumn.

The size which plants usually attain is generally given on the outside of the seed-bag, and you may be guided by it in the choice of places for planting. Towards the middle of the month, almost all the flower seeds may be planted, Amaranths, Balsams, Asters, Gillyflowers, etc. It will be well at this time, also, to plant the seeds of many biennials; they will thus get well grown this year, and blossom better next, than if sown later.

Among these are Sweet William, Antirrhinum, Canterbury Bell, Foxglove, Coreopsis, Dracocephalum, Asclepias, Cassia, Gerardia Hedysarum, Hibiscus, Enothera, Penstemon, Lychnis, Rudbeckia, Solidago, American Aster, Spigelia, Chelone, Trillium, Veronica, Podalyria, Liatris, Ragged Robin, Columbine, Iris, Valerian, Thrift, Lily of the Valley, Hollyhock, China Pink, and common Pink, and many others are enumerated in all dealers' lists.

All flower seeds should be planted very shallow. If planted too deep, seeds are in danger of decaying; but if shallow, they receive the full benefit of the sun and showers of spring, in their germinating season. Dig the bed up thoroughly, either with a spade or trowel; then beat it fine with rake or fork; remove one quarter of an inch of the top earth, either by skimming or by pushing it back with the rake. Scatter the seed thinly over the surface; then sift back the loam, not more than one-fourth inch deep, over the seeds. Or, having prepared the ground as before, with one tine of the weeding-fork, or a stick, draw a line in the earth one quarter of an inch deep; scatter the seeds into it, and cover as before. It is pretty to plant seeds in circles, stars, or other figures. Concentric circles of different flowers have sometimes a charming effect. For instance, a small circle of purple Candytuft, surrounded with one of white, then Escholtzia, and outside of that Portulacca, white, red, or yellow. Mignonette and a fringe of Tassel Flower might be introduced.

The disposition of flowers, with a view to producing a good effect when in blossom, is a matter of individual taste, and there is ample opportunity for variety. It is difficult, indeed, to produce other than a good effect, with such beautiful material, but the general rule should be followed of keeping the tallest plants in the background.

Some varieties should be used but sparingly; Zinnias, Four-o'-clock's, and such tall, stiff plants occupy a great deal of room, and their flowers are never particularly pleasing. Four-o'-clock opens only morning and evening, and has nothing to recommend it at other times.

I recommend the use of only the more delicate annuals; they give a greater abundance of flowers, and of the kinds most desirable for bouquets and vases, and they harmonize better with the bedding-out plants. It is always well to have some bulbs, some perennials, some bedding plants, and some annuals. By such an intermixture, a great deal of pleasure is secured, without much labor.

The trouble of cultivating most annuals goes far towards counterbalancing their attractions. It is better to plant a few of their seed in many places, than many in one place, with a view to transplanting them. Some bear transplanting ill, others scarcely notice it. When all the seed is sown in one place, you have first to prepare the ground and plant the seed, then to thin and weed the young plants, then transplant as they are wanted; protect from the sun, and water them, and so you get your plants with a great deal of trouble; and as many of them have but little top, they do not cover much ground, and must, therefore, be planted in large numbers to produce any effect.

The rules to be observed are: Sow the seed thin, cover but slightly, water in dry times, do not let plants stand too near together, cut down all plants as soon as out of blossom, remove dead leaves, tie up to sticks the drooping heads and branches, let all be neat and orderly.

Where effects of color or form are attempted, by concentric circles, irregular, straight, or wavy lines, or otherwise, great care is necessary. The outer shoots of the plants should be supported by small branches of Birch, Beach, etc., stuck into the ground, deep enough to be firm, and so far under the plants as to be concealed by their leaves and side shoots. The greatest obstacle to the successful culture of annuals, is the too great luxuriance of their growth, and rather poor soil is generally better for them, on this account, than very rich. Much may be done towards producing a perfect bloom, by thinning out side branches, and occasionally pinching back leaders.

I shall give, in a few pages, a list of plants which will grow and blossom at different seasons, and the sizes and colors being given, any person can easily choose such as will produce the effect he desires. But to get effects of color, you must plant a large mass of the same kind, or color, together, otherwise, only a thin, meagre, and spotty result will be obtained. Many treatises devote a large space to the analysis of colors, showing how plants may be mixed and blended, correctly and pleasantly. Their statements are based on some theory of colors, in which I have no faith. I do not believe that the exact and minute gradings and blendings of color proposed can be produced in an ordinary garden. These treatises analyze the colors of the rainbow, and show how its harmony was produced, and may be reproduced. But in their reasonings, they forget that there is a great difference between the spectrum which they study, and the flower-garden. For the colors of the spectrum are blended where they meet and merge in each other, in a way that is impossible with the distinct lines of color in the flower-bed, and their connection in the latter case, is still farther effected by the green leaves that mingle more or less in every part. Besides, if it were possible to give this wonderful effect from one point of view, it must be lost with a step in either direction, and a flower-bed is manifestly made to be seen and enjoyed from many points; further, plants are constantly growing in height and breadth, and no two can be expected to grow just alike. Therefore, elaborate plans of coloring in flower-beds must fail; and yet, in arranging flowers, we should always be guided by a regard to the relative positions which their colors occupy in most harmonious combinations, so that they may, when in perfection, resemble a well-arranged bouquet, or dish of flowers. By familiar observation of their colors in beds, both the eye and the taste may be cultivated till we learn to love and appreciate color, and instinctively, as it were, how to combine with the pleasantest effect. A bouquet or dish of flowers so arranged that all their colors show to the best advantage, is seldom seen. Flowers are too often mixed confusedly, so that there is no distinct character obtained, and the eye gets no healthy excitement. Arrange your flowers always so that one decided color shall predominate in the whole, and also be massed in some particular place. Then contrast with the principal mass of color, those colors best calculated to relieve and show it to advantage. Do not entirely disconnect the main mass from the same color in other parts, but, by a single flower of the same, or a similar hue, carry the eye along to the other parts where the dominant color is again to be seen. Do not put your flowers in blotches, or formal masses, but introduce them with graceful irregularity, so that while you are enjoying the principal color, your eye may be unwittingly led into the other forms and colors that blend and intertwine with it. Do not fall into the common mistake of making your bouquet of nothing but flowers; they should be in abundance, but not so as to conceal the green leaves, twigs, and berries. To show them to their best advantage, mix plenty of green, and in autumn, colored leaves and berries with them, which may rest and divert the eye, till it returns to find the flowers more bright and beautiful than before. I believe that very much more beautiful dishes, or bouquets, may be made in the autumn, when the flowers are almost gone, than in their midsummer profusion. In the summer, the richness cloys, we enjoy them less, because of their quantity, and cannot help feeling that what is abundant, is cheap, and yet in this abundance of flowers we cannot persuade ourselves to use green enough.

As in the dish or bouquet, we approach the reds and crimsons with the colored leaves of autumn, or the scarlet berries of Holly or Wintergreen, or the hips of the rose, the haws of the Thorns, or the jetty black berries of the Privet, we gain an intensity of color that the flower could never attain except in such union. If the edge of the dish, or outside of the bunch, is bordered with the brown greens of the Cedar, Arbor Vitæ, and Juniper, the whole tone is still more intensified. Try now the effect of laying under your Crimson Verbena, or Scarlet Geranium, a bit of cool, gray moss, and, a little farther off, a purplish Heliotrope, and still farther, a group of White Verbenas, contrasted with the rich green of the Geranium leaf, and again toned by some pink flower, and you will find a wonderful effect, one that will vibrate as you look at it.

The habit of heaping colored flowers one upon another, and putting nothing else in the dish, arises, I think, partly from the want of delicacy of taste, and partly from taking as a standard of color the spectrum, or pictures, where other things, as light and shade, atmosphere, etc., come in to blend and tone the whole.

To return to the colors of the garden. As I have said, arrange your plants according to a well-digested system of colors, but remember that unity of effect and harmony is almost impossible from all points, or for a length of time. My flower-garden, if I have in it all the varieties I want, if I work over it for weeks, cultivating, pruning, tying up, and watching it, during all that time, may give me the precise effect I have desired and looked for, yes longed for, for months; but it will probably only be for one day, or even for a part of a day, and never again during the year; and if I can get that perfect effect for those few moments, I shall be certainly satisfied and repaid, and regardless of comment from those too dull to appreciate or *too critical to admire*. I shall be content to work another season, just as long, for the same few moments' pleasure.

There are moments in life when the beautiful is recalled to us, for which we have waited, watched, and longed, for which we have spent money, time, study; moments which others cannot share, and may not know, which are gone as soon as come, but which are the best reward for all our labor and trouble, and which open glimpses to us of the beauty and nobleness, unseen and unattainable here, but which we can thenceforward believe have an existence on the other side the grave.

The artist may see this desire of his heart, in some early morning, as the clouds roll away from the rising sun, showing sea, mountain, and forest, or he may come upon it suddenly, in the glisten of drops of rain, or dew, or in the blaze of ice-clad trees and bushes under the moonlight, when each twig is a seeming fire of diamonds, or it may look up from the depths of the water, which reflect the awful beauties of the heavens, stretching unfathomable distances beneath his feet; the musician may hear it in some strain floating through his dreams, in the voice of a singer, in the caroling of birds, in the tones of the sea, in storm or calm, in the lulling, lilting, babbling of the brook; he may have studied and sought for it through a lifetime, and it may come to him as the reward of his labor, or in apparent mockery, heard for so short a time, so soon gone; nevertheless, it is something to have lived for, and to die for. The poet will get it in that song which is irrepressible, and from his heart's depths a wail of unbounded sorrow, or a burst of immeasurable gladness.

Every lover of beauty sees it now and then, it may be, when the glorious and beautiful waterfall of Montmorenci leaps before him, unexpected and terrible, one moment a hurrying mass of water and rapids, a confused outline of hills, river bank, wierd evergreens, rocky ledges; the next shut into a gorge beneath his feet, it leaps in the glad sunshine, spanned with rainbows, 300 feet, a torrent of foam, a resplendent veil of mist, a wonder and glory forever; and then, gathering its waters, gently and peacefully glides, over stones and sand bar, to the broad St. Lawrence. He may see it in his own child, or in the flower-bed before his door. It is never the certain reward of labor; we may work for it a lifetime, and never find it while we seek it; but the seeking will so ennoble and purify the mind, and quicken the powers of appreciation, that when a sudden movement unexpectedly brings us upon it, we shall be repaid and stimulated, let it vanish as speedily as it may.

The flower-garden may give this momentary delight, or a dish of flowers that we have arranged; but in whatever form it comes, when you receive it, you have lived; the moment is an epoch, one of the milestones on your way; you will remember it forever, and date from it all kindred matters.

COLORS. — You are now in the joyful spring; you have begun the culture of beauty anew. Out of cold earth, rough clods, uncontrollable elements, mysterious seeds, you may, with love and patience, bring out the rarest beauty, capable of administering to whatever is best in our natures; or, in discouragement, you may let weeds choke your flowers, and disorder and neglect turn your garden to a reproach and a sorrow.

The following arrangement of colors I have taken out of McIntosh's Book of the Garden, and they may be expected, according to that treatise, to produce harmonious results: —

Dark blue, scarlet, white, black, blue, brown, scarlet, white, black, light drab, black, orange, black, light drab, black, white, black, claret, orange, gray, white, scarlet, dark green, crimson, white, dark gray, dark red, black, deep crimson, mixed, geranium, red, orange, yellow, green, blue, violet, dull red, gray, mulberry.

The reds need not, and should not, be all of the same shade; and so of other colors. Black, of course, cannot be got; in its place may be substituted the deepest crimson and the darkest purple; why it is introduced, I do not know, unless it be for intensity of tone. I shall not give any of the elaborate patterns, geometric and irregular, so common in books upon flower-gardens.

You may get a beautiful effect by a number of small round beds along a path, each of which is filled with one kind of flower, surrounded by slate edgings, and in the Grass. They give great variety, in spite of their sameness of shape.

For instance, fill one bed with Carnations; they will blossom all about the same time, and may be full of flowers for some weeks; the next two or three beds may be filled with varied Picotes, one red, one yellow, one white, one variegated; after them Carnations again. Or you may fill one with Mignonette, the next with white Candytuft, the next with pink Lantana, pegged down, then two Verbenas, first purple, then crimson, deep blue Ageratum, dark purple Heliotrope, then Horse-shoe Geranium, and down the other side with a similar succession. There must be enough of each kind of plant to produce a decided spot of color.

Another bed, as G, in our flower-garden, may begin, 1, Nemophila, 2, Gilia, 3, Ageratum, 4, Heliotrope, 5, Purple Lantana, 6, Scarlet Geranium, 7, Yellow Lantana, 8, Scarlet or Purple Salvia. A, in this garden, has in the middle 1 Heliotrope, outside 2 Mignonette. F has 1, Scarlet Geranium in the middle, 2, Scarlet Verbena on the edges. O, 1, is Heliotrope, 2, Gilia and White Verbena. B and C are full of bulbs in the spring; as they go, prick out among them such bedding plants as you like. As there are shrubs all along here, I shall put in these beds the lowest growing plants, Verbena, Gilia, Nemophila.

In G and E put annuals among the perennials, and set out among them, like shrubs, large plants of Salvia, Heliotrope, Lantana, Brompton tenweek Stock, Wall-flower, and Carnation. The groups of sweet Peas must be so managed as to cover all the brush which they trail over.

The following lists of hardy annuals are taken from the Book of the Garden, p. 817. They are the best for general use among the many there given:—

Ageratum,	cellestinum,	pale blue,	18 in.	seed or cutting.
"	oderatum,	lilac,	18	"
Alyssum,	calycinum,	white,	12	"
Anagallis,	cœrulea,	blue,	6	"
"	carnea,	flesh colored,	6	"
"	indica,	purple,	6	Sow in
"	latifolia,	blue,	6	frames in
"	grandiflora,	red,	6	March.
Asters,	china and german,	many colored,	12–24	seed or cutting.
Amaranth,	globe,	red and white,	12	"
Bartonia,	aurea,	yellow,	18	"

Brachycoma,	iberidifolia,	blue and white	12	seed or cutting.
Balsam,		colors,	12–24	"
Calandrinia,	ascendens,	dark crimson,	6	"
"	glandulosa,	red,	12	"
"	grandiflora,	rose lilac,	12	"
"	speciosa,	maroon,	18	"
Calendula,	officinalis, filo. pleno,	orange,	15	seeds
"	stellata,	yellow,	24	"
Campanula,	loreyi,	dark blue,	9	"
"	pentagona,	bluish purple,	9	"
"	stricta,	blue,	9	"
Candytuft,		white and purple,	9–18	"
Cacalia,		scarlet,	9–18	"
Centaurea,	cyanus major,	blue,	18	"
"	depressa,	bright blue,	18	"
Cientranthus,	macrosiphon,	scarlet,	18	"
Chrysanthemum,	carinatum,	white, yellow, purple,	15	"
Cheenostoma,	fastigiatum,	pink,	9	"
"	polyanthum,	lilac,	9	"
"	viscosum,	brown,	9	"
Clarkia,	pulchella,	red purple,	18	"
"	flora alba,	white,	18	"
Clintonia,	pulchella,	blue and white,	6	"
Collinsia,	bicolor,	purple and white,	12	"
"	grandiflora,	blue and purple,	9	"
Collomia,	coccinea,	scarlet,	9	"
"	grandiflora,	buff,	12	seed and cutting.
Convolvulus,	tricolor,	blue and white,	12	"
"	atroviolacea,	dark purple,	12	"
Delphinium,		various,	18	"
"	consolida,	"	18	"
Dianthus,	siniensis,	"	12	"
Erysimum,	perowskianum,	dark orange,	24	"
Escholtzia,	crocea,	orange,	12–18	"
"	californica,	yellow,	12–18	"
Eucharidium,	grandiflorum,	dark crimson,	12	"
"	concinnum,	reddish,	18	"
Gilia,	tricolor,	lilac and purple,	18	"
Godetia,	tenella,	"	18	"
Gramnanthes,	gentianoides,	deep orange,	6	"
"	flora lutea,	yellow,	6	"
Gillyflower,		various,	12–24	"
Heliophila,	arabioides,	blue,	9	"

Hemineris,	incisifolia,	scarlet,	24	seed and cutting.
Hibiscus.	africanus,	pale yellow,	18	"
Iberis,	(candytuft,)			"
Isotoma,	axillaris,	blue,	9	"
Kaulfussia,	amelloides,	"	6	"
Lasthenia,	californica,	yellow,	6	"
Leptosiphon,	densiflorus,	lilac,	12	"
"	androsaceus,	rose lilac,	9	"
Linaria,	spartea,	golden yellow,	12	"
"	tristis,	brown,	12	"
Lobelia,	crinoides,	blue,	6	"
"	heterophylla,	"	15	"
"	ramosa,	"	12	"
Lotus,	jacobeus,	black,	12	"
Lupinus,	bicolor,	deep blue,	6	"
"	pilosus,	"	24	"
"	nanus,	blue and white,	6	"
Malcomia,	maritima,	red,	9	"
"	flora albo,	white,	9	"
Mathiola,	(stocks,)	various,	12–18	"
Mesembryanthemum,	tricolor,	red,	8	"
"	pomeridianum,	yellow,	8	"
Nemophila,	insignis,	blue,	9	"
Nierembergia,	maculata,	white and purple,	6	"
"		blue and white,	6	"
Nasturtium,		yellow and orange,		vine or cut.
Oxalis,	rosea,	rose colored,	9	bulbs
Oxyura,	chrisanthemoides,	yellow and white,	12	"
Phlox,	drummondi,	various,	12–24	cuttings.
Petunia,		"	12	"
Platystemon,	californicum,	pale yellow,	9	"
Podolepis.	gracilis,	pinkish lilac,	18	"
Portulacca,	thellusonii,	orange crimson,	6	"
"	grandiflora,	"	6	"
"	aurea,	yellow,	6	"
"	alba,	white,	6	"
"	gillesi,	purplish crimson,	9	"
Reseda,	odorata,	(Mignonette,)	9	"
Rhodanthe,	manglesi,	bright rose,	12	"
Sanvitalia,	procumbens,	yellow,	6	"
Saponaria,	calabrica,	carmine,	9	"
"	ocymoides,	red,	9	"
Schizanthus,	diffusus,	purple and white,	18	"

Schizanthus.	venustus,	lilac, purple, and yellow,	24	cuttings.
"	pinnatus,	"	24	"
Schiziopetalon,	walkeri,	white,	12	"
Sedum,	azureum,	pale blue,	6	"
Senecio,	elegans,	various when double,	24	"
Shortea,	californica,	yellow,	6	"
Vesicaria,	oculata,	bright rose,	12	"

It is very likely that all these flowers cannot be at first obtained in this country, and probably all would not be desirable, except in a very large garden, where very elegant and precise effects are wished for, but the sizes and colors being distinctly marked would enable a careful horticulturist to produce any result that he had planned. The time of bloom is not given, but all blossom about the same time, or may be made to do so by starting such as are of slow growth, in hotbeds or the greenhouse.

The practice in the best English gardens is to have what is called a reserve-garden, which stands in relation to the flower-garden as the hot and green houses do to the conservatory; in it plants are brought into condition for setting in the main garden, into which they are removed to supply gaps. Without such a reserve, it would be almost impossible to keep a garden in perfection for any time, or even to have it so once.

A real flower-garden is rarely seen in America, and I do not know of any one which can be at all compared either in style, keeping, or size, with the remarkable gardens of England, where 20 acres have been devoted to the display of annual, perennial, and bedding-out flowers. Of course this area includes other ornamental features suitable to a flower-garden, as sheets of water, fish-ponds, and fountains, arbors, statues, vases, etc. The cost of keeping such a place is enormous, and in a country where labor is as costly as it is here, would be beyond all bounds; and certainly, the pleasure to be derived from it is not in any measure proportionate to the cost and trouble expended, for size and quantity do not add beauty and pleasure in such a case. Still, such a garden, kept open to the public, near some large city, might be of great service to the people; it would expand their minds and cultivate their tastes, and give an impulse to floriculture throughout the whole country; but it will be long before such a thing exists here; this generation certainly will not live to see it. Such a garden would be, too, a fitting and beautiful feature in the laying out of a great park of several hundred acres, where its artificial and cultivated beauty would be an agreeable contrast to the wild natural style in which most of the ground would be laid out.

Such a garden is not to be produced merely by having a good design to start from; I could give any number of elaborate designs for such a purpose, but even if the ground were carefully staked out and planted in accordance with them, they would need to be watched and tended by some person who *loved* the work, and who could devote all his time and thought to it.

Flowers are naturally simple and retiring; — they rarely intrude on the notice of man; they bend over the brooks, lending and receiving beauty by the reflection; they peep out of the grass, they fringe the roadsides, and their masses of bright color contrast with the gray stones and dark foliage about them; but they never insist on being noticed; they are always subordinate to leaves and branches and stems, and those that give the best and most enduring pleasure, combine modesty of appearance with beauty of color and delicacy of fragrance. The possessor of a bed of such flowers, however simple and familiar, if they are perfect of their kind, and well-cared for, need not envy the owner of the widest and most expensive flower-gardens of England.

There will not be much return for the care of the garden during this month, unless there is a good collection of bulbs, and they will be in their glory before the month is over.

Choice Hyacinths and Tulips should be shaded from the hot sun and severe rains and winds, and early in the month it is well to loosen the earth amongst the bulbs with a trowel or fork. The sun blends the colors of the Tulips, and destroys the Hyacinths. Drive in stakes round the edges of the bed, at moderate intervals, and higher ones through the middle at corresponding distances, and connect them all together by strips of wood or strong cording, over which a canvass or well-oiled cotton cloth can be spread to form a roof. The cover should hang down a little over the sides. It will be an efficient screen from the sun, and in case of a storm can be lowered on the exposed side, and defend the flowers perfectly from the beating of the wind and rain.

Common bulbs will not need this protection, but the rarer plants will not repay us for the time and money we have spent on them, unless we take this extra precaution, which will often keep them a week or two in perfection.

As soon as the leaves decay, remove those bulbs which you wish to divide or reset, and pack them in dry sand until it is time to plant them in the fall. Common bulbs may be left in the ground for three years, but the choice kinds should be removed annually. When you take them up remove all the outside skin, to the brown under skin. Be careful in taking them up to keep a catalogue of kinds and qualities, otherwise you will be unable to plant them with judgment in the autumn.

Before the tops of the bulbs decay, set amongst them the annuals and bedding plants, by which they are to be replaced, and give the new plants all the care possible, to stimulate early growth. If pains are taken, there need be but a short interval of nakedness.

During the summer, water occasionally with liquid manure, or shake over and rake into the bed dressings of guano, just before rain.

Set in place all trellises and wire baskets, and plant the seeds or cuttings which belong to them. The Tropeolum, or Canary-bird flower, and the Maurandya and Ipomea, and German Ivy are the prettiest summer vines, on a small scale, while Nasturtium, Convolvulus, Maderia, Ipomea learii, are quick growers and beautiful coverings of a larger kind.

In the course of the month make all the plantations of woody vines, as Wisteria, Honeysuckle, Rose, Periploca, Aristolochia, Clematis, etc.

The first of June should find you about ready to enjoy and weed. If, however, the sowing of flower seeds out of doors is delayed till the last week of the month, when the ground is warm, but little time will be lost.

CHAPTER LXI.

KITCHEN-GARDEN.

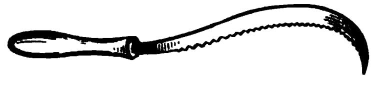
THE hotbeds are to be watched with care; the Melons and Cucumbers will be in blossom, and showing fruit, and all plants are in a state of advance. Give air in abundance, to make them hardy.

Make a dungbed early in the month, just as you would for a hotbed, in some sheltered situation, and cover with 3 inches of loam. As soon as the manure begins to ferment, set into this bed the Melons and Cucumbers which are in thumb-pots, or on bits of sod in the greenhouse. Set 2 Melons or 3 Cucumbers in each place; cover with a hand bell-glass, keeping the glass on all the time, unless the weather is decidedly warm, till there is no danger of frost, giving air in the middle of sunny days by tilting the glass.

Prick out into sheltered places the most forward Lettuce, Cabbage, Cauliflower, and Broccoli plants; make beds in which to sow seeds (as directed in the flower-garden) of these plants for later summer use; and carefully forward and harden those which are still in the hotbeds.

Plant an abundance of early Peas, and continue sowing later crops once a week during the month. Sow seeds of Radish in the same manner. Radish seed may be mixed, two for one, with Carrots, Beets, and Turnips, when sowed in the seed-sower; the Radish will germinate early and grow rapidly, and mark the rows so that they can be cleaned readily, and they may be pulled long before the other vegetables are much grown.

Asparagus will be fit for the table as soon as it has grown from 2 to 4 inches. It is better so than larger. Be careful when cutting it not to injure the buds of the crown of the roots, and be sure always to cut it below the surface. A common knife will answer, but it is not so good as one made for the purpose. The objection to the common knife is that it makes a smooth, clean cut, in which case the stump of the shoot will bleed considerably, while by cutting it with a saw-toothed edge, you leave a jagged surface, and the sap is not inclined to extravasate.



Lettuce in the hotbeds should be now about ready for the table, and in the graperies an abundance of Salads, Strawberries, Cauliflowers, etc.

Sow in beds seeds of small Salads, Mustard, etc., as often as once a week, to ensure frequent and tender growth.

This is the proper time to make beds of Artichokes, either for the table or the field. Sow in beds seeds of Sea-kale, Cardoons, Alexanders. Make beds of Horseradish. Sow seeds of Parsley. This will remain for some years in the same spot, and should, therefore, be planted in some place whence it need not be moved. Sow Spinach, for summer use, several times in the course of the month. Plant early table Turnips; English White are the best.

Procure the roots of Rhubarb, to make new plantations the first of the month. The best variety for family use is not that which grows the largest, but that which melts most completely in stewing. Victoria Rhubard is a very large and rather coarse variety; the Early Prince Imperial is better for family use. Plant it in deep, rich soil with plenty of manure. Every autumn cover with a foot of loam and manure, and in the spring repeat the process, and dig in around the crown. The leaves will push before the middle of the month, and it will be ready for the table before its close. Some farmers recommend covering heads of Rhubarb with an inverted barrel, for the purpose of hastening its growth, at the same time that they blanch and make tender the edible portions. The latter purpose is accomplished, but not the former, and it is maintained by some that the process develops some medicinal and disagreeable qualities.

The very first of the month plant Strawberry beds; the earliest planted generally make the best beds. Mulch old beds with tan.

There are many methods of making beds, and many varieties of vines, as I have before said. The size and shape of the beds must be determined by the amount of room that can be spared them. Sometimes Strawberries are planted as an edging to the large divisions of the vegetable garden. For this purpose set them along the edge of the bed, and take care to turn the runners in towards the bed as they begin to grow, and thus ensure a thick and well-filled edge.

The more delicate varieties of fruit are by no means the best for general culture, as they are with considerable difficulty gathered and preserved for marketing. But they are, of course, the best for the table. Shake some guano amongst the plants in old beds, but do not set new beds in newly manured land.

Set out Raspberry beds now. Set the rows 3 or 4 feet apart, and the plants 2 or 3 feet apart in the row. Select for planting the best of last year's suckers; they should be well grown and have an abundance of fibrous roots. Cut the cane of the plant back to within four or five buds of the roots; set the root 3 or 4 inches deep in the earth, and at the same time set stakes if you are to use them, so as not to injure the roots by driving them afterwards.

The best varieties of Raspberry vary with the latitude and often very greatly with a short distance. The advice of a good and *honest* nursery man in the neighborhood is the best guide in selection.

Make the beds for pot herbs as before directed, and be sure before planting the seed that you rake the loam on the surface of the bed until it is reduced to a fine tilth, and then sow the seed not more than one-half inch deep. Set the offsets of roots rather deeper, enough so to be well covered.

Caraways are biennial, and if sown this year will bear seed next: they are valuable for medicinal and culinary purposes.

Plant Onions for seed the first of the month, as directed in October. The earlier they are planted, the earlier and better crop they will bear. Sow the seeds for late onions during the month; be sure to have the loam well pulverized before sowing the seed.

Plant Beet seed any time this month; the early-planted often grows better and produces less stringy, and more juicy Beets, than the later; this depends, however, much on the character of the season, whether wet or dry. To ensure success with Beets or any tuberous root, the plant should grow regularly, rapidly, and uninterruptedly, and with sufficient moisture; the tuber becomes coarse, hard, or stringy, when checked in its growth by drought or any other cause.

The best variety of Beet for home consumption is the long Blood Beet; turnip-rooted Beets grow more rapidly, and are equally well liked by many.

The Beets for field culture will be described hereafter. All the roots for early kitchen use can be planted in May, but for winter not till June, July, or August.

In selecting seeds of Celery, remember there are several kinds, some of which are ready for the table earlier than others. Make a bed for them near the last of the month, in a warm spot, and sow them as in a hotbed.

Plant beside fences, or in other favorable places, Nasturtiums for pickles; the seeds have quite as good flavor as capers, and the brilliant flowers contribute largely to the gaiety and pleasantness of the kitchen-garden. The seed vessels are taken for pickling when about half ripe.

Sow in a good place, according to previous directions, Endive for salad use in August, also the seed of broad-leaved Sorrel.

In the middle of the month sow Sweet Corn, and Stowell's Evergreen Corn, as mentioned in April.

About the third week plant the seed of all kinds of Melons. Earlier planting than this for out-door crops is rarely successful. Do not make the common mistake of putting a shovelful of strong manure under each hill. It soon dries, and unless frequently watered hinders the growth of the young plants. Make the hills in a rich, moist soil, for Cantelope, Musk, and similar melons, 3 feet apart; for Watermelons 4 feet; for Squashes 10 feet. Dish the earth where you propose to make the hill, and scatter a little guano over the earth; rake it in, and sprinkle the seed four or five in the hill, intending when the plants are fairly established to reduce them to three. If the land is not rich and moist, dig or plough in over the whole area a heavy dressing of rich, well-rotted, barnyard manure.

The best land for vines of all kinds is a newly broken sod. It is unnecessary to give any general directions for the selection of Melon seeds; the experience of each locality must decide. The flavor of the Musk is not so delicate as that of the Cantelope, but the yield is generally larger. The Mountain Sweet Watermelon is the most reliable in the neighborhood of Boston, but many cultivators have been very successful with the Black Spanish and other varieties. At the South there is a Watermelon called the Ice-Cream melon, the rind of which being turned back like that of the Banana, shows a perfectly regular and delicious pulp.

Of the Summer Squashes there are at least two varieties, the round or scallop shaped, and the club shaped. The latter is much covered with warts and wrinkles, and is gourdlike; the former is the more common Scallop Squash, and rather the better for use. There are also several varieties of Winter Squash; the Crook-necked and the Marrow are those most generally cultivated. The latter ripens earliest, the former keeps longest; the Hubbard Squash is very much liked by many and keeps well.

There is also a Squash called the Chili or Valparaiso, which is not fit for use till the spring after it is planted.

The treatment of Pumpkins is the same with that of Squashes, except that in New England the seeds of the Pumpkins are generally planted in the hills of Corn in cornfields.

Cucumbers vary in kind, and may be planted early in the month for table use, but for pickles not before June; for the latter purpose the small varieties are best.

By the third week in May it is safe to plant Lima and Sieva Beans. The seed of the former is sometimes out of the market; they are rarely ripened in our latitude. The Sieva is next to it in quality, and is also late in coming into bearing. However early they are planted, they are seldom ready for use till September, and may then be used constantly till frost, and if, after severe frosts have destroyed the leaves of the vines, they are pulled up, poles and all, and stacked and covered at night from the cold, the Bean pods will remain uninjured, and may be used for a long time — indeed till they are all gathered.

These are pole Beans; set the hills 4 feet apart, and make the hill by setting the pole, and then planting the Beans around it. Treat all pole Beans in the same manner.

Set bushes for the Peas to run upon as soon as they show the rows distinctly.

It is but little use to plant the seeds of Tomatoes in the open ground, as they rarely get sufficiently advanced to bear. The earliest Tomato plants may be set out and covered with boxes as previously directed, the first of this month.

Red Pepper seeds can be sown in beds the middle of the month, to be transplanted in June.

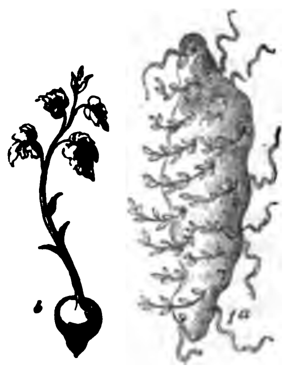
Scorzonera and Salsify are two plants not in general use, but valuable. The latter is better known as the Oyster plant. Sow the seeds the first of the month, in rows 6 inches apart, and covered ½ inch deep. Thin to 6 inches apart as soon as well developed. They may also be propagated by slips from the roots. The roots are fit for use as soon as the leaves decay in the autumn, but may be kept like Parsnips, till spring. The roots may be sliced and fried, boiled, or stewed. If left in the ground till spring, the Salsify will early throw up an abundance of young shoots, which are a very good substitute for Asparagus. These plants need a good deal of moisture, and should be planted in a deep soil.

Skirret is a plant similar to these; the edible portion is the root, which is composed of a cluster of fleshy tubers, as large as the finger, which may be eaten boiled and dressed, or fried in batter, or having been boiled, cold with vinegar and salt.

The seed of Skirret, as of the last two plants, may be sown in April, if the season is early; it may also be propagated by taking up the old roots in the spring, and cutting off slices, or slips, each having an eye, which are to be planted in rows, 6 inches apart each way; but by seed is the easiest method.

Another plant not commonly cultivated in this latitude, is Okra, the green capsules of which are very much esteemed in soup, to which they communicate both flavor and body. The dry seeds are burned and ground like coffee, and are preferred to it by some. Sow the seed by the middle, or last of May; set it in drills 4 feet apart; seed an inch deep, and hills 8 inches apart. Put three or more seeds in each place, to allow for failure. Weeding, hoeing, and occasionally drawing the earth up to their roots, is afterwards necessary.

By the last of the month it will do to set out Egg plants, from the hotbed, particularly if some slight protection against frost is provided; set them 3 feet apart each way. The purple-fruited is the best for culinary purposes. If there are no plants in the hotbeds, sow the seed in a sheltered place about the third week, and set them out permanently in June.



SWEET POTATO. — "This plant requires a dry, rather light, deep, well-stirred soil, which must be located on a dry subsoil, and the whole either rich in organic manure, or rendered so by manuring. Stiff clay does not suit it. Slips or sprouts from the previous year's tubers are used for planting, and are obtained in the following manner: On a bed of earth make a box with planks set edgewise, and fill in about a foot in depth of good, warm, fresh manure; over which spread two inches of fine, rich earth, and on this lay the potatoes, so near as to almost touch each other, and cover them from 2 to 2½ inches deep with the same earth. If the nights are cold, this bed must be covered with straw, or some other warm covering, which is to be removed during the day. There is danger in making the bed too warm, and so spoiling the roots; they must be kept tolerably wet after the sprouts appear. When these are 3 inches long they are fit to set out. *a*, Sweet Potato sprouted, *b*, a sprout ready to plant.

Plough the ground very deep, and throw the earth into ridges, or common Potato hills. Do this immediately before planting, that the earth may be moist and fresh. Remove the slips, or sprouts, from the Potato, and set 2 in each hill, 2 or 3 inches apart, and make the top of the hill sufficiently hollow to hold a pint of water. If there is no rain, watering in the evening is requisite for a few days. When planted in ridges, the sets should be 8 or 10 inches apart; keep the weeds clean, and hoe earth up about the bottom of the plants; when ploughed the last time, about the last of July, hill them." Be careful in ploughing not to bruise the vines, or cover them with earth; when covered, the vines will root and produce small Potatoes At the South, the crop is increased by covering the vines; our season is too short. "They should be dug as soon as frost kills the vines." Store in boxes, tubers packed in dry sand, the temperature of the room equal, and above frost.

By the last of May, the Onions planted for seed in the fall will have advanced so far as to need to be tied to sticks.

Tie up the leaves of Cos, or Roman Lettuce, so as to insure blanching.

Thin out all vegetables which are well growing, and hoe up the starting weeds. A great deal of time is gained, and labor saved, by destroying weeds when young, before they have got firm hold in the soil, as later they impoverish the ground, and shade the plants from the sun. During the next month the care of removing weeds is a serious annoyance; they should be dug up in the morning on sunny days, and will then entirely dry up before night, whereas, if hoed in dull weather they are likely to grow again.

Examine the Strawberry beds occasionally, and remove weeds when it can be done without injury to the vines and young fruit.

By the last of May, the early Cabbages, Cauliflowers, Broccoli, etc., will be ready for hoeing.

The kitchen, like the flower-gardener, should never go into the garden without knife, strings, and sticks. It is surprising to see how much may be done by early attention; in nothing more than in the various branches of gardening, is the old proverb exemplified, that "an ounce of prevention is better than a pound of cure."

By the last of the month the largest Radishes may be thinned, and there will be ample supplies of Lettuce in the hotbeds.

Do not leave any piles of stones or rubbish in the walks of the kitchen-garden, but remove them at once to the manure pile and waste hole.

Examine the espaliered fruit trees, and rub off all buds which will produce shoots in bad positions; this saves future pruning.

Any stocks or branches which were budded in the autumn, must be cut back to the bud the first of May, that the buds may start with vigor.

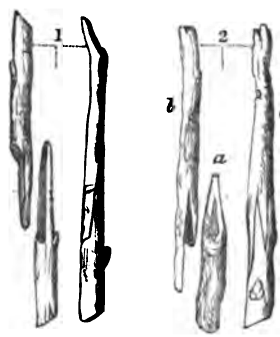
At the same time uncover the Figs, and get them ready for summer. For details of culture, see July.

CHAPTER LXII.

ORCHARD.

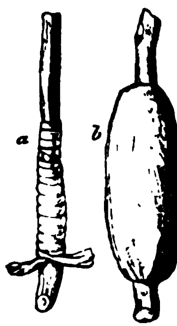
The pruning is, of course, over, and the hunt for caterpillars proceeds with full vigor. The trees will begin to blossom about the last of the month.

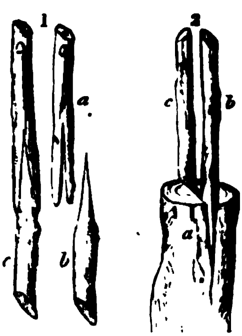
This is the best month for grafting all kinds of trees; the sap is in free circulation, and the weather mild, which promotes the rapid growth of the scion, and the healing of the wound.



It will not be necessary to minutely describe all the kinds of grafting, as but few are ever practiced on a large scale. Cleft and whip grafting are the common kinds, especially the former. The method of whip or tongue grafting is described by Downing as follows: —

"Having chosen the stock, cut it off at the point where it appears best to fix the graft (see cut); if the stock is quite small, it may be within 3 or 4 inches of the ground; then with a very sharp knife make a smooth cut upwards, about 2 inches in length. Next make a split from the top of this, cut about quarter of the way downwards, taking out a thin tongue of wood; cut the scion 4 or 5 inches long, so as to have 3 buds; then shape the lower end with a single smooth, sloping cut, about the same length as that on the stock, and make the tongue upward to fit in the downward slit of the stock; now apply the scion accurately to the stock, making the inner bark of the scion fit exactly the inner bark of the stock, at least on one side. Without changing their positions tie them carefully together with a piece of bass matting or tape, and finally cover the wound with well-prepared grafting clay, or wax. This ball, if clay, should more than cover the union by an inch above and below, and should be about an inch thick. If grafting-wax be used, it need not be more than half an inch thick. About the middle of July, for plants in the open air, after a rainy day, remove the ball of clay, and if the graft is securely united, also the bandage, and the angle left at the top of the stock should now be cut off smoothly, in order to allow the bark of the stock and the scion to heal over the whole wound. Though it is little attended to in common practice, the amateur will be glad to know that the success of the graft is always greatly insured by choosing the parts so that a bud is left near the top of the stock, and another near the bottom of the scion; these buds attract the rising sap to the portions where they are placed, from the woody matter, and greatly facilitate the union of the parts near them, the upper part of the stock and the lower part of the scion being the portions soonest to perish for want of nourishment."





The cut No. 1 here given shows saddle grafting, and needs no further expla-tion. *a* is the scion, *b* the saddle-shaped stock, and *c* the completed graft.

"Cleft grafting, No. 2, appears to have been one of, if not the most primitive of all modes, which may be naturally inferred from its great simplicity. Although easily performed, it has a clumsy appearance, but is yet very useful in the case of old trees requiring to be cut down from old age, disease, or other causes."

The figure shows a specimen of cleft grafting. "*a* the stalk, of almost any diameter; *b*, *c*, scions; but there may be several, according to the size of the stock. The operation is thus performed: The head of the stock is first sawed over, and then smoothed with a knife; a cleft is then made in the stock with a hammer and splitting knife, or as often with a carpenter's chisel. The scion is prepared by cutting it down to a wedge shape, taking care to preserve the bark, on the outer edge, pushed into the cleft as the knife or chisel is withdrawn, taking care that the inside bark of the scion fits the inside bark of the stock. When the number of scions desired is inserted, the whole is bound round with matting, and clayed in the usual manner."

Instead of using coarse and unsightly lumps of clay, where directed, you may use the grafting-wax and a firm cotton cloth. The wax is poured on warm, and runs into and over the apertures; pierce a piece of cloth with holes to fit over the scions, and then bind it around the stock, as round a sore finger, covering it with a little more wax, to keep it firm and in place. The wax will immediately harden, and hold all in place, exclude air and rain, and as it is not rigid, will expand as the scion grows, and finally fall off.

Downing further adds, "Apple stocks are grafted in great quantities in this mode, the stocks being previously taken out of the ground, headed down near the root and cleft-grafted with a single scion, sloping off with an oblique cut the side of the stock opposite that where the graft is placed, and then planted in rows, so as to allow only a couple of buds of the scion to appear out of the ground. It is not usual with many either to tie or clay the grafts in this case, as the wound is placed below the surface; but when this plan is adopted, the grafts must be set, and the trees planted at once, drawing the well-pulverized soil with great care around the graft.

"Another way of grafting Apple-stocks, in some western nurseries, consists in tongue grafting on seedling stocks of very small size cut back to the root; this is performed in the winter by the fireside; the grafts carefully tied, and the roots placed in the cellar in sand till the spring, when they are planted, the top of the graft just appearing above the ground."

"Cleft grafting with one scion is in general not a good mode, because if the split has been made right through the stock, it is in danger of being injured by the weather, before it is covered by the wood of the scion. If the cleft is only made on one side the stock, the evil is mitigated. Another objection arises when only one scion is used; the tree becomes as a matter of course, attached, as it were, to one side of the root only."

"Cleft grafting the vine is sometimes done in the following manner. A spur is cleft commencing the incision exactly above the second eye. The scion when chosen is cut in a wedge-shape form at its base, commencing the slope of the wedge just below a bud, and so that when the scion is inserted into the cleft, the bud of the latter and that of the stock may be placed opposite each other, which is considered the most favorable position for success; the process of tying and claying goes on in the usual manner, with the exception that a small hole is left in the clay opposite the bud of the scion, to allow that bud to develop itself freely.

"When the scion has grown 14 or 15 days it is then headed back to one bud, which is left to draw up the sap until the union has fairly taken place between the stock and the scion. The proper season for grafting the vine in this way is when the shoots have made four or five leaves. If done sooner there is danger of the sap flowing so fast as to prevent a union taking place, by what is called bleeding. This process is often adopted in grafting succulent plants, and some European growers employ it in propagating Roses and Camellias. For the latter purpose it is of considerable importance, as each individual bud is made to form a plant, the scion being so cut that only one bud is attached to each.

"*Crown* grafting is merely a variety of cleft grafting, and is sometimes called *rind* grafting. It is practised upon old trees either for their total removal, or upon large amputated branches, to renew by degrees. It is upon the whole better than cleft grafting, because the stock if old is not subjected to the chances of being split, the scions in this case being placed between the wood and the bark. It is performed later in the season than cleft grafting, because the bark separates more freely from the wood than at an earlier period. In rind or crown grafting, great care must be taken that the bark of the stock be not bruised during the process of opening the bark for the reception of the scion, and for this purpose a proper spatula or grafting knife should be used."

The ivory end of the budding knife is the best instrument for separating the bark from the wood, as it is made for a similar use in budding.

"The scion is to be prepared without a tongue, and is placed in the stock so that its wood may be in contact with the albumen of the stock. Sometimes it is cut with a sort of shoulder at the top of the graft, that the graft may rest on the top of the wood, in which case this kind of grafting is called *shoulder* grafting.

"The scion being prepared in either way, the bark is opened to the extent of 2 inches, and the scion is made to pass down between the wood and the bark. If the bark of the stock is hard and dry and does not yield readily, it may be scored or cut perpendicularly downwards, to enable the operator to open it (as in budding) so that he may thrust the scion into its place with its cut side next the wood; this being done, tying and claying follow as in other cases."

Herbaceous grafting *a*, *b*, p. 564, is rather a singular kind of grafting. It consists in attaching the solid parts of herbaceous plants, or of woody plants, when in a herbaceous state, to others of the same or similar species, while in a similar state. The Tree Peony has been successfully grafted on the fleshy roots of the herbaceous plants of the same genus.

In the case of the Tree Peony, the operation may be performed at any time from the middle of July to the middle of August. The tubers throw out roots in the autumn, and are then taken up and potted, and preserved under cover during the winter. The operation is exceedingly simple; it consists in selecting single tubers of the plant, in which a triangular notch is cut near its top, *b*, to which notch a scion of the tree sort, *a*, is made to fit, having two or three buds upon it.

When placed, it is tied with soft matting, and clayed or waxed over in the usual manner. If the plant which supplies the scions be scarce, only one bud may be used, instead of three. In selecting tubers for this purpose, barren ones, that is those having no visible eyes, are as good as fertile ones, or better.

By this means, Dahlias may be largely multiplied, as every tuber is a stock, whilst only the crown of the root produces buds.

a

b

When *whip* grafting is the means used, and the bud is set high up from the root, it is well to wrap the whole stem with moist moss, to keep it in good condition for the union to take place.

Whip, *splice*, *tongue*, and *saddle* grafting can only be effectively used when the stock and graft are about the same size, as otherwise the proper parts could not be brought together; but *cleft* and *crown* grafting are possible, no matter what disparity there may be.

There are many refinements upon grafting, with which I shall not trouble you, for when you have advanced so far as to inquire about the refinements of culture, you will no longer need such aid as this book offers.

The other work of the orchard will be very simple — a mere repetition of the work of April.

Keep the caterpillars well rubbed off. No more tar need be put on between the last of the month and November, for in that interval the egg-laying canker worms do not run. You will find it a simple way of destroying great numbers of the worms which eat the leaves, after they are hatched, to jar the trees by heavy blows. The worms feeling the jar, cease eating, and drop to the ground, lowering themselves softly by a thread which they spin as they go. The thread will be broken directly, and the worm will run for the tree to climb back, and be caught in the tar on his way.

The appearance of these worms is very unlike that of the grub which laid the egg, and if there is no sign of perfect, leaf-destroying worms, the tar may be omitted early in the month.

If your orchard is surrounded by stone walls, or close board fences, you will find it advantageous to plough very early and sow with any succulent fodder, and to turn in young pigs when it is pretty well grown. They eat all the green crops, particularly Clover, greedily. A good Clover field is a certain source of fat and growth for pigs, and in an orchard they will pick up windfalls through the summer, thus destroying enormous quantities of worms. The great value of pigs, in this way, is not sufficiently appreciated. They thoroughly root over a field in which they are turned, and eat all the worms and grubs they can find.

A litter of spring pigs, fed in such an orchard, and supplied beside with skim milk, will thrive wonderfully.

CHAPTER LXIII.

THE FARM.

CONTINUE the work of April with regularity and rapidity; postpone no necessary job, for a loss of time, however small, in the spring, can not be made up during the year. On every farm there is always far more to do than time in which to do it, and this is especially the case on a place like ours, where there are ornamental grounds, which offer employment for every leisure moment.

We sowed clover over the Wheat field in No. 3, and also over the Rye in orchard No. 1. The pasture in No. 1 will have given good feed during the last half of April, if properly irrigated, and should now give abundance.

The Grass lands and Wheat fields may be kept constantly irrigated through May.

Our Spring Rye should have been sown in April, unless the season was late, in which case sow it early in May. Sow one acre of Rye, Clover, and Grass, and one acre of Oats, Clover, and Grass, to be cut in the milk; reserve the third acre for fodder, one-half of which should be got in as soon as the warm weather has regularly begun; sow 2 to 4 bushels seed to the acre, in a seed-sower; sow very thick, and set the rows within 3 feet of each other; the Corn will come up thick, and will tend to leaves more than butts, and will keep the ground well shaded. You may either broadcast your Grass seed before sowing the Corn, and trust to hand weeding, or sow it at the second hoeing, as I have directed, when the Corn is just large enough to cover the ground. No hand hoeing will be necessary, if the land has been well attended to heretofore.

With the Rye and Oats spread 300 lbs. guano, 300 lbs. plaster, one cart-body full of fine peat, 100 lbs. potash, mixed, unless you gave a generous coat of manure at the beginning of the rotation, in which case omit the potash. The Grain should be sowed with a drill, and the manure spread at the same time.

Cut the Winter Rye in orchard No. 1 just as soon as there is enough for the scythe, and feed it out together with Roots, any which are left, and Grain and Hay to the milch cows. The Rye will grow very fast now, and may be stimulated as much as you please by liquid manure.

In the orchards to be cultivated there are rather more than 6 acres, half of which is not to be cultivated; but half is for culture, which will not injure but rather stimulate the growth of the trees. Two acres should be devoted to Indian Corn, one to fodder. Sow the fodder on this land rather later than on No. 3; one-half as late as the second week in July, and then sow Millet.

The Sweet Corn fodder will then follow the Rye, the Sugar Cane, the Sweet Corn, to be again followed by Sweet Corn and Millet.

During much of the month there will be good feed upon the pasture in No. 1; and after the lower lawn and No. 4 are mowed, they may be fed. Remember that the pasture in No. 1 is no common New England pasture, needing 3 acres for one cow, but land well able to give $1\frac{1}{2}$ tons per acre, and must therefore be fed early and close, to prevent the grass growing rank. Small as the enclosure is (5 acres) you will gain decidedly by setting a hurdle fence across half way, and eating down one-half before you turn on to the other.

Before turning out your cattle sell those cows who have proved poor milkers during the last year, and be on the lookout through the summer to buy better. It is not for your advantage to keep many cows during summer, unless for butter. The price of milk is higher in winter than in summer, and we know that the manure is neither so valuable nor so easily saved in summer. Try to keep enough, and no more, of the best kind for dairy purposes, and devote yourself to getting large *crops* to be fed out the next winter to cattle, sheep, or milch cows, whichever is the best in your experience.

It is well now to start a calendar or account-book with each of your animals, as a test of their value. If you begin at the date of turning out to pasture, charge each with its cost, pasturage per week, every item of food and care for the suceeding year; and credit it with its milk and manure. You will then know how you stand, and what is profitable and what not.

The same should be done with each field and each crop, charging it with all the expense it makes, with interest, with one-half of the manure spread on it, and crediting it with its crops, whereby you will soon learn the profit and loss of crops and manures.

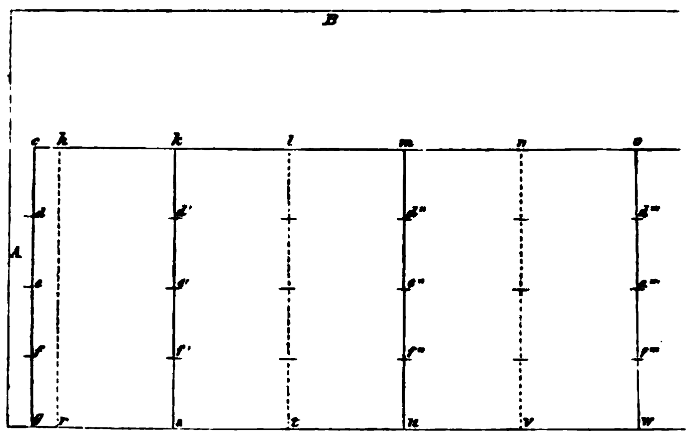
If there come any wet days, when you are short of work, go through all the cellars, and thoroughly clean them, cleaning away all cobwebs, etc., and then apply a strong lime wash. We are told never to apply whitewash except in bright weather, as it will not dry white at any other time. I give the statement for the satisfaction of those who believe in it, of whom I am not one. I have whitewashed the ceiling of good houses during dark and rainy weather, and have never seen any inferiority in the final whiteness and lustre. But in stables and cellars it is of no consequence whether the wash prove white or not; it is for cleanliness.

We are to plant 2 acres with Potatoes, in No. 2, and will select some variety to test its quality. If you must buy the seed, you will like to know the proper quantity. A large Potato judiciously cut into 3 pieces, and all these planted in one hill, yields better than it would if planted whole. A medium-sized Potato should be cut into 2 pieces; cut from end to end, and not across. Remember that the tuber is like the branch of a tree; the buds at the ends are perfect or not, as it is perfectly or imperfectly ripened; the middle buds, or eyes, are certainly ripe and perfect. By cutting across the middle, you divide the middle eyes, and are liable to put all the immature buds into one piece. Were the two ends of the Potato to go into the same hill, it would not matter much; but the cut pieces are mixed in the basket from which they are planted, and if they are all cut across, there is great chance that some hills will be planted wholly with immature eyes. The quantity of seed cut as above, which will be needed, is about 8 bushels. It depends somewhat on the variety. In a bushel of State of Maine, Eastport, Chenango, Jackson White, Worcester Red, or other round Potatoes of medium size, there are about 400. If the rows are 4 feet apart and the hills 3 feet, each hill has 12 square feet = 3,630 hills. Call it 3,500 hills, the acre will need 8¾ bushels of seed. In any case, 10 bushels to the acre ought to be an abundance.

Be sure that the rows are perfectly straight, for this saves a deal of time and trouble, first and last.

If you are depending on farmyard manure to keep your land in good heart, cart on to the 2 acres of Potatoes not less than 20 cords of your best compost. Now is the time to manure for the whole rotation. Had the bed been manured last year for Indian Corn at the same rate, there would now be no need of any other manure than plaster. Cart on only just in advance of the plough, and spread thickly over the surface; plough as deeply as a stout pair of horses can carry a deep-tiller plough, and follow with a one-horse subsoil plough. On most land one horse will make but little impression with the subsoil plough, but that little every year is all important. He will, if the plough is held firmly, deepen the soil one or two inches every time he goes over the field. These two inches are the top, and, consequently, the hardest part of the subsoil, and being loosened and improved, will be seized on by the roots of the crops, and mixed with the top-soil when the deep-tiller plough goes through again. When you plough the same field in the fall for Rye, or Wheat, you will find the first plough gaining much more than 2 inches on the spring ploughing, and a new subsoiling will show the wisdom of the proceeding through the rotation.

Having ploughed in the manure, draw straight furrows across the field both ways, with a one-horse plough. Strike the first furrow by what the English ploughman calls feering poles. These poles should be a part of the permanent equipment of the farm. They are 9 feet long, shod at one end with an iron point; paint them in 3 colors, red, white, and blue; but do not put the paint on the same part of all the poles; vary the arrangement, so that when set up in the field it will be the easier to distinguish them from the objects around; graduate them into 3½ feet lengths, so that they may serve for measuring. When ready to begin ploughing, measure off from B, p. 570, the straight side of the field, a head land, 15 feet, or one ridge wide, and set one pole, *c*, 3½ feet from the fence A; then go as far as you please along the side *A*, at a right angle to the headland, and measure another $3\frac{1}{2}$ feet, and set another pole, *d*, and so on to the



end of the side A. Now start your horses and plough exactly down the line of the poles *c*, *g*, keeping them always in line, and allowing the cord which connects the horses, or the yoke of the oxen, to knock the poles down. As soon as it (*d*) is ploughed over, stop the team, and take the pole once and a quarter the width of the ridge, and at right angles to the line of poles, and there set it firmly into the ground at *d'*; go back to the beginning of the furrow, and take the first pole *c*, and carry it once and a quarter the width of a ridge, and at right angles to the line of poles, and fix it at *k*; start your plough again, and when you plough over the next pole, *e*, treat it like *d* and *c*, and set it at *e'*, and so on. Return on the back of this furrow, and continue to plough till you arrive at the end of the quarter ridge made on one side by your first furrow and the fence on the other. You will thus have ploughed half a ridge. Return to the line of feering poles, and plough down from *k* to *s*, and back as before; as the poles are ploughed down, reset at the distance of a ridge. See diagram. This method leaves an open furrow for surface drainage, etc., from *h* to *r*, from *b* to *t*, from *n* to *v*.

Of course this method of ploughing cannot be followed on new, stumpy or unbroken land; it is suited to subdued and open land, even to that which is very stony, but not to ledgy land. Ledges are as invincible by the plough as stumps.

A *land* is that portion of ground marked out by natural limits, by the eye of the ploughman, or by stakes, which is to be ploughed through before starting afresh. Its width and the method in which it is to be ploughed depend on circumstances, but it should not be wider than 30 feet.

It would seem to the uninitiated that the length of the furrow, the width of the slice, the area of land, were of no particular consequence to team and ploughman; but these things are of real importance, and the work must be broken with stopping, turning, etc., to insure its being done to the best advantage. Careful experiments have been made in England and tabulated, to show how the amount of land ploughed in a given time by a given force is effected by the width of furrow-slice and the length of furrow; it is upon these that the speed of the team, and consequently the amount of work accomplished, depends.

Speed per hour in miles.	Distance walked in 8¾ hours.			Breadth of furrow-slice in inches.	Land ploughed in 8¾ hours at that speed.		
	Miles.		Yards.	Inches.	A.	R.	P.
1	8	and	1,284	9	0	3	1
	8	"	440	10	0	3	14
1 1-2	12	"	642	9	1	0	21
	12	"	220	10	1	0	34
2	17	"	808	9	1	2	2
	16	"	880	10	1	2	28
3	26	"	332	9	2	1	3
	24	"	1,320	10	2	1	42

NOTE. — The above is taken from "Stevens' Book of the Farm," vol. 1, p. 167.

In calculating the time necessary to plough a given area, remember that the team cannot be kept constantly at the same rate of speed; apart from the time lost in turning, allowance must be made for stops and rests and changing lands.

The next table shows plainly which length of furrow was found the best.

Length of ridge in yards.	Breadth of slice in inches.	Time lost in turning		Time ploughing.		Horses worked.
		H.	M.	H.	M.	H.
78	10	5	11	4	49	10
149	"	2	44	7	16	"
200	"	2	01	7	59	"
212	"	1	56 1-2	8	3 1-2	"
274	"	1	22	8	32	"

NOTE.—Stevens' Book of the Farm, vol. 1, p. 167.

In ploughing longer ridges a loss of time appeared, though not so much as in the short, but the ridge of 274 yards (or a medium one of 250 yards) gave the best average. Just look at the difference! in one case, out of 10 hours work, 5 hours 11 minutes were lost in turning, whilst in the ridge of 274 yards there was a loss of but 1 hour 22 minutes in 10 hours work.

This is of the greatest importance, for you may thus lose or save one half the time you have to plough. Under the best circumstances ploughing is a difficult and slow process, needing every possible advantage; yet it is generally done as if it were susceptible of no improvement.

Breadth of slice and kind of land are the next considerations, and are decided by the character of soil and crop.

It should be the work of the best ploughman on the farm to set the feering poles and plough down the ridges the first two furrows; the rest of the ridge may be ploughed out by a less expert hand. The headland is left a ridge wide and ploughed last. The proper width for the ridge, in the opinion of experienced cultivators, is 15 feet; from open furrow to open furrow, 30 feet. By ploughing thus you will make all your furrows lie in the same way on the same side of each ridge.

Such care in laying out lands and ploughing will be ridiculed by most of our farmers, and pointed out by some of my readers as an evidence of the foolishness of my theories. Nevertheless it is wise; it saves time and labor, and pays well. The extra work, *i.e.*, skilled labor, should be done by the head of the farm, and thus money be saved; there is no time lost in turning, no corners unploughed or half-ploughed, and the land is in the best condition for after culture.

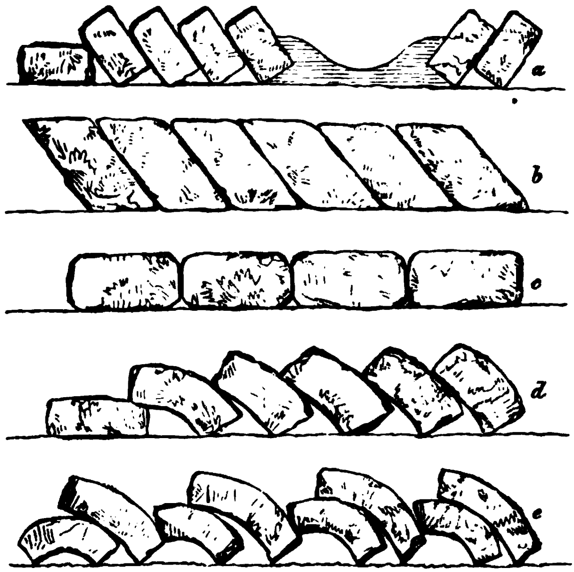
Certain circumstances decide the best way of ploughing; for instance, on a hill-side all the furrows of each ridge are turned down hill; but the principle of the detailed plan will apply to all lands. The calculations of time etc., in the preceeding tables are based on ploughing Grass land.

Many farmers plough stubble land and sod in opposite ways; but it seems to me that their practice should be just reversed. The plough they use in stubble land has a somewhat convex mould-board, and leaves the furrow-slice on its edge, where it is well exposed to the air and the harrow; but the plough they use in sod turns it down flat, the idea being that each sod should just fit into the place of the last, so as to leave no sign of grass, *c*, p. 574. No better method than this last could be devised to consolidate land, and it is the best for sandy lands or those where wheat is to grow; but for the general purposes of agriculture it is bad. Where the sod is thus inverted, the grass is turned over upon the subsoil, air is shut out from it, which can be neither ameliorated nor sweetened, and the sod will only decay after a long time, and the roots of the crop get nothing from the subsoil till they have penetrated the thick sod.

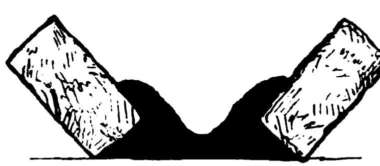
Plough such sods with a very concave mould-board, which will roll the sod into a pipe, double it on itself, *d*, p. 574 or leave it on its edge. To most lands it is important that the air should get into the sod to feed the roots, to sweeten the soil, to decompose the turf.

The Michigan plough answers this purpose admirably. It peels off a thin sod, which it rolls over on itself like a pipe, and then covers it with a quantity of under soil, in which the seed will be sown, *e*, 574.

On p. 574 are diagrams to show the appearance of the ends of these different furrows, where the sods *e*, are cut narrow and rolled upon themselves, whilst they are covered by the loam piled on them by the stubble plough, which follows on the same beam. As soon as the harrow runs over the field after this plough, it crumbles the furrow-slice of subsoil, down over the sod, and leaves plenty of fine earth in which to plant; whilst the sod is so doubled over as to be broken at the same time, that it makes a kind of pipe in the soil, a good opening for the circulation of air and gases, which gradually crumbles and settles under culture. When the ridge is ploughed out, the plough should go down the open furrows and back, to lay a



new small furrow of subsoil upon the bottom edge of the furrow-slice, thus: —*

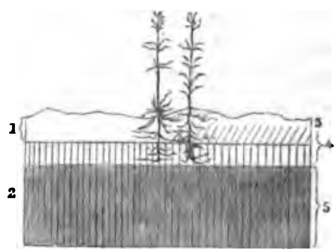


The furrow slice should be about 10 inches wide, and from 7 to 12 thick; but the thicker it is, and the deeper the plough goes into the soil, the more careful we must be to turn the slice enough to loosen it from the earth, and thoroughly commingle the parts. Picture to yourself a field well ploughed, and you see how thoroughly the manure, which was spread before ploughing began, is turned into the subsoil, when all

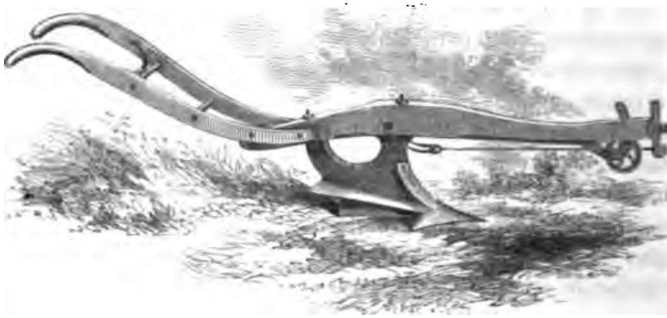
* It will be observed that *d* and *e* are incorrectly drawn, as they should represent the left instead of the right side of the ridge; and the team would seem to be walking towards us.

that is unconsumed the first season must wash down into it, out of the reach of vegetation; and you can see for yourself how beneficially artificial manures come in during a rotation, to supply that which the crops are in immediate want of, which was in the barnyard manure, but has washed down out of their reach.

Subsoil ploughing is considered by many as the great discovery of modern agriculture. And it is easy to see that ploughing the same soil year after year, to the same depth, with heavy plough and team, compresses the soil, and makes the subsoil very hard. Into this the roots can no more make their way than into a ledge of rocks; they are denied the use of the valuable manure which has washed into it for years, and thrive only in proportion to the richness of the surface soil. Though the subsoil be a mine of manure, they cannot work, and must spread out on its surface. It may be full of water, yet can only delay vegetation in the spring, without nourishing it in times of drought. The wealth which is shut up there, out of the way of air, etc., becomes its injury; undecomposed and uncombined, what may be food often becomes poison; so that when an adventurous ploughman stirs it a little, and brings some of the "yellow stuff" to the surface, it hinders, and perhaps even kills vegetation. Thought has unlocked the treasures of the subsoil, and shows the enterprising farmer that if he can loosen it up, and open it to air and moisture, without turning it on top of the good surface earth, he can ameliorate it and make it available food for his crops.

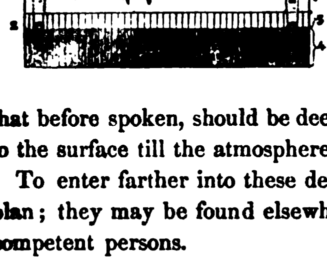


The first step is, of course, thorough-drainage; the next, to put in the subsoil plough, invented to break up the hard pan, and open and improve the subsoil in just the way I have said is necessary; so that when the stubble plough runs through next year, it brings up more earth to the surface, and enriches, without injuring, the topsoil. In a word, the subsoil plough runs under ground, like a mole, loosening the earth, and leaves the other plough to turn up hereafter the earth which it has loosened. In this way the power



is put into the farmer's hands of doubling or vastly increasing his acreage, of giving his crops 12 inches instead of 6 to feed in, and the additional 6 inches contain the accumulated food of years; how the roots descend if an opportunity offers, is shown in the cut.

Some subsoils are the worse for stirring. An open, loose, gravelly, or sandy, leachy subsoil, a strainer to the surface soil, carrying off rapidly water, and all things dissolved in water, should be left undisturbed, and rather compacted than lessened. Others are overloaded with mineral matter, deleterious to vegetation until after their combination with air and oxygen; and they, like



that before spoken, should be deepened slowly, and not ploughed up to the surface till the atmosphere has had time to do its work.

To enter farther into these details would be inconsistent with my plan; they may be found elsewhere discussed in full and by more competent persons.

The 3d week in May is quite early enough to plant field crops of Indian Corn. Country tradition says, "Plant when the oak leaves are as large as a mouse's ear." After this week there is rarely a frost severe enough to do harm. The 90 day variety may be planted as late as the 3d week in June with a good prospect of success. The seed may often be saved from insects by steeping it in solutions or pickles of soot, alum, blue vitriol, etc., by rolling it in tar and afterwards drying it in ashes.

Though any crop may be planted in May, I do not recommend the planting of Roots before June, or in some cases till July. Their place in the rotation must decide how liberally it will pay to manure them. I wish to persuade you to adhere rigidly to the rotation ; by so doing you give your land the best chance with the least outlay. Remember that frequent experience says there is a gain of 5 bushels of Corn on an acre, where 100 pounds of the best guano has been sowed with the seed, and that by the use of such manures there is no fear of exhausting the land.

The benefit of these manures is especially in the early start which the plants are enabled to make, when the rains are frequent and the plant is young. Nine-tenths of all the accidents which happen to crops occur during their infancy, and may be avoided by careful stimulus at that time.

The special manures being in the form of a dry powder, need moisture to dissolve them and take them to the roots of the plants, and should therefore be applied when the rains are abundant. I have seen Grass crops increased from 1 to 2½ tons to the acre, by the application of 250 pounds of guano in April, when the ground was first thawing and the frequent rains carried it directly to the roots of the grass, and I have observed that the increase was not nearly so great when the same amount was applied in May, after the Grass had started, and the spring rains were mostly over. But the person who used it in May, is to this day convinced that guano is of no value, "at least on his land," not knowing that the mistake he made was in taking the wrong time to apply it.

Experiments are *trials*, and the experiments of the agriculturist being more than usually uncertain in their issue, because of the uncontrollable nature of the influences with which he has to deal, more than common care and thought are required on his part, that nothing that he can do may be wanting to his success. He cannot rely upon sun or air or rain, so that he must all the more make sure that what he *can* do is done with exactness, to make up as far as may be for the uncertainty of the elements, and yet it is in agricultural experiments that, as a general rule, the least care is observed.

To perfect a chemical or mechanical experiment is admitted at the outset to be a very nice matter, and all the elements are carefully calculated, and the manipulation is put into the hands of an expert. In agriculture, on the contrary, men think any one may try an experiment, and go so far as to send a stupid Irishman to make the application, and note the results. Nothing is more common than to hear farmers say certain things may do for other people, but not for them; their farms are never benefited by the improved, or new-fangled notion; and this because they are too lazy to take the necessary pains. I heard not long since, of an old and quite successful Maine farmer, who, leaning over the fence, observed some men gathering pickles; *i.e.*, small Cucumbers. He looked on for some time, and then asked how much the crop would pay. He was told $200 an acre. He looked some time longer, and then said, "that if it paid $500 an acre, he would not bend his back all day in picking the 'tarnal' things." I might give numberless instances to prove this point were this the proper place.

Set the hens, geese, and turkeys, whenever you have eggs enough, and the fowls show a desire for it. For details, see next month.

I quote the following as a guide to experimenters and to give some idea of the value and effect of special manures.

EXPERIMENTS WITH SPECIAL MANURES ON GRASS. *By Mr. Alexander Ross, Land-steward to George Cranstoun, Esq., of Corehouse, Lanarkshire.*

"The manures were top-dressed on young Grass for Hay on the 14th of April; the Grass was cut on the 3rd of July, and the Hay weighed and stacked on the 15th of July. The hay is valued at $15 per ton. Nature of the soil light brown loam. Exposure, east. Elevation about 700 feet above the sea:—"

	Substances employed.	Application of the special manures. Quantity of special manure.		Cost of do. per cwt.	Cost of do. per acre.	Cost per acre of the special manures mixed.	Effects of the special manures. Produce of Hay per acre.		Value of the Hay crop.	Economical result of the application of the special manures. Excess of produce in Hay.		Value of the excess of Hay.	Grain from application.
		cwt.	lbs.	\$. ct..	\$. ct.	\$. ct.	cwt.	lbs.	\$. ct.	cwt.	lbs.	\$. ct.	\$. ct.
1	Nothing.						36	2	26.61				
2	Peruvian Guano.	1	56	2.20	3.29	3.29	56	63	41.29	19	51	13.67	10.36
3	Peruvian Guano.	1	0	2.20	2.20	3.89	63	37	46.93	27	35	20.26	15.35
	Animal Charcoal.	2	0	.84	1.69								
4	Peruvian Guano.	1	0	2.20	2.20	3.69	54	27	40.46	18	25	12.93	8.20
	Saldanha Bay Guano.	2	0	.73	1.49								
5	Saldanha Bay Guano.	4	0	.73	3.00	3.00	42	14	31.26	6	12	3.64	.64
6	Saldanha Bay Guano.	2	0	.73	1.49	3.15	47	2	35.20	11	0	7.60	3.43
	Gypsum.	4	0	.41	1.66								
7	Saldanha Bay Guano.	2	0	.73	1.49	3.18	58	84	43.15	22	82	16.60	11.60
	Animal Charcoal.	2	0	.84	1.69								
8	Animal Charcoal.	3	56	.84	2.95	2.95	40	0	30.00	4	0	2.40	loss
9	Animal Charcoal.	2	0	.84	1.69	2.93	44	37	32.53	8	35	6.00	2.04
	Gypsum.	3	0	.41	1.24								
10	Gypsum.	7	0	.41	2.90	2.90	41	14	30.66	5	12	3.06	.13
11	Gypsum.	4	0	.41	1.66	2.98	41	1	30.60	5	0	3.00	0.00
	Common Salt.	4	0	.32	1.32								
12	Coal Ashes.	60	0	.04	3.00	3.00	43	36	31.86	7	34	5.40	1.40
13	Turf Ashes.	60	0	.04	3.00	3.00	40	3	30.01	4	1	2.40	loss
14	Common Salt.	9	0	.32	3.00	3.00	39	7	28.43	3	5	1.83	loss
15	Turf Ashes.	40	0	.04	2.00	3.15	54	83	40.75	18	81	13.20	10.40
	Liquid Manure.	140	0	.01	1.15								
16	Liquid Manure.	300	0	.01	2.49	2.49	49	38	36.46	13	36	10.00	6.49

CHAPTER XLIV.

ORNAMENTAL GROUNDS.

On estates which were thoroughly put in order in the fall and winter, the spring work on the ornamental grounds is very small; but whoever is laying out a new place should have begun as early as April, if the frost was out of the ground, and should have decided before that time all such preliminaries as plans and contracts.

It is no small matter to lay out a country place, be it large or small; nothing in the range of agriculture, or horticulture, demands more refinement and culture, more rare and peculiar qualities; yet there is nothing which every one feels so competent to do. Insinuate that a man does not understand this kind of gardening, and you lay yourself open to the same retort as if you hinted that he was not to be trusted with a horse, or managed his children ill; viz., that you had better mind your own business. I have known a great many persons who wished advice about laying out their grounds, but of the whole number, not 10 per cent ever attributed their wish to ignorance of the proper method of doing this work. It was always a press of business, or a natural disinclination for such occupation, which led them to employ a professional person. Adroit inquiry will generally show that these persons have bought and read all the cheaper books on the subjects, have pumped their neighbors, have tried various experiments, and have at last discovered what was plain to all lookers-on from the first, that they have neither the knowledge how to lay out their places with taste, nor the necessary qualities of mind to enable them to receive such knowledge.

I will not attempt to say which are the most essential of the qualities that go to make up the perfect landscape gardener. The man is not to be found who possesses them all.

The true landscape gardener will scarcely think of worldly success, which in this country he can hardly get, but he will be imbued with a love of nature, which compels him to search out and develop her beauties; the occupation will be bread and meat, and the money returned for his services will be of value to him only as a means of enabling him to contirue in the work. He must have a large share of innate taste, good taste.

I will not pretend to dogmatize on the nature of good taste. As I understand it, it is the power of perceiving the beautiful wherever it exists, the love of it, and the *wish* to reproduce it. The *power* of reproducing it may be totally wanting in the man of good taste; he may be appreciative only, and in no wise executive. But the true landscape gardener must be both a man of taste, and of executive ability; otherwise, his works will be weak and worthless in their conclusion, however grand they may be in conception. I have known the worst blunders to be made by men of acknowledged taste.

Beside taste and executive ability, he must have a practical education, which is the basis of judgment. He must be a good botanist, and must understand not only the species of plants, and the localities and circumstances in which they thrive best, but also, how they may be planted and grouped so as to display all their beauties. He must be a geologist in the general way, understanding the formation of soils and surface, the stratification of rocks, and the principal features of the various transformations the earth has undergone. He must be something of a chemist, for he will be obliged to use many compounds in his varied work, such as limes, cements, washes, steeps, etc., the quality of which will depend on their compounder's knowledge and judgment. Above all, he must have a good engineering education, and be earnestly interested in all kindred studies, and must keep up with all improvements in engineering and mechanics. He is to be the pioneer of all agricultural improvements; with him it rests to try all new machines, to simplify all agricultural processes, to appeal to and stimulate the love of agriculture, as a means of developing the beautiful.

He should have a fair knowledge of architecture; enough to tell him when and how the grounds should be subordinated to the house; as in the case of a fine house in a small area, in city or town, where architectural ornaments should be so combined with *gardenesque* effects that house and grounds may seem but parts of the same whole. So too, in the country, there should be gradation in the improvements; those near the house being more architectural in character, the house being forgotten, and nature borne in mind more and more as the distance widens. This cannot be done by one who knows nothing of architectural styles and effects.

And the true landscape gardener must have a genuine sense and appreciation of fine pictures, must be an artist in this respect, though he be unable to make a picture or drawing which can bear criticism. For his aim must be to show pictures both within and without the grounds he lays out, to screen or to show objects near or remote, by judicious planting, to fix attention to favorite spots by single trees, to secure or preserve beautiful reflections in water.

But though thus much familiarity with engineering, architecture, and painting is essential to the landscape gardener, no amount of proficiency and excellence in either of these arts will fit a man for landscape gardening. Great and glorious though they be, a position at the very head of them is no guarantee, but rather the opposite, of success in their sister art. What Michael Angelo said of one is true of all the arts; they are "jealous mistresses; no man shall be taken into their intimacy and confidence, shall be blessed with their smiles and favors, in whose heart they do not reign alone. Each must be worshipped and wooed faithfully for a lifetime, or she can never be won. Most worthy are they of all the devotion, the genius, the patience, study, labor, that have been offered them. These are the elder arts. But their younger sister is their Peer, and will not smile on *their rejected or inconstant lovers.* She too demands devotion, life-long devotion. With whomsoevor she is mistress, the others will be handmaids, and vice versa."

When a painter looks at grounds, he looks for a painter's effects, and approves or condemns as the *picture* is good or bad. Were he to lay out grounds, his constant thought would be to produce pictures on the large scale. Had he miles of country to deal with, could he move houses, hills, woods, towns, rivers at will, he might make pictures to his liking. But this he cannot do. The work must be confined to a few acres; the place is to *live in*, not to *look* at. Were the most admired picture criticised on the score of fitness for a home, it might prove a failure. If our grounds are not well adapted for our use and enjoyment, they are useless to us, however beautiful they may be. The tree which is all important to shade a favorite seat or walk, may to the painter's eye be just in the wrong place, so that he longs to paint it out, and yet in its absence the seat, the walk, the lawn would be naked and desolate.

Still more impossible is it that an engineer should be a first-rate landscape gardener; his watchwords are regularity, order, method, precision; he works by formulas, he thinks mathematically; he rules nature, cuts down a hill to fill a valley, hollows out the bed of a lake, dams a river. He deals in force, and his pride is that the forces of nature are under his control.

Of architectural gardening too much may be found here, and in Europe its effects have been much more disastrous. I need not enlarge on the artificial and unsatisfactory results which would follow from the extension of the architectural style, which has been spoken of as so important under some circumstances over a large estate.

The education of this artist who works in ground, trees, grass, water — all out-of-door things — is never complete, and always advancing. The Violet, hidden under its leaves, the tuft of Goldenrod, which fringes and rounds a corner, the spot of color among the green leaves made by the Wild Rose or Sweetbrier, thrust through the branches of a Cedar, or relieved by a Pine, the Columbine nodding on the ledge of a rock, the blasted tree, the dash and play of a mill-race, the mighty waterfall, the snow-laden tree, bending and struggling with its burden, the sublime and the picturesque, the ugly, which he is to eschew, the lovely, which he is to reproduce, are acting on his mind as regularly as the air upon his lungs. He sees a beauty of color which the artist's eye never notices, because he must reproduce the near effects, which the other may neglect. He watches varieties of form as closely as the sculptor; he seizes improvements in engineering as eagerly as the engineer, for his success depends much on his observing the maxim, "Ars est celare artem."

But above all he must be able to appreciate the true home spirit of the class for whom he may be working. He may as gladly lay out the grounds of the village carpenter as the estate of a retired merchant; but his success in either case must depend on his ability to enter into and thoroughly appreciate the peculiarities of his employer; he must know them better than the man himself; and whilst he neither fawns nor flatters, never yields a point which he knows to be right, he must be able to present his views to his employer in such a way that he may see them through the artist's eyes, and follow the artist's ideas as though they were his own.

As the sketch-book of the earnest painter is always in his hand, so should the mind of the landscape gardener be always open to new impressions, and his memory should be as retentive as his eye is quick, that he may have the power to recall the effects he would reproduce. And finally, he must be a good draughtsman, to show his ideas on paper to his employer, before the work is begun.

If such a man could be found, his advice must be liberally paid for. Years of study and observation have contributed to make him what he is; and his occupation can be pursued for a portion of the year only. When you employ him, you expect him to be a walking dictionary, an enclyclopædia, to which you need only mention a subject to receive all the information you want; and for this collection of ideas and learning on legs, you must pay a fair price; enough to support the artist and pay the interest on the outlay with which he bought his knowledge.

And if you decide to employ a man like this, if he can be found, and to pay him fairly, expect him to be an honest man when he comes on to your grounds; do not expect him to be in love with what you love. In all matters, acquaintance is needed to develop appreciation; you have lived on a spot and loved it, association gives it beauty and value in your eye, and it is well to employ a stranger to improve it; he will see it as it is, and prescribe for its real wants. If you have a long, narrow strip of land like a turnpike, he will know how to disguise its defects, for he will see them at once; and so in other and more important things.

But you take alarm at the expense of the advice, and the designs of such a man. Remember that it is a work of time and money to make a beautiful place; that a good landscape gardener has laid out many places, has learned all the short cuts in time and money, has tried all the new experiments, and is able to set you on your legs at once, and save your creeping. In such matters time is money, and you save both by employing a skilful person at the outset; the $20 you pay him for advising you how to begin, may, and probably will, save you hundreds before you finish.

And above all, whether your place is large or small, have a plan of what you propose to do before you begin, that you may know definitely not only what is to be done, but what it will cost, as you may within a small per cent, with a good plan and specifications before you. But never expect your place to look like the plan. Under no circumstances could you see it from the same point of view or distance. The resemblance between the completed work and the plan must be so great that it will be at once recognized, but no more.

And if you employ an artist, let his work alone after its completion long enough — for years — to allow it to show what he intended. The architect, painter, engineer, leaves his work perfected; it may be seen at once in its beauty or ugliness. The painter does his work on smooth canvas, with pliable brushes and easily flowing oils. The landscape gardener works with clods of earth, trees, wheelbarrows, shovels, laborers; and when he has done his best, he must leave time to finish and smooth his work; eight, ten, or fifteen years may be required to show what he saw in his mind when he began. Long before that time, the caprice of the owner may have pulled to pieces and planted, may have neglected or altered; Nature may have refused the sun and rain on which the artist relied; and the most beautiful design may become a sorrow and a mortification to its originator.

Bear in mind all these things; and then before the frost is gone, as I have said, get a real landscape gardener to examine your place and direct the summer's work.

If there are any trees to be planted, plant the deciduous between the 1st and 15th of May; the evergreens between May 15th and June 6th. Be guided by the new growth; when this is just beginning or has just begun, and the buds begin to tassel out, it is the best time to plant.

Prune all trees, evergreens as well as deciduous, but the former must be thinned as directed in September.

Renew seedbeds in the nursery, and clean up the rows of young trees. Plough through the rows, and tie up to stakes all that are bent by snow and wind. Cut back to bud or graft all budded or grafted trees and plants.

SLEEPY HOLLOW.

CHAPTER LXV.

GREENHOUSE.

JUNE. The greenhouse in June gives but little pleasure and considerable care. During the month remove out-of-doors all the movable plants that are not to be retained to flower; there is no longer danger of frost, as it but rarely occurs in June. Sow seeds of plants for winter. Repot Gloxinias, etc., for summer. Repot Euphorbias for winter; prune and repot Heaths and Epacris; tie, prune, and water Stephanotus, and other running plants.

The graperies will be attractive through the summer, with their ripening and growing crops of grapes and fruit, and will, if well managed, be an honor and pride to the place, while the flowers left in the houses, though few, as Orchids, Fuchsias, Cape-bulbs, etc., will be interesting from rarity and beauty.

Withdraw moisture, as far as it is safe, from all the vines and permanent plants, while those which are to blossom during the summer must be abundantly watered. Many of the Orchids which need the greatest amount of heat will blossom now. As soon as the flower buds on the Camellias are easily seen, remove them to shade, and reduce; water permanently.

The sashes should be let down, and raised only in case of a long, driving storm. Overhaul the houses during the summer, to repair, sweeten, and restock with plants.

This is the proper time to begin such a conservative pit as I have described, and also any greenhouse or conservatory. An early beginning gives time to get a stock of plants started, and to have the work thoroughly done.

Take down and clean out all the pipes, and clean out flues, etc

Soot is a very valuable manure, is highly nitrogenous, and should be preserved.

Many of the tools will not be used again for some months; an inventory should be made of them, and they should be cleaned and put away.

Constant work in the garden now occupies the gardener and he should be very careful in attendance on the young stock of plants which he is to bring forward in the autumn. They should be set in cool and partially shaded places, and on good drainage, and be secured against damping off.

The bulbs which have gone out of flower, and whose leaves are yellow or withered, must be removed from the earth, dried and wrapped in dry moss, or covered with sand, and laid away in a cool but dry place, till they are wanted in the autumn; do not put them where the temperature will fall below the average before given.

Cuttings may be made at any time during the summer, and seeds should be sown early of such annuals as will be wanted in blossom in the greenhouse in autumn and early winter.

Bud the hard-wooded plants whenever the bark slips readily from the wood, and the wood from the eye of the bud.

The treatment of the greenhouses, etc., will be the same throughout the summer, and will require no further mention.

The conservatory being near the house, will be more subject to observation than the greenhouse, and will require some care to keep it attractive. The front perpendicular sashes may be removed, and a canvas cover hung over the top glass in sunny weather will convert it into a verandah, or the glass may receive a few coats of whitewash. In the place of the plants which are removed, bouquets and baskets of flowers from the garden should be set about on the shelves, and various floral decorations devised to conceal the barrenness of the place. Indeed, the evergreen plants may as well be kept here as elsewhere, if the sashes are removed, and they are well shaded.

I might have entered more in detail into the management of these houses, but I think I have said enough to enable any reader to supply, by his mother wit, all that I have omitted. I hope, at least, that I have said enough to awaken or strengthen a love for the subject, and perhaps to arouse in some a determination to begin at once some house of the kind. I repeat that I know of no kind of culture that better rewards the loving patience of him who devotes his time to it; and no one who can afford the expense, which, after all, may be very much reduced by judgment and economy, does well to forego the enjoyment it affords.

The great drawback to the full enjoyment of such houses is, generally, the employment of an ordinary gardener. Most of the men who apply for this situation, if competent men, are either dogmatic, and overbearing, angry if the proprietor or family remove a flower or plant without permission; or have had but very superficial instruction, and are by no means fitted by nature or education for the delicate, careful, thoughtful attention that the work requires. So they freeze the plants one day, and roast them the next, they drown or they dig them up, kill them by kindness or neglect, and the whole history of a greenhouse, in the mind of its owner, is often only a series of chapters of accidents, resulting from the stupidity or carelessness or self-will of a succession of ignorant would-be gardeners.

More may be learned of a gardener's character and competency by previous investigation, than of that of any other servant; and much of the trouble so common may be avoided by careful and discreet inquiries. But the only way in which the owner can be secure of good service, is first to make himself thoroughly master of the work to be done. Then he knows exactly what to require, and can put his finger at once on any mistake or omission; and the very fact of the master's being so well informed will of itself be likely to ensure better service than any other thing. And such a master can detect directly a man's incompetency, and decide whether he is worth training or not; if he is, he can train him, if not, dismiss him before he has had time to do much injury by his ignorance.

Therefore, if you cannot spare the time to take care of the greenhouse yourself, which is the way to get from it its utmost pleasure and benefit, be sure you know how it should be taken care of, if you would have it well done by others.

After all, beyond the knowledge of the general principles of culture, the chief requisite in a gardener is *judgment;* the power to adapt himself to emergencies, to decide where the neglect of rules is better than their observance. The mere labor of taking care of a greenhouse is not great; many a lady has done the chief part of the work, and women might often be employed in them to great advantage.

CHAPTER LXVI.

FLOWER-GARDEN.

THE flower-garden in June is more attractive in name than in reality. It is in fact more meagre than in the month past, or those to come. The bulbs have nearly gone, and the annuals and bedding-out plants are not sufficiently advanced to take their place. Still, a little skilful management will shorten the interval very much, and many gaps can be filled as soon as made.

Bedding-out plants should be watered for some weeks, every day, directly on the ball, unless rain is abundant; so too, young annuals. Remember that it is but little more trouble to enrich the water a little, than to give it pure and poor; and the growth of the plants depends, of course, on the care they receive. I refer rather to pot plants than annuals. They have been accustomed to find their nourishment within the narrow limits of a pot, and do not readily push out roots. You will often find, on taking up the pot plants in the autumn, that the involved, cork-screw roots which they had in the pots, have not opened at all in the ground, but only grown more involved and contorted. It is, therefore, important to open out the roots before planting, as much as possible, to assist them to stretch out for their food.

If your flower seeds have not all been planted, lose no time; set the Dahlias from the hotbeds, Tuberoses, Amaryllis, Gladiolus, etc. Transplant from the frames all the annuals whose seeds were sown there, and so far as the season's culture is concerned, have no more to do with greenhouses and hotbeds. Should the month prove very dry, water the flower-garden thoroughly, from time to time. Water copiously, and in the late afternoon; the water will then have time to soak in.

Remove those bulbs which are to be taken up, as fast as the leaves dry up. Fall flowering bulbs, Colchicum, Crocus, etc., should be taken up, if not already separated and replanted, as soon as their leaves are decayed, in order to replant later.

Attend carefully to the edgings of the beds, and eradicate weeds as soon as they make their appearance. Watch the vines on the garden or house trellises, every day, and train them frequently, if you would have them make their best growth. Vines always grow better and faster when constantly trained than when left straggling, to be threshed about and broken by the winds. Cut down and tie up as previously directed, and make neatness and order rule throughout the garden.

June is the month of roses, and we may now enjoy a profusion of the most beautiful flower that nature affords. No cottager in the country is so poor as not to have a rose-bush, and in our older settled country we often see roses blossoming along the stone walls and hedgerows in great abundance, which may be recognized at once as former inhabitants of the garden.

We do not see such large general collections of Roses now, as a few years since, owing, I think, to the rose-bug and green slug, more than to any thing else.

It is very discouraging to see one's Roses when in full luxuriance of leaf and flower growing brown and sere, and looking as if they had been burned by fire, and still more so to find the centre of our Damask and Moss Roses, instead of being the seat of fragrance and beauty, full of disgusting bugs; and yet, we all suffer alike from them. If there were no way of restraining them, we might abandon the culture of the Rose in despair, for the fleeting beauty of the blossoms illy compensates us for the red and withered bushes left by the insects after the flowers are gone.

But we do seem able to check insects if we take care enough. Great vigilance is needed to insure success, but success well repays all trouble.

The first insect which attacks the foliage is a green fly, much like the vine fretter, and comes about the last of May, or the first of June. Its ravages, however, are not alarming, and the fly may be driven off by showering the bushes with dry lime and lime-water.

But the slug of the saw-fly is the great enemy. The egg is laid in May, and hatches by the last of the month. They confine themselves to the under side of the leaves, and eat off the outside, so that the circulation is destroyed; it is this which gives the red and burned appearance to the foliage.

For a long time these slugs baffled all efforts to destroy them, until it was discovered by Mr. Haggerston, of Watertown, Mass., that syringing the bushes thoroughly with weak solutions of whale oil soap would destroy the larvæ, and drive away the fly. The solution may be made as strong as can be used without injury to the young foliage. A pound of the soap to 4 gallons of water is a strong solution; to ascertain how strong it is safe to use it, dip a few half-grown, tender leaves into it, and observe the effect. The stronger the solution, within the bounds of safety, the greater the benefit.

Shower the suds over and under the bushes from a syringe with a fine rose, so as to give a powerful and yet well-divided shower. After twelve hours, repeat the operation with clear cold water, and again with the suds, after an interval of two days. This process performed three times, will banish the slugs and save the bushes for the season; and if the practice is followed up for three successive years, worms and flies will be driven from the garden, unless it is surrounded by other gardens not so protected.

The showering should begin in May, when the little fly first makes its appearance, to discourage the laying of eggs. As the smell of the soap is very offensive, it should be applied for the last time not less than a week before the flower-buds expand, that they may be untainted when they unfold. Select for putting on the soap, a dry time, with promise of fair weather; if rain follows within twelve hours, the benefit of the soap is diminished.

Whale-oil soap is equally effective with all kinds of slugs, canker worms, etc., if well applied.

The next nuisance is the rose-bug, which appears after the Rose is developed, and feeds upon its petals. These bugs are so hard, and covered with such horny shells, that showering does not affect them. But with care they may be subdued.

In the first place, use toads; they eat the rose-bugs with avidity, and if the bushes are shaken, a great many bugs will fall off and be snapped up at once by their waiting mouths. The proprietor of a fine garden could well afford to pay $20 a hundred for toads, as they are gluttonous consumers of worms and flies of all kinds.

A more certain method is to take a basin of boiling water, and go over the bushes, picking off every bug and dropping it into the water; this is a good deal of trouble, but it is effectual.

The later blossoming Roses, and the second blossoms of the perpetuals, escape all these nuisances, which are gone by July.

Showering the bushes with strong decoctions of quassia drives away and kills slugs and flies, without any bad smell. Use 1 ounce of chips quassia to a quart of water. 1 quart of gas liquor to 10 of water, showered over the plants in the same way, is effectual against aphides and other insects.

Aphides are but little annoyance out of doors. *Smoking* has been described in the winter months as a remedy against insects. Sprinkling with fine Scotch snuff often kills small insects.

In confined situations, *mildew* is very apt to attack the Rose, and injure its foliage. Syringing with sulphur and water, or nitre and water, is good for prevention or cure; or flour of sulphur may be dusted over the bushes from a sulphureter.

A species of *red fungus* sometimes attacks the plants in late summer, which may be rubbed off by hand.

When a Rose thrusts out a bunch of leaves from the middle of a bud or blossom, it indicates too much strong manure at the roots, and the supplies should be withdrawn for a time.

It is generally supposed that Roses may be grown by any one in any soil, and indeed, the poorer kinds do not seem very fastidious, but the really fine ones are shy and dainty, and unless well cared for never thrive. They will not grow well in poor soil, nor on lawns choked up with Grass; and although all thrive best when fed with abundant moisture and liquid manure, most of them are particularly averse to wet situations.

The number of varieties is very great; some European cultivators having had at one time 30,000; but of this vast number but very few are worthy general culture.

There are several large families with well-marked peculiarities, needing different culture and giving very different returns for kindness.

The method of *propagation* to preserve varieties is by layers, cuttings, and budding, the latter being the quickest way on a large scale. Seeds have been the original source of nearly all the varieties. Cuttings are readily made to grow, of almost all kinds, particularly when taken off with a heel of the old wood.

Many varieties of *soil* and *manure* have a remarkably powerful effect on the Rose. Charred turf from old pastures seems to have wonderful virtue, inducing the roots to send out new fibres at once, and consequently producing new and enlarged growth. Guano, as a liquid manure, is also very beneficial, while soapsuds from the house washings has an excellent effect, especially on the strong-growing varieties.

June Roses are familiar to every one, and having once blossomed they are soon gone. If your means and opportunities confine you to Roses of this class, have them by all means, but get better as soon as you can. By *better*, I do not mean better blossoms, for what is better than the old Damask, the Red Moss, the White, or the Hundred-leaf? They are unsurpassed in color and fragrance. But I mean better varieties, which, though they may bear no flowers equal to June Roses in perfection, bear their own several times in the course of the season.

Before describing the improved Roses, I wish to draw your attention to our *wild Roses*, and the Sweetbrier. I do not know whether any efforts have been made to improve this class of Roses, and doubt very much whether their especial merits could be improved upon.

They are single, mostly rather low growing, and with small leaves. But they are perfectly hardy, accommodating themselves to all soils, and growing freely among other bushes, or in the Grass; are very fragrant, and their blossoms are succeeded by red *hips*, or seed vessels, which contribute much towards the enlivenment of the shrubbery during the winter. A bank of these Roses has often seemed to me more beautiful than any garden collection.

Garden Roses need careful culture, and should generally be grown singly to insure perfection, whilst the effect of the Wild Rose is increased by numbers. To fill a bend in a path or road, to skirt a plantation or fringe a pond, they are as beautiful as any thing. For the latter purpose, the Carolina is the proper variety. It is a late and strong growing plant, with large, dark green foliage, perfectly hardy, and very fragrant; it has an abundance of flowers, produced in clusters of three, or more, and it continues in blossom for several weeks. It will thrive beside a pond, on an island, in a brook, or along a springy bank, and I class it in the first rank of shrubs.

The R. blanda, the nitida, and lucida, are lower-growing, blossom very early, do well in poor, sandy, or gravelly, dry soil, and are as beautiful in color of flower as the Carolina, but inferior in color of foliage and fragrance.

The Sweetbrier, everybody knows. Its delicate pink and white petals, constrasting with its rich, dark-colored and fragrant leaves, have long made it a universal favorite. It differs materially from the Eglantine, or Sweetbrier Rose of England.

Our Sweetbrier is second to no other plant or shrub, for its many virtues. It is properly a wall, or pillar Rose; it throws up long shoots, often 20 feet in a single season, and soon covers a trellis, but, like all other running Roses, dies down in a mysterious and rapid manner. It is a capital stock on which to bud other Roses, its strong and hardy habit giving increased strength and hardihood to the bud. When planted on a trellis it should be trained with care, and some of its shoots may be budded to produce variety; the same plant may have half a dozen different varieties upon it, and some of its own also. It is very much nourished by soapsuds or guano water.

The Michigan, or Prairie Rose, is found wild only at the west, but has been extensively introduced here as a climber; it blossoms profusely late in the season, and has an especial value from coming in after the other running Roses have gone, but it has no fragrance. From its seeds the improved Prairie has been derived.

The Cherokee Rose, of the south, is the most magnificent of our American Wild Roses. It grows strong and flowers profusely. So strong, indeed, is its habit of growth, that it is used at the south for hedges and fences, for which purpose it is unrivalled, as it cannot be penetrated even by a hog. It seems to be too tender for our latitude, although when sufficiently experimented on, I do not doubt that some seedlings, or hybrids, will be found which will combine all its virtues, and be hardy besides.

With these Roses, our list of American Roses may close. There are some hybrids besides, which are more properly garden Roses. In Plymouth County, Mass., there is to be seen along the road sides and old walls, a very large, semi-double, crimson Rose, which seems almost naturalized, but it undoubtedly escaped from some gardens at first, and is not of sufficient value to induce any general culture.

The Cinnamon Rose, R. cinnamomea, has all the qualities of a wild Rose ; comes early, grows anywhere, defies Grass, thrives in gravel, and, if let alone, will make a thicket full of flowers in June, but the flower, apart from its fragrance, has no attractions.

I would urge strongly the use of these native Roses in the making of new plantations and shubberies, for the reasons already given. Our planters and gardeners, hitherto, have been too apt to consider all wild flowers as worthless, and have left them to their native woods ; but as a better appreciation of these plants prevails, they will be sure to receive more attention. The wild Rose has a value that the garden Rose cannot have, for the latter can never bear neglect. The Rose is as much the queen of flowers in her exaction of attention thus, as in every other respect. Neglect kills her, and to thrive well she requires to be appreciated, praised, and cultivated, and then when duly worshipped, her gracious bounties are lavishly bestowed.

June Roses, so called, are not, in my estimation, equal to our wild Roses, which so readily and abundantly hang out their treasures by the wayside, for man or nature, as either is ready to enjoy. The June Rose blossoms once, and then in perfection only if well cared for, and then is gone for a year, while there are Roses which, with the same amount of care, will blossom several times in the season, or even every month. There is something very fascinating in the constant succession of buds and blossoms, always offering some new beauty to our admiration.

The following remarks upon the Rose, and those on the same subject in July, are condensed in great measure from Paul's Rose

Garden, and from McIntosh's Book of the Garden, but my own observations are so interwoven as to make it impossible to use quotation marks in all cases.

Besides the Natives, Roses are divided into several classes; the Bourbon China, Noisette, Ayreshire, Scotch, Perpetual, or Remontant, Tea, Banksia, Austrian Brier, Provence, or Cabbage, Evergreen, etc. Each of these classes has its own peculiar merits; some individuals of each class are nearly, or quite hardy, and some of each are very tender and can be cultivated only under glass.

The countries in which Roses naturally arrive at the greatest perfection, are all warm and dry, as Italy, Turkey, Syria, India, and our Southern States; and in order to attain such perfection in our colder regions, we must imitate those climates in houses built for the purpose.

It seems strange that no large collection of Roses under glass has been made in America, for the Rose has a large number of admirers, and is as worthy of a special house as the Orchid or Camellia.

The full beauty of the Rose can only be understood when many individuals are collected together and in blossom, at the same time where the effect of each may be heightened by massing and contrast. Even in out-of-door collections, the gain over the usual practice would be very great, if a larger number of bushes were collected in one place, the sizes being carefully arranged.

The Provence or Cabbage Rose has many varieties, and has given origin to many beautiful Hybrids. The Unique Provence is very beautiful, sometimes white, sometimes striped. These are June Roses, may be propagated by seed and cuttings, but make few layers, are almost universally hardy, are free growers, but do not usually attain a very great size; they should be pruned in the autumn, as the wood is then pretty well ripened, and by pruning them the sap is induced to settle into the remaining buds, thus improving them and inducing a better bloom the next year.

Disbudding is found as advantageous with the Rose as with fruit trees, and is to be practised as much as possible. The Provence Roses should be cut down to 3 or 4 eyes, according to their strength, after the removal of all malformed and superfluous shoots.

The Hybrid Provence tend to form dense heads, and should be thinned out to about one-third the number of shoots, and those left must be shortened to 6 or 8 eyes. No apprehension need be felt that this autumn pruning will start the buds of either the Provence, Moss, Damask, or Alba Roses, in case of mild weather in winter; this is only to be feared with the tender or half-hardy varieties.

The Moss Rose springs probably from the Provence, and has many beautiful varieties. The old Red Moss is generally the most esteemed for beauty and thickness of flower as well as mossiness. They must be treated like the last. The best varieties are the Old Red, Crested, Princess Adelaide, White, Unique de Provence, and Perpetual.

They differ very much in constitution, some being very delicate, others hardy, some loving a poor, others a rich soil, but like the Provence they need high culture to bring out their best powers. The Miniature Moss is a pretty and delicate little Rose.

The French Rose, or Rosa Gallica, is the largest class of summer or June Roses; these are hardy and robust, and afford fine plants for standards and for large specimens; among them are many splendid varieties, and if they were not single bloomers, they would certainly stand first in Rose culture. By pruning some of the June Roses in October, and leaving others till May, a regular succession of blossoms may be obtained. By pruning in this way, from month to month, the time of blossoming may be materially altered.

Some gardeners delay pruning their French Roses until they show flower-buds, and then prune severely, by which means they not only remove the flowers about to come, but induce the plants to throw up new strong shoots, which blossom in the fall. I do not altogether believe in this practice; for although it sometimes proves successful, it is by no means certain, as the plant often contents itself with making a new growth, not accompanied by flowers. It is in this class that we find the best variegated Roses.

Among the Hybrid Provence Roses are many well adapted to pole or pillar culture; they are easy of culture, and require to be moderately pruned.

"The Hybrid China Roses are a cross between the Bourbon, China, and tea-scented Noisette, crossed with the French Provence, and other summer Roses. This class of Roses illustrates a very curious principle; that impregnating the Bourbon, China, Noisette, or Bengal Roses, all free summer and autumnal bloomers, upon the summer Roses, Provence, or Gallica, takes away all perpetual or remontant habit, and leaves them only summer bloomers."

"The Hybrid China are very vigorous growers, and are often used to advantage as pillar Roses. When grown as standards, they should be trained down to check luxuriance of foliage, and induce flowers. They should, in pruning, have some shoots left long, and others entirely cut out. The strongest growers should be cut away at least one-third, the weaker, one-half, and be thinned out. Such Hybrid Chinas as are used for pillars should have three canes left, which should be allowed to grow without stopping; the spurs from them will give an abundance of flowers for some years; when they show age or weakness, cut down and replace by new shoots. Disbud through the summer, and prune in the autumn."

Most of this class bear our winters without covering, but are benefited by pruning down and covering with litter or straw.

"The Hybrid Bourbons are derived from the Bourbon, and are similar to the Hybrid China in vigor of growth and abundance of flowers (with more substance in both flower and foliage), but require closer pruning; otherwise they should have much the same treatment with the Hybrid China." They are mostly hardy with us, but improved by coverings of straw and litter.

The White Rose, as a family, is better known in New England than most of the other Roses. They are not all white, some having a delicate pink or blush on their petals. I have seen the most superb of White Roses as far north as Norridgewock, Maine, some bushes being 10 feet high, and white with flowers. They are all distinguished by the glaucous foliage, by being nearly thornless, hardy, and for the most part of moderate growth; they should be closely pruned in November, but if pruned in spring will blossom rather later in the summer.

"The Damask Rose is a free grower, does not require close pruning, is light red in color." It is the Rose from which, in Asia, the largest quantity of rose water is made, has always been a favorite, and is well adapted for general culture, being quite hardy. Prune in November; blossoms in summer.

It is from this rose in some of its older varieties, that all the favorite Perpetuals have originated. They have thick leathery foliage, and thorny shoots; are propagated by seed, offsets, cuttings, or layers.

The Scotch Roses are well known, and are always favorites; they grow almost as readily as our wild roses, and may be used with excellent effect in the formation of shrubberies. When once planted they need little pruning or attention for many years, as they sucker freely, and keep themselves well replaced. There are a great many varieties, although they do not differ much in color, being generally some shade of white and pink. The Yellow Harrison is sometimes called Scotch, but is, undoubtedly, derived from the Austrian Brier.

One of the most beautiful rose-beds I have ever seen, was made from a large number of Scotch Roses planted in a bed shaped like a cross. The Roses and their offsets soon filled the bed, and spread on all sides, sloping from the highest old plants in the middle down to the grass. The effect when in blossom was a large quatrefoil, and could hardly have been excelled in beauty.

They may be planted with good effect along the sides of an avenue, in its bends, or on the edge of a plantation of other shrubs or Roses. The foliage is not so liable to be destroyed by insects as that of other Roses; the fragrance is exquisite and they are perfectly hardy.

The American Sweetbrier, I have already mentioned. The English Sweetbrier, "R. Rubiginosa, is a beautiful Rose in its original condition, and there are many improved varieties. The Splendid, less fragrant, but with large crimson flowers. The Rose Angle, very double, bright rose-colored flowers; the Celestial, very double and fragrant; the Carmine, semi-double red flowers."

The Austrian Brier is the source of many very beautiful hybrids. The whole family and its hybrids are very impatient of all smoke and foul air, and rarely thrive well in cities or large towns. The Persian Yellow is the best hardy Yellow Rose, but is weakly in habit. These Roses all require rather poor, moist soil, and moderate pruning.

"The Sulphur Rose, R. Sulphurea, is of this family, and is a magnificent Rose, but is blossomed with the greatest difficulty in the open ground, and can be best brought to perfection under glass. It should be budded into strong growing stocks like the Dog Rose, R. Mannetti, or the American Sweetbrier."

"The Boursault Rose is well known amongst us, and is the commonest of all our climbers or pillar Roses; there are several varieties, varying from red to pink; one, Elegans, being red with white stripes." These Roses are peculiar for their reddish, thornless wood, and dark reddish foliage; they are very easy to grow, and for covering arbors, festooning along chains, climbing walls, are second to none.

I have already mentioned the American Prairie Rose, R. Setigera. The original Michigan has been hybridized and developed, until from being a late-blooming single, it has become an early-blooming, very double Rose. The Queen of the Prairie is the most double of all the wall Roses. In spite of its profusion of very double flowers, and its very rapid growth, I do not like it so well as many other wall Roses. The Baltimore Belle, Milledgeville, Superba, Mrs. Hovey, Eva Corinne, are better in color than the Queen of the Prairie, and the King of the Prairie has the superior merit of being very fragrant.

These Roses should be trained to three shoots and allowed to grow their whole length; the long shoots will throw out spurs well filled with flowers. As the shoots show signs of age, cut down in spring, and induce new growth to replace them. Prune in November. Mrs. Hovey is rather more tender than the others, and should be covered with straw.

R. multiflora is a very charming family of pillar Roses, but tender; with care, a dry soil, hot manures and protection in the winter, it may be blossomed out of doors, but they are more properly in this latitude greenhouse Roses. Laura Davoust, R. grevilla, and R. multiflora are the usual representatives of this family; they require but little pruning.

"Banksia Roses are natives of China, very fast growing, but too tender for out-of-door culture; they are admirable for the walls and pillars of the conservatory. They require a rather dry soil, and but moderate pruning; the short branches bearing the flowers.

"In our more Southern States, and even in the Northern States, if grown on walls and taken down and covered in the winter, these Roses might be got into good flower, but could not be much depended on. They make many strong shoots from the roots which are to be removed every autumn unless there is need of new canes to replace the old ones."

The family of Hybrid Climbing Roses vary in their source. Laura Davoust and Russelliana are from the Multiflora; Garland and M'me D'arblay are from the Musk; Sir John Seabright from some Italian Rose.

"The Evergreen Roses are found to thrive well in France, England, and Scotland, and it would seem that they might come into general culture in this country, as they will undoubtedly thrive, if well protected during the winter, and grow in a dry, warm soil. They give clusters of from 10 to 50 blossoms at a time, and from their trailing character are used as creeping Roses. The shoots should be grown to their full length, and allowed to flower from spurs as long as they will, and then be replaced. They should be well thinned out at pruning, and some of the shoots should be shortened back; the latter will blossom later in the season than the former."

"The Ayrshire Rose is but little known among us, which is much to be regretted; for although they are not a large family, they are very beautiful, and would be a great acquisition for wall and pillar culture; they also make good weepers and trailers. Their origin is a mystery, but they are supposed to be derived from some of the trailing Roses of the wood and are hardy."

Trailing and weeping Roses are not often enough used in our planting. Beautiful effects may be produced by setting in the centre of the bed a strong-growing standard Rose, like Pio Nono, which will make a good upright growth, and yet is well furnished with pendant side branches. Next to the standard, all round, set several pendulous Roses; round these, again, Hybrid China, or Bourbon; then Moss, and edge with Scotch. Instead of Pio

Nono, which is a perpetual, while the others are summer Roses, may be used some standard, Hybrid Bourbon, or China.

That the Ayrshire will answer in our latitude with slight protection, I am certain; for I have seen the R. Ruga and Dundee Rambler for several years doing well on a north-east exposure. without winter covering, and they were rarely cut down by the frost more than two-thirds their length.

The Roses I have described thus far are all summer Roses, and. as I have said, are well deserving of especial attention and culture, but are not equal in real value to those which may be properly called Remontants, which blossom two or three times a year.

The China and Bengal Roses are monthlies, but are all tender, or not more than half hardy. The latter, as well as the Tea-scented, are usually found in greenhouses, and are the main dependence for flowers in the winter, and are very desirable, but not to be compared to the hybrid perpetuals, or summer. They are rarely more than semi-double when open, and although delicate in color, and of good fragrance, are possessed of *Rose qualities* in but a moderate degree.

Much objection has been made to the so-called perpetuals, because they blossom only two or three times, instead of monthly, and are rather short lived. The first of these objections seems to me to have but little weight, as certainly two blossomings are just so much better than only one. The second, that of their short lives, may be done away with. They are usually budded into other stocks, to get hardihood and size, and to increase the number in proportion to the demand.

A budded Rose may be known on the slightest inspection. The lower part of the stem is at a different angle from the middle, and at the point where the angle is made a cicatrice is plainly visible, showing the mark of the incision for the bud.

The Rose is affected by its stock, as a fruit tree, only in vigor of growth and hardihood, and in the latter respect the influence is not very great.

The Rose stem is full of latent buds down to the very roots, and as a little attention will show, it is inclined to *sucker*, or throw out subterranean branches, which struggle through the earth to a greater or less distance, and then come up to the surface, making each a new bush. The stock prefers to develop its own buds on these suckers rather than to nourish the bud or graft; and as many of them are made under ground, it is quite difficult to detect them; but if the stock does develop any of its own buds or suckers, it will send all its sap to them, and the budded Rose must die. To prevent this, the plant must be narrowly watched, and every bud cut off as soon as it appears; and occasionally the earth must be removed, the roots examined, and any detected suckers destroyed.

This trouble may be qualified in the following manner: Set the budded Rose into the earth so deep as to fully cover the junction of the bud with the stock, and score the budded portion a little. If it is strong enough to allow it, tongue it as for layering, and put a stone or piece of wood in to keep the cleft open. In time, the budded Rose will send roots out into the earth, and support itself quite independently of the stock. Some of the choice varieties, however, are very much disinclined to root when budded, and by thus rooting lose any benefit which might have been derived from the stock.

The second source of loss is a difference in hardihood between the bud and the stock, the latter being either more or less hardy than the former. In either case, a severe winter will sometimes kill the one and not the other.

It generally happens that the stock is the most hardy, and it is therefore prudent where there is any room for doubt, to cover the plant with straw, etc., below the junction of stock and bud. A prudent gardener will protect himself against reverses by having cuttings of his budded Roses in case of accident, for although some of them may not be as fine on their own roots as when more amply supplied with sap, yet the difference is slight, and scarcely perceptible to the uncritical eye, and after all, "a live dog is better than a dead lion."

The Hybrid Perpetuals are more troublesome in another way; they have to be pruned at least twice in the season. All Roses blossom from the new growth only, and after blossoming the bush must be cut back, to stimulate a new growth.

"This invaluable family has been got by crossing the H. China with different varieties of China and Bourbon Roses, until a great variety have been obtained.

"Among this great variety, some are much more hardy than others, and those which are best adapted to different latitudes are to be ascertained only by actual trial. Being difficult to root when layered, is, no doubt, one reason for their being so often on other stocks than their own; but on their own stock they thrive better on poor soils than when worked."

I think, on the contrary, that it is useless to hope much from Hybrid Perpetuals in poor soils, under any circumstances.

To insure a good second blooming, the plants must be well watered and manured; but, though needing plenty of water, Roses dislike a *wet* soil, that is, one in which water stagnates.

Liquid manure is particularly grateful to Roses, and no better use can be made of soapsuds than to water them with it.

"Damask Perpetuals are a very beautiful class; they make thick, close heads, their flowers are abundant and fragrant; they are equally good for garden, or pot culture. Disbudding and pinching off the young growth may be substituted for after pruning to some extent."

"Perpetual Scotch Roses are a hybrid between the Scotch and the Damask Perpetual. They come into blossom in June, and continue till frost."

"The Bourbon Roses as a class, are perpetual, and are all worthy of cultivation, some more so than others. They seed freely, and are, therefore, good for further experiments. They do not form so good heads as some of the other Perpetuals, and, therefore, should not be budded high to form standards; they do well on their own stocks, but make rather better plants when budded; their profusion of bloom and long continuance, especially recommend them."

The Perpetual Moss is a small group, and yet, a delicate one; the bud is the charm of the plant, and, if we could have them in October or November, they would give as much pleasure as the greenhouse in January. Like the common Moss, they require a rich, deep soil, and thorough pruning. Perpetual Maguet is the best; Perpetual White and General Davoust are bad growers, and uncertain in time of flowering."

"The Musk Rose is common in all mild climates, but must have a mild and humid atmosphere; it succeeds well as a wall or pillar Rose, and is the oldest of the Perpetuals. Its great charm is that it blossoms rather late in the season, and thus comes in between the earlier and later Roses. It blossoms in quite large clusters, and the flowers have a musk fragrance." It should be covered in winter, and should have a good deal of attention; our summers are rather hot and dry for it.

The China and Tea Roses, as I have said, are the stock greenhouse Roses, blossoming monthly; they may be removed into the garden in the spring, and will blossom all summer profusely, when they may be removed to the house, or left where they stand, either protected or abandoned. The roots rarely die if they are covered, and although nearly the whole top will winter-kill, the roots, if not dead, begin to grow very early in the season, and do well all summer. Cut as freely as you choose when in blossom, as this induces a more abundant growth. It will be observed that in this class those Roses which, like Safrano and Yellow Tea, are pillar Roses, and large growers, do not get to be any thing beyond shrubs in the open ground. There is not time for them to grow to perfection, and yet, when single plants are set out early, they will blossom profusely till frozen, and the Safrano will live with slight covering through the winter.

I think the Safrano the queen of Tea Roses. It has not the long, greyhound-shaped buds of the Yellow Tea, the brilliancy of the Cloth of Gold, the yellow of the Solfaterre, nor the strongest tea fragrance, but its rich-colored wood and ruddy foliage, its splendid color, comparable only to the orange tints of the most glowing sunset, and its profuse bloom, ought to make it indispensable in every collection, however small. When budded on a strong stock, like the Sweetbrier, it gets a much stronger habit of growth, and both buds and Roses increase very much in size. I have often seen them as large as the Cloth of Gold.

"The Macartney is from China, and does well under glass, or during the summer in the border. It may be trained as a wall Rose in the greenhouse. The old Macartney is not equal to the Maria Leonida."

"The Minature Rose (*R. Lawrenciana*) seems to be a small variety of the China, and is best adapted to pot or border culture. They prefer a light, dry soil, and a warm situation."

"The Noisette Roses are in some respects, the finest of this class; they are nearly all for the wall and pillar, and are generally too tender to do well out of doors, but are the main reliance for the conservatory and greenhouse. The original Noisette is an American, and seems to be a hybrid of the Musk and China."

The originals were quite hardy, although needing in our latitude, some slight protection during the winter; but the more nearly they have approached the China parent, and the more richly they are perfumed with the tea fragrance, the more tender they have become, and the less of the Noisette appears in the clustering buds and blossoms.

The pruning of this class differs with the individual; some being of a long and straggling growth, others short and compact. They are free bloomers, and mature seed readily. All flowers should be removed from those inclining to fruit, as soon as withered, as a single bunch of seed weakens the plant more than many blossoms.

Such of the Noisettes as are of compact and dwarf habit, may, like other half-hardy kinds, be cut down in the autumn, and covered with litter for the winter.

We have now gone through the list of the Rose families, making but little reference to the varieties, which will be considered again before leaving the subject.

I have endeavored to inform you with regard to the specific differences, and the sources of varieties, in order to enable you to decide upon the treatment to be adopted towards such plants as you possess. It would only be confusion, if I were, in October and November, to run over a list of names, and tell you to cover this, cut down that, and neglect others. I have here explained what *kinds must be* covered, what *may be*, and what *need not* be, and when the time comes you will act accordingly.

These general divisions of species will be a great assistance also in buying; bearing them in mind, you can pass steadily and without distraction through the bewildering lists of names, put into your hands to choose from at the nursery or at the trade-sale.

One general fact in the treatment of Roses you have plainly inferred from these directions; viz., that they should be collected in family groups, which should be kept separate as far as possible; not only for convenience in giving them similar treatment, exposure, soil, pruning, etc., but in comparing individuals, and retaining or rejecting them, according to their merits. It would be beautiful to have a Rose garden arranged with a bed for each family, the size of each bed corresponding to that of the family. Such a garden would be a source of great advantage and satisfaction. I will hereafter give a few designs for such gardens.

The variety of forms that Roses assume when grown according to their nature and inclination, is very great, and it is not easy to describe or conceive their beauty when allowed to grow in that way. We are accustomed to think of them as shrubs, or, at the most, low standards; but when we have such plants as those, we are lost in astonishment and delight. The pillar Rose is grown, as will be hereafter described, around a cedar post; these posts may stand in the open lawn, or along the sides of the walks in the Rosary, or they may be used at the corners of the house, or wherever fancy may dictate; they cannot be out of place, and they are beautiful in any position. Quite tender Roses may be grown thus, as they can be taken down in the fall and covered. By pillar Roses are meant the strong-growing, vigorous kinds.

Climbing Roses are of a strong but pendulous growth, and are used very effectively for walls, arbors, and chains. The latter method is rarely used in America, but if once introduced, could not fail to be admired and imitated. The Roses are grown up to a series of posts, enclosing the garden. Two or three shoots, not more, are allowed to grow to the top of the posts.

When the post is well furnished in the spring, chains are stretched from post to post, and allowed to take their natural curve, and the next season shoots are trained along the chains. By a judicious course of disbudding and cutting back, the chains in a single season become entirely enwrapt. The next season they form festoons of flowers from post to post.

Standard Rose.

In attempting to give lists of those Roses best adapted to our climate and purposes, I find myself met by various difficulties. In the first place we are sadly in want of reliable data, as to what varieties will flourish best here; different towns and localities suit Roses very differently, and when the most careful precautions are taken, each person must try for himself, and must expect many disappointments. Yet every one complains of such lists as those I am about to give, that they are too general and indefinite, and do not give sufficiently minute directions to enable the reader to decide beyond a doubt as to a proper choice.

But even if it were possible, which it is not, to give sueh a list and such directions as should infallibly meet the wants of each reader, another difficulty arises the moment he presents himself, list in hand, at a nursery or at a trade-sale. The nursery man is very sorry, but though your names are all down on his printed catalogue, he unfortunately has not just now all that you require. He is just out, or has ordered, or will order, or those that he has not, are, he is sure, too tender or too shy to answer your purpose; here are others that would be a great deal better.

At a trade-sale you are even worse off, for if you find what you want, the chance is, ten to one, that it is in a bundle with half a dozen things that you do not want, and you must either lose the one or take the whole. I have myself seen at such sales a bundle made up of Pio Nono, La Reine, La Marque, and Souvenir de la Malmaison, the first two hardy, the last tender, and the third so delicate that it will *live* in a garden only by great care and attention during cold weather.

I shall, however, give you several lists of Roses, the best of their kind, describing the families and degree of hardihood, and their peculiarities, as far as my space will allow.

The first are Downing's lists; the second, those of McIntosh given for Scotland; and though our climate is more severe than that of Scotland, they will thrive with us with such limitations as I have added.

HALF A DOZEN BOURBON ROSES.

* Souvenir de Malmaison,	pale flesh color.
Paul Joseph,	purplish crimson.
Hermosa,	deep rose
Queen,	delicate fawn color.
Dupetit Thouars,	changeable carmine.
Acidalie,	white.

HALF A DOZEN REMONTANTS OR PERPETUALS.

La Reine,	deep rose color, very large.
Duchess of Sutherland,	pale rose.
Crimson Perpetual,	light crimson.
Aubernon,	brilliant crimson.
Lady Alice Peel,	fine deep pink.
Madam Dameme,	dark crimson.

These would most of them stand our winters, but would be none the worse for a light covering.

HALF A DOZEN CHINA ROSES.

Mrs. Bosanquet,	pale flesh color.
M'me Breon,	rose.
Eugéne Beauharnais,	bright crimson.
Clara Sylvaine,	pure white.
Cramoisie Supérieure,	brilliant crimson.
Virginale,	blush.

All half-hardy. If covered in the fall the roots will start anew in the spring, but they rarely live uncovered.

HALF A DOZEN TEA ROSES.

Safrano,	buds, rich deep fawn. Already described.
Souvenir de mon ami,	salmon shaded with rose.
Goubault,	bright rose, large and fragrant.
Devoniensis,	creamy white.
Bougiére,	glossy bronze.
Josephine Malton,	shaded white.

All tender; the roots will live through the winter if covered.

HALF A DOZEN NOISETTES.

Solfaterre,	bright sulphur, large; will not blossom out of a greenhouse.

* Needs protection in winter.

Jaune Despres,	large bright fawn, greenhouse.
Cloth of Gold,	pure yellow, "
Aimée Vibret,	dwarf in the border very tender.
Fellenberg,	brilliant crimson, " "
Joan of Arc,	white, " "

These Roses should never have been given without the comments here appended.

HALF A DOZEN HYBRIDS; need little protection.

Chenedole,	Village Maid,	Fulgens,
George IV.,	Great Western,	Blanchefleur,
Old red Moss,	Crested Moss,	Gen. Dubourg.
Persian Yellow,		

Three best, Souvenir de Malmaison, Old Red Moss, Gen. Dubourg.

FOR WALLS IN NORTHERN GARDENS.

Queen of Prairie, Baltimore Belle.

FOR SOUTHERN GARDENS.

Ruga Ayrshire, Laure Davoust, Greville.

The following lists are taken from McIntosh. One word first, to those about purchasing Roses. Go to the dealer and buy what he has of those on your list, and no more; the next year of the same, and so on till you have them all. Nursery-men, like store keepers, wish to suit their customers, and if you insist on what you want, you will have it in time, but if you can be persuaded out of it, you will have put upon you instead, whatever has been grown with the least trouble, and can be sold at the largest profit.

Winter Roses in bloom in November and December, under glass.

HYBRID PERPETUAL; hardy.

Comte d'Eu, Gloire de Rosamene.

NOISETTE.

Fellenberg, Vittellina.

TEA-SCENTED (Perpetual).

Bride of Abydos,	Laura,
Nitida,	Mondor,
Fragrans,	La Sylphide,
Goubault,	Caroline.
Nina,	

CRIMSON CHINA (Perpetual).

Alba,	Fabvier,
Bardon,	Belle de Florence.

BOURBON; hardy in America.

Amarantine,
Comice de Seine et Marne,
Hermosa,
Justine,
Celiméne,
Splendens,
Queen.

Weeping Roses, which, when wrought on stems from 6 to 9 feet high, are trained in a pendulous direction to a framework of wood or iron. Such Roses are difficult to manage, from the constant tendency of the stock to throw out its own buds and suckers, and from that of both stock and bud to die.

Noisette Du Luxembourg, tender; Hybrid Noisette, Adolph, tender; well covered in winter; Evergreen, Felicitè perpetual, warm, moist atmosphere, potted in winter; Boursault, Amadis, hardy; Hybrid China, Belle Fleurette; hardy, but improved by litter in winter. Ayrshire, Splendens, half hardy; Multiflora Laura Davoust, hardy in summer but needs great care in winter. Bourbon, Pierre de St. Cyr, hardy. Musk, Princess de Nassau, needs moist, warm atmosphere.

PILLAR OR POLE ROSES.

HYBRID PERPETUAL; a little covering.

Mrs. Elliot,
Louis Bonaparte.

HYBRID CHINA; a little covering.

Decandolle,
Vingtneuf,
Petit Pierre.

DAMASK; hardy.

Mad. Hardy,
La ville de Bruxelles.

HYBRID CHINA; cover a little.

Berenice,
Fulgens,
Vulcan,
Chénédole,
Richelieu,
Juillet.

MOSS; hardy.

Emperor,
Princess Adelaide,
Princess Royal.

HYBRID NOISETTE; tender.

Madame Plantier,
Madeliene.

HYBRID BOURBON; hardy.

Henri Barbet,
Victor Hugo,
Great Western,
Charles Duval,
Paul Perras.

BOURBON; hardy.

Bouquet de Flore,
Acidalie,
Madame Desprez,
Pierre de St. Cyr,
Amenaide,
Imperatrice,
Josephine,
Madam Aude.

EXHIBITION ROSES, WITH LARGE, FULL FLOWERS.

Felicite Parmentier,
Eugeinc Beauharnais,
Alba (hardy),
Crimson China (tender).

TEA-SCENTED BOURBON ; tender or half-hardy.

Comte de Paris,
Triomphe de Luxembourg,
Bougère,
Moiret,
Devoniensis,
Souvenir d'une Amie,
Josephine,
Malton,
Silène,
La Renommée.

CHINA ; tender or half-hardy.

Madam Bréon,
Clara Sylvain.

BOURBON ; hardy, if slightly covered.

Souvenir de Malmaison,
La Camée,
Acidalia,
Mad. Nérard,
Mad. Soucher,
Le Florifère,
Lichas,
Dupetit Thouars.

HYBRID PERPETUAL ; cover a little.

Baronne Prevost,
La Reine,
Dr. Marx,
Count Egmont,
Reine de Fleurs,
Duchess of Sutherland,
William Jesse,
Mad. Laffay,
Robin Hood,
Austrian and hardy Persian Yellow.

DAMASK ; hardy.

Mad. Hardy,
Mad. Soetman's.
Triumphe de Rouen.

HYBRID BOURBON ; hardy.

Coupe de Hébé,
Victor Hugo,
Legouvé.
Comte Boubert,
Paul Perras,
Charles Duval,
Tippoo Saib,
Sylvain.

PROVENCE ; hardy.

Cristata,
Adrienne de Cardoville,
Laura.

MOSS ; hardy.
(I have indicated the best moss before.)

Laneii.
White Bath,
Louise Colet,
Comtesse de Noè,
Etna,
Alice Leroi,
Blush.

HYBRID CHINA ; cover.

Brennus,
Galien,
Comtess Plater,
Lady Stuart,
Chénédole,
Marjolin,
Belle Marie.

HYBRID FRENCH; hardy.

Dubois Dessauzais,
Pauline Garcia,
La Vestalle.
Alette.

FRENCH; hardy.

Adèle Prevost,
Berenice,
Col. Coombs,
Guillaume Tell,
La ville de Gand,
Leo X.,
Ne plus ultra,
Surpasse tout,
Sophie Duval,
Randolph,
Omphale,
La ville de Londres,
Ohl,
Belle Rosine,
Cambronne,
Celestine,
Duc de Trevise,
Eclat de Roses,
Couronne d'Amour,
Duc de Trevise,
Duc de Valmy,
Franklin,
Gloire des Amateurs,
Jeanne de Laval.

Roses for grouping, to produce contrasted colors: —

BOURBON; hardy, slightly covered.

Armosa,
Mrs. Bosanquet,
Queen,
Princess Clemantine,
Paul Joseph.

HYBRID CHINA; tender.

Beauty of Billiard,
Belle Thurette.

HYBRID PERPETUAL; cover.

Mad. Laffay.

NOISETTE; tender, but may be kept if covered.

Miss Glegg,
77
La Pactole.

DAMASK; hardy.

Deesseflore.

CRIMSON CHINA; tender.

Fabvier,
Belle de Florence,
Belle Emilie.

HYBRID NOISETTE.

Mad. Plantier.

CLIMBING ROSES.

(Those marked 1, 3, 5, 8, 9, 11, 12 are of very rapid growth. 2, 4, 6, 7, 10 are adapted for a shady wall or a northern aspect.)

BOURSAULT; hardy.

1. Amadis,
Elegans,
Inermis,
Drummond's Thornless,
2. Red.

AYRSHIRE; cover.

3 Ruga.
Splendens,
Countess of Leven,
4. Queen of the Belgians,
Dundee Rambler.

EVERGREEN; tender, but will live if covered.

5. Felicité Perpetuelle,
Princess Louise,
6. Banksiæ Flora,
Carnea Grandiflora.
Carea Spectabilis,
Leopoldine d'Orleans,
Rampant,
Princess Marie.

MULTIFLORA; half hardy.

7. Russelliana,
8. Graulhie,
De la Grifferaie.

HYBRID; hardy, if covered.

9. Mme. d'Arblay,
Garland.

NOISETTE; tender.

10. Grandiflora,
Du Luxembourg,
Belle d'Esquermes.

RUBIFOLIA.

11. Beauty of the Prairie.

MUSK; moist climate, half hardy.

12. Princess de Nassau,
Eponine.

ROSES FOR COVERING ROCKS AND ROUGH BANKS.

These are, as I have said, only possible with careful treatment; they may be covered with earth like Raspberries.

AYRSHINE AND EVERGREEN.

Leopoldine d'Orleans.
Alice Gray,
Lovely Rambler,
Felicité Perpetuelle.
Thoresbyana,
Rampante,
Countess of Leven.

VERY SWEET SCENTED ROSES.

Minerva,
Riego Aubernon,
Adam (tea-scented),
Hamon, "
Belle Allemande (tea-scented),
Belle Fabert,
Clementine Seringe (H. P.),
Goubault,
Louis Puget,
Fulgoric,
Rachel,
Gen. Dubois (a rather single, but very fragrant and valuable Bourbon).

YELLOW ROSES.

NOISETTE; tender.

Clara Wendell,
Solfaterre,
Pactolus.

AUSTRIAN; hardy.

Harrisonii,
Persian Yellow.

TEA-SCENTED; tender, but may be covered.

Eliza Sauvage,	Vicomtesse de Cazes,
Safrano,	Princess Adelaide,
Devoniensis,	Pellonia.
Diana Vernon,	

ROSA SULPHUREA; covered in winter, soil rather rich, and an open and dry exposure.

ROSES WITH MOTTLED OR STRIPED FLOWERS; hardy; summer bloomers.

Perle des Panachées,	white, striped with rose.
Rosa Mundi,	white and carnation.
Village Maid,	white, striped with rose and purple; pendulous.
New French,	chocolate and slate, with red, spotted centre.
Mad. Campan (rosa alba),	vivid rose, mottled with dove.
Panache pleine (moss),	white, striped with rose.
Duc d'Orleans (French),	cherry rose, with white spots.
Donna Sol, "	purplish rose, spotted with white; pendulous.
Aramis (French; hardy),	white, stripped with rose.
Duc de Bassano, "	crimson and violet marbled.
Comte de Maurinais (hardy),	slate with blush, and chocolate spotted.
Omphale, "	rosy pink, and spotted with white.
Superb Marbled,	vivid crimson marbled with purple (Gen. Danermoor.)

The following is a SELECT LIST of much esteemed varieties, arranged alphabetically; those marked P. are strong growers, and good for pyramids, poles, or pillars, and it includes most of the finest Roses in cultivation.

Adam Paul,	rose colored,	hardy,	Hyb. Perp. and Provence.
P. Acidalie,	white,	"	Bourbon.
Aimée Vibert,	"	tender,	Noisette.
Aristobule,	crimson,	hardy,	Moss.
Antenor,	rose,	"	French.
Alexandrine Bachmeteff,	bright red,		Hyb. Perp.
	"		"
Angeline Granger,	pink,		"
Auguste Mee,	light pink,	hardy,	"
P. Augustine Monchelet.			
Aramis,	striped,	hardy,	French.
Archiduc Charles,	rose,	tender,	China.
Abricoté,	apricot,	"	Tea-scented.
Adam,	blush,	"	"
Adelaide d'Orleans,	creamy,	hardy if covered,	Evergreen.
Beautè Lyonnaise,	rose and white,	"	Bourbon Perp.
Blanche Lafitte,	white and flesh,	"	"
P. Boquet de Flore,	light carmine,	"	"
Blanche de Beaulieu,	white and rose,	hardy,	Hyb. Perp.
Blanche de Portemer,	pale blush,	"	"
Bernard,	salmon,	"	Damask Perp.

Banksiæ Flora,	white,	tender,	Banksia.
Bernard Palissy,	deep rose striped with purple,	hardy if covered,	Hyb. Bourbon.
Beauty of Billiard,	vivid scarlet,	hardy,	Hyb. China.
P. Blairii,	bright rose tinged with lake,	"	"
P. Brennus,	brilliant crimson,	half hardy,	"
Bizarre Marbree,	marbled,	hardy,	French.
Boulade Nanteuil,	crimson purple,	"	"
Blanche fleur,	white,	"	Hyb. Prov.
Baronne Heckeren,	rosy pink,	"	" Perp.
Baronne Prevost,	pale rose,	"	" "
Beranger,	light crimson,	"	" "
Catherine de Wirtemberg,	rose,	"	Moss.
Celina,	rich carmine,	"	"
Comte Plater,	creamy white,	"	Hybrid French.
Comtesse de Segur,	clear flesh,	"	" "
Chénédole,	brilliant light carmine,	"	" Bourbon,
Comtesse Lacepide,	violet purple,	hardy if covered,	Hybrid China.
Charles Duval,	bright rose,	hardy,	" Bourbon.
P. Coupe d'Hébé,	delicate bright rose,	"	" "
P. Grivelii,	bright red,	tender,	Multiflora.
Crimson Superb,	deep crimson,	half hardy if cov'd,	China.
Caroline de Sansal,	blush,	hardy,	Hyb. Perpetual.
Charles Boissière,	crimson,	hardy if covered,	Bourbon,
Chateaubriand,	glossy pink,	hardy,	Hyb. Perpetual.
Chereau,	cherry,	"	"
Colonel Lorry,	brilliant red,	"	Damask Perpetual
Cymedor,	dark red, peculiar,	"	Hyb. "
Comte de Nauteuil,	deep crimson,	hardy if covered,	Bourbon.
Comte Montalivet,	dark violet,	"	Hyb. Perpetual.
Comtesse Duchatel,	bright crimson,	hardy,	"
Comtesse Batthiani,	flesh,	"	"
Ceres,	glossy rose,	hardy if covered,	Bourbon.
Cerise pourpre,	purplish crimson,	tender,	Tea-scented.
Cezarine Souchet,	blush and rose,	hardy if covered,	Bourbon.
Charles Souchet,	crimson purple,	"	"
Comte de Bobrinisky,	"	"	Bourbon Dwarf.
Comte de Paris,	rose lilac,	"	Hyb. Perpetual.
Cloth of Gold,	yellow,	tender,	Noisette.
Devoniensis,	straw and buff,	"	Tea-scented.
Dupetit Thouars,	brilliant crimson,	hardy if covered,	Bourbon.
D'Assas,	dark violet spotted,	hardy,	French.
Diodore,	red to pink,	"	Moss Perpetual.
Dr. Arnal,	bright rose,	hardy if covered,	Hybrid "
Duchess de Montpensier,	delicate rose,	"	" "
Duch. d'Orlèans,	blush and pink,	"	Hybrid Provence.
" of Sutherland,	bright rose mottled,	"	" Perpetual.
Duc d'Aumale,	rose,	hardy if protected,	Bourbon.
Dometille Becar,	rosy blush,	hardy,	Provence.
Duc de Trevise,	velvet crimson,	"	French.

P. Devignè,	pink blush,	hardy,	Hybrid French.
De la Grifferie,	rose to blush,	tender,	Multiflora.
Eugène Napoléon,	rosy crimson,	hardy,	French.
Eblouissante de la guerre,	dark velvety crimson,	"	"
Eugène Sue,	red rose,	"	Hybrid Perpetual
Edward Defosse,	fresh pink,	hardy if covered,	Bourbon.
Enfant d'Ajaccio,	bright cherry,	tender or half hardy if covered,	Indica.
Eliza Sauvage,	salmon yellow,	tender,	Tea-scented.
Eugenie Desgaches,	bright rose,	"	"
Earl Talbot,	rose and lilac,	hardy	Hybrid Perpetual.
Fairy Queen,	glossy lilac	"	" "
Ferdinand Deppe,	rose color,	"	" "
P. Frederick II.,	deep purple crim.,	hardy if protected,	Hybrid Bourbon.
Fulgens,	crimson velvet,	"	" China.
Felicité Parmentier,	rosy blush,	hardy,	Alba.
Fringed Provence or Crested Moss,	rose pink,	hardy,	Provence.
Gen. Foy,	purple,	"	French.
" Bertrand,	white striped lilac,	"	"
" Changarnier,	violet purple,	hardy if protected,	Hybrid Perpetual.
" Bernard,	dove centre, crim.,	hardy,	" China.
" Jacqueminot,	deep purple,	"	" "
" Negrier,	rosy blush,	"	" Perpetual.
" Cavaignac,	rosy pink,	"	" "
" Bedeau,	bright red,	"	" "
" Castellane,	brilliant crimson,	hardy,	" "
" Drouet,	crimson and purple,	"	" China.
Gloire de France,	deep rose,	"	French
" de Colmar,	crimson,	"	"
" de Coulines,	carmine,	"	Hybrid China.
Garabaldi,	bright crimson,	hardy if covered,	" Bourbon.
Gracilis,	bright pink,	hardy,	Boursault.
Geant de Bataille,	crimson,	"	Hybrid Perpetual.
Graziella,	brilliant pink,	"	" "
George Cuvier,	rosy cherry,	hardy if protected,	Bourbon.
Georges de France,	salmon and yellow,	tender	Tea.
George IV.,	deep velvety crim.,	hardy,	Hybrid China.
Henry Lecoque,	deep carmine,	hardy if protected,	Bourbon.
Herman Kegel,			
Harmonii,	yellow,	hardy,	Austrian.
Hermosa,	pale rose,	"	Bourbon.
Je me maintiendrai,	rosy pink,	"	French.
Jupiter ponctue,	bright velvety crim.,	"	"
Juno,	pale rose,	"	Hybrid China.
Jaunâtre,	primrose,	tender,	Banksia.
"	fawn colored,	"	Evergreen.
Inermis,	deep rose,	hardy,	Hybrid Perpetual.
"	bright red,	"	Boursault.
Isocrate,	rose,	"	Hybrid Perpetual.
Jacques Lafitte,	bright rose,	"	" "
James Veitch,	rose,	"	" "
Jeanne d'Arc,	pale blush,	"	" "
Joseph De Caisne,	satin-like rose,	"	" "

Julia,	crimson,	half hardy if cov'd,	Noisette.
Laurii,	rosy crimson,	hardy,	Moss.
La ville de Londres,	rose,	"	Hybrid Provence.
La ville de Bruxelles,	bright rose,	"	Damask.
Lucrèce,	pale rose,	"	Alba.
La ville de Gand,	brilliant rose,	"	French.
Letitia,	deep rose, veined,	"	"
L'attrayante,	nankin,	"	Hybrid China.
Las Casas,	rose pink,	hardy if protected.	Hybrid Bourbon.
Laura Davoust,	rose,	tender,	Musk.
La Reine,	rose,	hardy,	Hybrid Perpetual.
Lady Stuart,	delicate rose,	"	" "
Lion de Combat,	crimson and purple,	"	" "
Louise Odier,	bright rose,	hardy if covered,	Bourb. Perpetual.
Louise Peronne,	bright silver pink,	"	Hybrid Perpetual.
Leonore d'Este,	flesh,	hardy,	" "
La favorite,	deep rose,	hardy if covered,	Bourbon.
La Sylphide,	blush,	tender,	Tea-scented.
La Pactole,	yellow,	very tender,	Noisette.
La Marque,	pale yellow,	tender unless well protected,	"
Melanie Willermoz,	white,	hardy,	Hybrid Provence.
Mad. Ogier,	flesh,	"	Hybrid Perpetual.
" D'Arblay,			
" Sylvester,	white, yellow centre,	tender,	Tea-scented.
" Bréon,	rose,	half hardy,	China.
" Bosanquet,	flesh,	hardy if protected,	Bourbon.
" Angelina,	white and fawn,	"	"
" Souchet,	rose carmine,	"	"
" Tripet,	dark rose,	"	"
" Campan,	bright rose, spotted,	hardy,	Alba.
" Andry,	dark rosy crimson,	"	Hybrid Perpetual.
" Fremion,	light carmine,	"	" "
" Hiliare,	rosy blush,	"	" "
" P. Trudeaux,	bright rose,	"	" "
" Legras,	pure white,	"	Alba.
" Hardy,	white,	"	Damask.
" Zoutman,	delicate flesh,	"	"
" Lamorissière,	light rose,	"	Hybrid Perpetual.
" Alboni,	blush,	"	Moss.
" P. Audot,	rosy lilac,	hardy if protected,	Bourbon.
Menoux,	crimson,	"	Hybrid Climb.
Matthew Mole,	rosy crimson,	"	French.
Mrs. Elliot,	bright " ,	hardy,	Hybrid Perpetual.
Mrs. Rivers,	pale flesh,	"	Hybrid Provence.
Marianne,	rich bright rose,	hardy if protected,	Bourbon.
Napoleon,	blush, mot. with pink,	half hardy if cov'd,	China.
Nephetos,	pure white,	tender,	Tea-scented.
Narcisse,	pale yellow,	"	"
Ohl,	violet purple,	hardy,	French.
Oeillet parfait,	variegated white, striped with crim.,	"	"
P. Princess Adelaide,	yellow,	tender,	Tea-scented.

Adelaide,	pale glossy rose, flowers in clusters,		Moss.
Princess Clementine,	deep rosy purple,	hardy if protected,	Bourbon.
" "	pure white,	hardy,	Provence.
Princess Royal,			
" Lamballe,	pure white,	"	Alba.
" Marie,	coppery white,	tender,	Tea-scented.
" De Nassau,	yellowish straw,	tender unless well protected,	Musk.
Pierre Jaussens,	scarlet, shaded with crimson,	hardy,	French.
Perle des Panachées,	white, striped with rose,	"	
Paul Perras,	brilliant rose,	hardy if protected,	Hybrid Bourbon.
Paul Ricaut,	rosy crimson,	"	" "
P. President Mole,	pale rose,	"	" "
Persian Yellow,	yellow,	hardy,	Austrian.
P. Pius IX.,	purplish red,	"	Hybrid Perpetual.
Paul Dupuy,	bright velvety crimson,	"	" "
Prince Leon Kotschoubay (extra),	bright crimson,	"	" "
Reveil,	cherry red, shaded with violet,	"	Bourbon.
Robin Hovel,	brilliant,	"	Hybrid Perpetual.
Rosine,	clear rose,	tender,	Musk.
Reine des Fleurs,	pale lilac,	hardy,	Hydrid Perpetual.
Reine blanche,			
Rose du Roi,			
Reine d'Angleterre,	rosy blush,	"	French.
Rose Aimable,	rosy pink,	"	"
Semiramis,	fawn in centre to pink,	"	Damask.
Sylvain,	bright crimson,	hardy if protected,	Bourbon.
Souvenir de la reine des Belges,	red and carmine,	hardy,	Hybrid Perpetual.
Standard de Marengo,	brilliant crimson,	"	" "
Souvenir de Leveson Gower,	dark red to ruby,	"	" "
Salvator Rosa,	very red,	"	" "
Souchet,	deep crimson,	hardy if protected,	Bourbon.
Souvenir de Malmaison,	white,	"	"
Souvenir de l'Exposition,	dark crimson,	"	"
Safrano,	copper yellow,	half hardy,	Tea-scented.
Souvenir d'un ami,	salmon and rose,	" "	"
Solfaterre,	cream white,	tender,	Noisette.
Triumphe de bolrollyer,	cream,	"	"
Triumphe du Luxembourg,	buff rose,	half hardy,	Tea-scented.
Triumphe de Paris,	dark velv. crimson,	hardy,	Hybrid Perpetual.
" de Jaussens,	vivid rosy crimson,	"	French.

Unique Panache,	white, striped with pink,	hardy,	Provence.
Unique de Provence,	pure white,	"	Moss.
William Jesse,	light crimson,	"	Hybrid Perpetual.
White Bath,	pure white,	"	Moss.
William Griffiths,		"	
William IV.,	lively red,	"	French.
Vesta,	scarlet,	"	"
Vièillard,	delicate rose,	"	Moss.
Vicomte Cussy,	cherry,	hardy if protected,	Bourbon.
Vicomtesse de Cazes,	yellow rich,		Tea-scented.
P. Vivid (Paul's),	vivid crimson,	"	Hybrid Bourbon.

It will be observed on comparing these lists, that the same name is often repeated, but it is always in different connections, and to illustrate different peculiarities in the Rose. The last list is general, and gives a very perfect collection.

Many of those which are marked tender, it may be well to try out of doors, after you have gained experience by the culture of those whose hardihood you are sure of, for sometimes a slight advantage of exposure, a little careful protection will enable a tender Rose to thrive; and by some care in getting varieties from seed, in budding, etc., the constitution of the most tender may be hardened.

The limits of the careful gardener's powers, have not yet been discovered, and the field of improvement extends farther, and promises more in Roses than in any other flower.

CHAPTER LXVII.

KITCHEN-GARDEN.

JUNE ends all spring planting in the kitchen-garden. We no longer talk about *early planting;* all seeds planted now are for succession and late crops.

After the first of this month, nature is in a hurry, and by the 15th, whether the season has been early or late, things are in about the same state of advance, year after year.

In the hotbeds there should be, by the second week, abundance of Cucumbers, and good-sized Melons; the vines as they grow over the frames, should be pinched off, to check the sap; hurry the fruit and keep the vines within bounds. Every kind of crop may be removed from the hotbeds. The Tomato plants will be very large, if the secondary frame was set over the first, as directed in the notice of hotbeds.

Make beds of Cardoons, setting the plants 4 feet apart each way; take the plants from the seedbeds and frames, with great care, and by no means nip off the end, or mutilate the leaves. Shade the plants when set out, with an inclined shingle, so as to break the sun's rays; it is on its leaves that the plant is to depend for attaining full size. If its roots are well developed, and it is well planted, shaded and watered, it will be able to maintain the leaves, and will thrive accordingly.

All the plants before enumerated, which were sown in the seedbeds, may be now transplanted for the last time. It will be well to shade all the large plants if possible, particularly Tomatoes, and also to water them in the evening for a few days; they will soon establish themselves.

Cabbages, Cauliflowers, and similar plants, should be set out before a rain.

The final transplanting of the young herbs will take place towards the last of the month. The more shrubby varieties, like Sage, Lavender and others, may be used to make an edging to the walks, or division lines for the beds. Cuttings of the old plants can be struck in any shady, moist place. Some of the herbs will be fit for cutting the last of the month. Cut just as they are in full flower; they are then richest.

The early-planted Cabbages, Lettuces, Cauliflowers, etc., must be hoed and hilled a little. Lettuce plants will head much better for several transplantings, and also for hoeing; so too, with Cabbages. The earliest Cabbages will be fit to use next month; Lettuce will be in fine condition for the table all this month.

As soon as the Asparagus begins to get spindling and stringy, cease to cut it. It is very poor economy to cut it too long, the permanent yield is impaired by so doing.

Hoe the Corn as soon as it is well out of the ground. The first hoeing you may draw a very little earth round it, but never afterwards.

All the vegetables are benefited by occasional hoeings, even when the weeds do not demand it. Breaking the surface of the earth lets in the air and rain, induces the earth to absorb gases freely, and promotes early and large condensations of dew.

The earliest Peas will soon be in blossom, and the latest should be sown. You will not get a large yield from any Peas sown this month, as they do not get into blossom till the weather is too hot for them to thrive.

About the third week in June, plant pickle crops of Cucumbers, Mangoes, etc. The plants of Red Pepper and Martinyia, should be transplanted from the hotbeds, the first of the month. Make in a good place, out of doors, a Mushroom bed. The weather will now be warm enough to insure, with frequent waterings, large returns. Hoeing the Sweet Potatoes increases the crop very much.

Hoe and clean the Irish Potatoes. Two or three times each week, examine the Melons, Cucumbers, and Squashes, for bugs. The troublesome ones are very small, striped black and yellow. They perceive the approach of a man long before he reaches them, by the jarring of the earth, and will either drop to the ground, or crawl under the leaf; turn the leaf and pick them off. When the vines are fairly freed, dust the plants with plaster of Paris; renew the examination and application as often as twice a week, until the vines are grown beyond danger of injury. The large squash-bugs come later, and are to be removed in the same way.

Any work directed last month, and not completed, should be finished as soon as possible. As you use up small Salads, sow more.

The early Radishes will be gone, and you will now draw those sown with the Carrots and Parsnips. As soon as the Carrots are well developed, thin to 6 inches, and Parsnips to 9 inches, long Blood Beets 9 inches, Turnip Beets 6 inches. As the Artichokes grow, remove all small side heads and suckers, that the principal heads may be more perfect. The perfection will be shown by the gradual opening of the scales, and the heads should be picked before the flower shows in the centre. As soon as the principal heads are grown, cut the stems down to the earth.

Sow Cabbage seed for the late crops. Sow seeds of Drumhead, Savoy, and Red Cabbage. Spinach will be fit to gather during the month.

Such plants as have been set out for seed, Radishes, Carrots, Onions, etc., will now have thrown up the seed stem, and are about ready to flower. Tie each stem to a stick, or set a stake at each end of the row, and connect the stakes with a rod, to which the heads can be tied. It is said that when the young Onions do not swell, but grow too much to tops, they may be induced to swell by bending the tops down.

Celery may be set out for the earliest crop. The latest must be set in July. By no means plant in trenches, but set it in rich, deep soil, flat, as you would a tree. Then let it, and all similar plants, grow freely without hilling, until it has long, well-developed leaves; then hold the leaves up and hill it. This must be done in dry weather, after the dew is off, or the Celery will rust. When set in trenches, the roots are too far below the sun in the autumn, and when hilled before the leaves are pretty large, they are choked, and, however long they grow, never get large, thick buts.

As the Tomatoes advance, do not put straw under them, or tie them up to sticks, but let the branches extend out over the ground. As the plants grow large and commence to ripen, in August, it is very well to work straw in under the fruit and about the branches.

Weeds are now a fertile source of discomfort; the earlier and younger you take them, the easier it is to destroy them, and the better for the plants. Every weed is a thief, who ought to be apprehended before his rascality is accomplished.

If June is dry, all the young plants will be benefited by occasional copious waterings, and particularly if the water is somewhat enriched with guano or other manure.

As the Strawberries ripen, gather; and do not be troubled if the robins get a few.

The Cherries will ripen about the first of July. It is difficult to get thorough protection against birds, unless the trees are covered with nets; but some advantage may be gained by the use of scarecrows. Those made of old clothes, etc., to represent men and women, are no protection against small birds; they are quite useful in Corn fields to drive away crows, who are over sagacious and deceive themselves, but little birds do not mind them; but set light poles, inclined at a considerable angle, in the tree, and tie them firmly to a branch. They must be long enough to project well beyond the tree; suspend to the loose end some strings, to which are tied pieces of tin, hung so that they may sometimes strike against each other. The noise frightens the birds, and still more, the light reflected from the dancing tin; on bright days this expedient is very effective; in bad weather only the noise is of any service.

Shooting does no good; you may kill a few birds, each of whom would have eaten 10 or 15 pounds of worms before winter, but their places will be soon supplied by others. As I have said, the effective guard is a net. Common mosquito netting is rather fragile and troublesome; a net made of packthread, which would entirely cover the tree, and could be drawn in tightly about the trunk, would admit light and air, and keep off the birds, and if well dried after using, and then laid away, the same net would last for many years. This is easily done with espaliered trees.

Apricots should be thinned this month; thin as directed in the grapery.

Watch the espaliered trees; pinch off all bad shoots, such as have been already described, and disbud where buds are formed, which would be ill-placed next year. Tie down the shoots as they grow, that they may not get too rigid and stiff.

Thin the Peaches and Nectarines; they are not good for pies, as the Apricots are; but the value, and indeed quantity of the crop, will be increased by wise thinning.

Watch the Plum-trees narrowly. This is the month for the curculio. Mosquito netting will protect the fruit; and all that which drops should be carefully removed.

Thin the Pears; all these fruits should be thinned from one-half to two-thirds of the fruit which sets, and the culls should be removed, not left on the ground to decay.

The first of the month you will find a marked benefit if you surround all your fruit-trees from 3 to 4 inches deep, and as wide as the circle of the branches, with a mulch; use old tan, wood chips, straw, or hay.

CHAPTER LXVIII.

ORCHARD.

THE orchard is but little trouble in June. Thinning the Peaches, Apricots, Nectarines, and Pears, should be carefully done; the Cherry-trees must be watched, and the fruit gathered and marketed.

The Apples would in many cases be benefited by thinning, but the size of the tree and the quantity of the crop prevent very careful thinning, as it would take more time and expense than the advantage to the fruit would warrant.

As soon as the fodder crop sown in the orchard is sufficiently advanced to admit of it, turn in the old sow and her litter of pigs to fatten. Previously, hints for mulching were given.

If the orchard is under a fodder crop, you cannot mulch, but if uncultivated, mulch by all means. Cover the whole surface with hay or straw, if possible. Salt hay is the best; rain washes the salt into the earth: the hay or straw packs closely over the earth, and shields it from the sun's rays; evaporation can take place but slowly, and no matter how dry the season, land so protected will be cool and moist.

A thick mulch of old chips and river waste was found by Mr. H. W. S. Cleveland, formerly a large Pear grower in New Jersey, a preventive against cracks in the fruit, to which it also imparted superior flavor, at the same time that it increased the smoothness of the bark.

He found, too, that native Grapes, previously much injured by rot and mildew, were saved from such diseases by the mulch. It should be, when settled, 5 or 6 inches thick, and if it is, straw or hay must be put on at first double that thickness. In the fall it should be drawn back from the trunks of the trees, to prevent mice from harboring in the straw, and under its cover feeding on the trees in winter. I have known men who thought themselves good farmers, spread straw under the trees towards the time of the ripening of the fruit, to prevent its getting bruised by falling on the ground. If they had spread it in the spring, they would have done better.

If you cannot afford to mulch the whole area of the orchard, mulch around each tree, as far as the branches extend. If the orchard is set, where no orchard should be, in a wet, undrained place, a mulch would be injurious, as it would keep the earth too wet; and in springy land, well drained, it would be less valuable, as the springs will give water enough, and the sun's rays are desirable, to warm the earth.

CHAPTER LXIX.

THE FARM.

Every farmer is now in full tide of work. Those who grow sheep, in addition to their other work, must shear early in the month. The sheep must be driven home, taken to the washing place or trough, washed, assorted, sheared, clipped, marked, then turned out to their lambs. The wool is rolled up, weighed, packed and stored for market. The whole process fully exercises the care and patience of the farmer and all his men, and it is to be the principal source of revenue for the year. The careless farmer turns his sheep, when shorn, out to the lambs, and then sends both off to pasture, where the poor creatures must take their chance of weather till the new wool has started sufficiently to protect. His sheep naturally take cold and contract diseases, which are the cause of loss to him sooner or later; a danger which may be mostly avoided by housing them after shearing, and on the approach of storms, and rubbing their bodies with refuse lard.

This interlude coming at the heel of planting hurries the farmer very much, and materially deranges his economies if the season has been late, but on this very account, it is only the better test of excellence in farming, and a proof of the smoothness with which the affairs of the good farmer run.

We have no sheep to care for; those which we had in the winter being sold as soon as they were fattened. Our only live stock which need constant attention, are the cows and calves.

The summer cows have been calving through May, some of them in June even. Examine each calf as it arrives; if a heifer, see how it is marked and formed. If your eye has been trained, you will not easily be deceived, even in a new-born animal, at least you can decide on its merits before it is three days old. If you are not practised in judging of stock, buy Guenon's Treatise on the Marks of Cattle. Though often sneered at by "practical men," and not infallible, it gives principles to guide your selection which are of great value, and will prove correct in the vast majority of cases. In examining a great many cows, I have not found one exception to his rules. Flint's Dairy Book will also be an aid to the farmer in the selection and treatment of cattle. All our calves will be Devon (direct, or crossed with stock we like), and as we wish to increase our stock, and have served our cows carefully, we shall raise every promising calf. Any which do not promise well, we shall either fat for veal, or kill when 3 days old. At that time the skin is valuable, and each day's delay in killing those which are unprofitable to raise or convert into veal, is a dead loss.

The male calves, if full blooded, are to be still more carefully examined; indeed, we should not decide how to dispose of them till they are some weeks old. Meantime feed them as well as you can. If we, or any of our neighbors, will want a new bull next year, or the year after that, select the one which is the best blooded in all respects, has the best ancestors (much depends on the milking qualities of the female ancestry), and promises best for breeding. The rest are to be killed for veal when fat, or grown for beef and work, if fit for such purposes. You remember that I said when speaking of Devon beef, that it is the better for having done some work.

Every farmer finds a difficulty in raising calves economically, and this arises, I think, from the general greediness for gain. The calves are grudged the milk which they take from sale of butter, and, consequently, all kinds of devices are resorted to to grow calves at a small cost. Now one thing is settled: nothing for nothing; a calf fed on weak, poor food, will make a coarse, poor animal, and the few cents saved in its infancy will cause a loss of many dollars in its maturity.

If you want fine cows or oxen, feed them abundantly and well during their earliest months. This will strengthen their constitutions, and they will afterwards thrive on poor pastures and less food. But stint them in their youth, and if they live, they will be no better than Pharaoh's lean kine.

In Scotland, and many parts of England, calves are raised as follows: as soon as some cow selected for the purpose brings a calf, another calf of the same age is bought, and one is tied on each side of the stall where the cow is, so that it can barely reach her bag. For a day or two she shows dislike of the new comer, but soon becomes wonted. The two calves suck the cow dry in a short time, and are then removed till time for the next meal. As they grow they are also fed on cut Potatoes, Hay, etc. In 8 or 10 weeks these calves are removed, and two others take their place, and are treated in the same way. It depends on the time at which the cow calved, whether she can bring up more than two sets; if she has still milk, though it be only enough for one calf, let her fatten it.

In this way calves get great size and early maturity at a cost which is really small. The expense of the cow for the time is not more than $1 per week, and in 10 weeks, or for $10, she will have brought two calves into a fine, healthy condition, so that they can feed themselves. If you do not like to use your choice cows for the purpose, buy a more ordinary animal.

C. F. Heard writes to the Country Gentleman, that he takes his calves away from the cow when three days old, and teaches them to drink by putting his fingers into their mouths, and then lowering his hand into the pail. After they have learned to drink, he gives them 4 quarts of milk, morning and night; *new* milk for 4 weeks; ½ new, ½ skim, with a little meal, for the next 2 weeks; then all skim and more meal, for some time longer. He gives Barley, Rye, or bolted Oatmeal, but not Indian, as that makes them scour. At the end of about 8 weeks, he gives sour milk from the cheese-press, or churn, and continues this as long as he has it, with some Meal, some Hay, and what Grass they will eat. In the fall he houses them to keep them warm, gives soft Hay, cut Turnips, wind-fall Apples, etc.; during the winter he gives Hay and Turnips. His calves weigh 600 to 800 pounds the first year, and on good feed, 900 to 1,000 pounds at 2 years old; at 3 years old, 1,200 to 1,400 pounds, and, when matured, 2,000 pounds and upwards.

I think either of these methods will produce the desired result. The first gives the least trouble, although it will not succeed unless the calves are in the charge of a competent and careful man, and I do not doubt that is the cheapest.

BUTTER. — During this and the next two months, we must make our butter and cheese for the season. I do not mean that none is to be made at any other season, but the butter made off good, fresh feed, keeps better, and is higher flavored than that of any other season.

Our milkroom is near the farm-house, which stands near the farm barn (see the general plan). The building is small, at a little distance from the back of the farm-house, faces the north, is well ventilated and shaded; its windows are covered with wire gauze to shut out flies. The shelves are of slate slabs, $\frac{3}{4}$ of an inch thick and 18 inches wide; of course they can easily be kept clean and sweet, which is very important. The floor is also made of slate slabs, and the rooms are in addition kept sweet and clean by whitewash. The temperature will range throughout the summer between 60° and 65°. In the centre is a well of constant cold water.

Morning and night, during summer, the milk is carried directly to the milkroom or dairy, where it is strained into pans and at once set on the shelves, in charge of the dairy-woman. It is kept cool for at least 12 hours, and skimmed before it begins to sour; the cream put into jugs, till enough is collected to begin churning. No doubt sour curded cream will make butter, but the best butter comes from cream which is but slightly acid.

The dairy-woman selects such a churn as suits her — one of the rotary kinds.

"The churn is not soaked over night; but in the morning put in a quart of boiling water, churn it 1 minute, then put in a pailful of cold water to remain in the churn 5 minutes, and the churn is ready for use. As soon as you have done with it, wash it well, dry it, and put it in a dry place. Churning should be done in the morning, while it is cool. Rapid churning is not the best; but if the cream is acid and of the right temperature, it will require less than half an hour. The temperature of the cream to churn best should be 62°. If the cream is not acid, put it in a warm place for a short time to make it so. Never scald the milk or cream; it gives a peculiar flavor, and is useless labor. I use tin pans to set my milk, because they are light to handle and are easily kept sweet and clean. The first cream that rises is best both in flavor and color."

"The milk should not be set more than 24 hours, and it is better if skimmed in 12 hours, as what little might be lost in quantity would be gained in quality."

"The cream should be kept in stone or glass jars, or well-glazed or enammelled ware, as the acid corrodes common coarse glazing, and it imparts poison to the cream."

"The cream should not be covered, except by a gauze which will not exclude air. I put an ounce of salt into a 3 gallon jar, when I begin to fill it with cream, and stir the cream well morning and night. It should not be kept more than a week.

"As soon as the butter has come, I draw off the buttermilk, and remove the butter into a long wooden tray. Then I press out the buttermilk with hard-wood clappers (it would be better to use the table and roller shown in Flint's Dairy Book), and mix in by weight 1⅛ ounces of salt to the pound. I then work it over thoroughly (but not long enough to heat it or make it like a salve), and mix in 2 ounces of white sugar to 10 pounds of butter. If it is for present use, I make it into balls and stamp it. But if it is to be kept for winter, I put it down solid into stone jars, sprinkling a very little salt on the surface, and covering it with a thick, fine cloth, put on the lid, and place the jar in a dry, cool place. It is better to fill the jar with one churning; but if not able to do so, pack in each churning solid, and exclude the air till you get the jar full.

"If it is to be kept a long time, or sent to sea, pour a little melted butter over the top of the jar before you put on the cloth.

"It is very important to have good salt to use, as some salt gives the butter an unpleasant taste, and prevents it from keeping well."

"I do not wash my butter, nor allow any water, hot or cold, to be put with the cream, to lower or raise the temperature when I churn, as it is very injurious to it. It washes out the flavor and sweetness from it, makes it insipid, and soon turns it rancid. The water which remains in it injures it more than buttermilk. I do not believe it is possible to keep butter for any length of time that has been washed. Some one should superintend the dairy to see that all is done as it should be." [Prize Essay, by Mrs. Winchester, of Brewer, Maine, read before the Maine State Agricultural Society, at Bangor, 1857.] There are as many methods of making butter as people who make it. The method given will insure a good result. The same is true of

CHEESE. — We shall make some cheese for our own use; and were the process more common, no farmer need *buy* cheese in order to get the best quality. One method is as follows: "Take a gallon and a half of water, and throw into it 1½ pints of common salt. Boil and skim it, and add 3 or 4 ounces of Rose leaves. After it is sufficiently steeped, let it cool, and put in 1 ounce of saltpetre and 4 rennets (calves' stomachs, properly prepared).

"A great spoonful of this preparation is enough to turn 15 gallons of milk. When the curd is made, dip it out carefully and put it into a cloth that sets in a vessel with its bottom perforated with holes."

"Let a person on each side take hold of the corners, and raise the curd carefully, and turn it from one side to the other of the cloth, in order to the better draining off of the whey. Then lay it as before in a vessel perforated with holes, and thus turn it once in fifteen or twenty minutes, and in the interval place a follower upon it with a stone above (a 'follower' is a cover made to just fit into the vessel when lying on the curd, and which holds up a stone or heavy weight; as the moisture presses out of the cheese or curd, and it shrinks, the board and weight follow the shrinkage), cutting the curd through each time."

"When the whey is out, season it with salt to suit your palate, while cutting it up in small pieces with a knife; then put it up for pressing. Let it stand under 30 or 40 pounds' weight for 24 hours, and then turn it and let it stand under the same for 24 hours more. A severe pressure, which is sometimes given, spoils a rich cheese entirely." A following weight, in this case, is better than a screw press. With a screw press, you may indeed tighten to any extent, but when the pressure has forced the whey out, and the cheese shrinks, the screw no longer exerts any pressure.

"Set your cheeses in closets made for the purpose, in which flies cannot enter, and turn them every day. By using the patent cheese shelf, you can turn a large number at once."

"The outside should be scraped clean, then be rubbed with a mixture of butter and Spanish Brown, which answers very well; but other mixtures answer equally well."

"A small quantity of Anatto (which imparts a yellow color), say the size of a kernel of Rye, sewed up in a cloth, may be put in each curd."

"Never wash out your cheese-cloth in soap, but rinse it out in whey."

The cheese-room may be in the dairy-house, but should be separated from the butter department, as the peculiar acids of the cheese tend to affect the sweetness and flavor of the butter.

The careful making of butter and cheese is both important and profitable. Really choice butter commands a very high price. In the summer the prices which milkmen pay for milk are ruinously low, and it is much more profitable to work up your milk yourself. Buttermilk and whey are the very best food for young pigs, particularly when they are at Grass.

The method of making cheese differs materially with each county, I might say *town*, in the United States, and England. The method I have quoted may not be the best of all, but it will unquestionably produce a good article, and if your dairy-woman is good she will improve.

FOWLS. — By the last of May, or the first of June, all the fowls will have hatched, or be on the point of hatching.

I mentioned in May that nests should be prepared. I will now briefly describe the proper management of fowls.

All fowls show great eagerness to lay in bushes, tufts of Grass, etc., and cannot be relied on to furnish eggs unless regularly confined to their house. Undoubtedly fowls which are allowed to stroll and lay where they please, are more certain to bring up broods of young, but their eggs are lost and they form bad habits. If their house is warm, they will, after once becoming habituated to it, lay and set there. The setting or hatching-house should be apart from the laying-house, as all fowls, and particularly hens, are annoyed by the presence of others during incubation. Eleven eggs are enough to put under any fowl, as many as she can well take care of; the size of the egg being proportioned to the size of the fowl. Ducks set so badly that it is best to hatch their eggs under hens.

Make the nests in roomy boxes, or baskets, raised a little above the floor. For geese they should be particularly low, as they find difficulty in climbing. Hay or Straw should be stuffed into the corners to keep the eggs in place. There should be room enough for the bird without its tail being bent up, or turned to one side, which pains the bird, and often interrupts her setting.

Set hens 3 weeks, ducks 4 weeks, turkeys 4 weeks, geese a calendar month. The hen is the least reliable setter of the three, and is very fastidious. Select a large, well-feathered hen, of a mild and gentle disposition; so soon as you find that she wishes to set, which may be known by her setting resolutely in a box or on the floor, remove her at night, just about roosting time, to the nest prepared, and put a couple of old eggs under her. She may dislike the place; change her quarters till she is suited. If she is removed in the daytime and covered from the light, she will be frightened, and will desert her eggs and lose her desire to set. After she has covered the 2 eggs for a day, remove them at night and put in the 11 eggs which she is to hatch; put near her plenty of water and food, and a box of ashes, in which she may roll when she comes off the nest to drive out lice, etc., and let her come off the nest to look for food when she pleases; if she is well selected and a good mother, if the food and water are near, she will eat and return immediately; and if she refuses to do so it is useless to try to force her; either set another hen on the same eggs, try to hatch them in an oven, or abandon them.

Never try to release the chicks when nearly hatched, by breaking the shell or removing pieces; the proceeding will hurt or kill them. After they are all out, set near them a plate with crumbled bread and meal, and some water, and give the hen food. If the day is fair, put the nest into a portable hutch, and remove hen and chicks and food, to some open gravelled space. The chicks will run about in the sun, and get food and strength; if rain threatens, put them under cover. In a few days they will be strong enough to take care of themselves. Feed them every 3 hours for the first few days, and afterwards 3 times a day, if you wish them to grow fast. Boiled Potatoes, Indian meal, crumbs of bread, etc., are fit food.

If it is ducks that are hatched, keep them in the house for a few days, away from the water, and feed on bread soaked in water, Barley meal porridge, boiled Potato, and other laxative food, and continue this fare after they go out. As soon as they are fit to go out, take them to a shallow pond in some retired place, where they will not get frightened or drowned by larger birds. In a week they will be strong and able to take care of themselves.

Turkeys are rather shy and difficult to raise. Contrary to the law in all other fowls, a single impregnation fertilizes the whole contents of the ovarium. The turkey lays her egg, if possible, in secluded places. Keep her in the house every day till she has laid; remove the egg at once to a dry place, and turn it carefully every day. When she shows a desire to set, set her at night. Once set she is very constant. Place food near her and keep her nest cleared of dung and loose feathers; when the poults are all out, be very careful of them for a few days. Some persons recommend that a pepper-corn be thrust down their throats directly; and as turkeys are fond of stimulating food, the pepper may warm their stomachs and give an appetite.

The old bird should be well fed with coarse meal, etc., but the poults will eat nothing for 24 hours; after that time their appetite comes.

The first danger is from a continued purging, which soon kills the young bird; feed with finely chopped, boiled egg every 3 hours, for a fortnight. After the young birds have eaten, remove the food they leave, out of the mother's way; at the same time give water in a shallow vessel.

After two days, if the weather is fine, set the turkey in a coop on the gravel or short grass, during the bright part of the day, feeding her with coarse porridge, boiled Potatoes, and water, and the poults with the chopped egg. Confine them to the house if foul weather threatens. A week of fine weather will make them strong enough to follow the mother, and she can then have her liberty; the poults will begin to pick up insects, and will thrive and grow astonishingly. The turkey is a very careful protector of her young, and you need have no hesitation in trusting them to her as soon as they are able to run about.

The goose is more difficult to manage. Not only must she be impregnated for each egg, but impregnation can only be effected in the water; and when she shows signs of laying, she must be caught every morning before she leaves the house, and felt, to learn if the egg is hard and ready to come away. If it is, confine her till she lays, then let her go; remove the egg to a dry place and turn it carefully every day. When she is ready to set make a low nest for her, and manage like a hen or turkey.

In all these cases, when the eggs are hatched, one side of the nest should be opened and sloped down, in order to allow the chicks easy passage to and fro.

Let the goose go off when she pleases, but keep food near, dry boiled Potato, Barley porridge, and Oats, for she easily becomes constipated. If she run for the water when she comes off, do not be alarmed; her feathers will not soak water, or chill the eggs, and wrapped up in the down with which she has surrounded them, the eggs will not cool, even though her absence be long.

If there are ganders enough, one pairs with each goose; and if there be but one gander, although he will serve each goose, he selects one for a mate, stays by her nest, and protects her against all intruders.

So soon as the goslings are out of the shell, even before they are dry, if it is fair weather, take them in a basket, and the goose by the wings, and carry them to a warm, dry spot in a Grass field, and leave them there so long as it is clear and warm; if rain threatens, remove at once, as the goslings must not get their backs wet for the first 2 or 3 days; if this happens they will grow weak in the legs and die or become worthless. In wet weather, cut a good sod and put it near the nest; they need to peck young Grass. Set near them a shallow plate of water, blocked up so that it cannot tip over on to the goslings, who will certainly walk into it.

In a few days they grow strong, but for a week still need watching, for if one of them fall into a rut in a cart track, or is caught in a tuft of Grass and turned upon its back, it cannot right itself, and the mother marches off and leaves it to die. After three days of sunny weather the goslings may be allowed to go to the pond. At the week's end they will be out of danger, and if well fed will grow rapidly.

If these directions for rearing fowls are followed, they will give good broods. Hasty as they are, they must suffice. For accounts of fancy breeds and their management, you must consult special treatises.

The early broods of chickens often hatch in April, and then the hen rears another brood in the fall. It is the earliest and latest broods which are most valuable; of course they are also the most troublesome. The very early chicks will often lay in the succeeding winter.

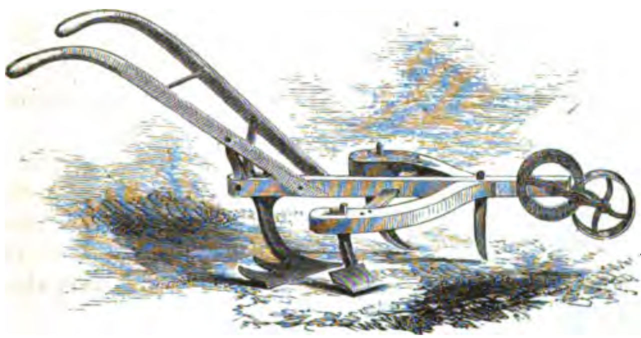
The important things in a henhouse are warmth, good ventilation, and light; and without plenty of good care you cannot have plenty of eggs. The demand for poultry is enormous. Thousands of tons are consumed in our large cities every winter, and for that which is well grown and well prepared for the market, very remunerative prices may be got.

But very few persons understand how to prepare poultry for market, and, as a consequence, it comes in a bruised and uninviting condition, and commands but a low price.

The proper method is to hang the fowl up by the legs, open a vein in the throat, and allow it to bleed to death. As soon as it is dead, plunge it in boiling water for a few minutes, long enough to heat the fat just under the skin, lay it under a thick covering to steam and loosen the feathers; then withdraw, pick carefully, again plunge in hot water, immediately withdraw; the skin will then have a rich oily appearance; dry and cool. Never draw fowls; they do not keep as well, or sell for as much as the undrawn.

Pack in roomy boxes; put under each layer a little soft Straw, or wrap each bird in paper, which is better; fill the box tight with birds and paper; then screw on the cover, and send to market. Your poultry will command several cents per pound more than if put up in the common way.

Summer Culture of Root Crops. — To return to the farm. Press forward the planting as rapidly as possible. By the middle of the month the Corn will be fit for the first hoeing; if it is very weedy and heavy, send the horse-plough through the rows each way, turning the soil from the Corn. Then, if the soil is not well pulverized, send the cultivator through in the same way, which will spread the earth out level again. If the land is in fair condition, and not stony, send the cultivator first, or better still, the horse-hoe. This is the best tool which can be used in common land, not too stony.



When the team comes out, let the men go in with hoes, and cut away all the weeds from about the Corn. Cut out or pull up all but four stalks, and then draw up the loose earth about the young stalks. If the land is in good condition, this can be done rapidly and easily.

Never hill the Corn. If the land is wet, and you think to drain it by hilling, you will be disappointed; the land must be drained. The only result of hilling will be to loosen the hold which the Corn has on the soil. Corn sends out aerial rootlets as it grows. If it is hilled, these roots go into the loose earth of the hill and get no firm hold; if there is no hill, they descend to the firm earth and strengthen the plant. Some of the roots of Corn spread near the surface; if it is hilled, these go into the hill and get no hold.

Treat Potatoes in the same way, only drawing earth enough about their roots to secure a covering for the tubers as they grow, for any that are exposed to the sun become worthless. But even Potatoes should not be hilled much.

The only difference in managing other crops is, that for most of them the horse-hoe and the cultivator should be used, instead of the plough.. These two tools will leave little to be done by the hand-hoe, in land which has been well tilled; the hoer need only go over the field, and clear away the few weeds which escaped the machines. The cost of cultivating by horse power is small,—$1.00 to $1.50 per acre.

In cultivating the Root crop, the Radishes will mark the rows and guide the boy who leads the horse. As soon as the cultivator or horse-hoe has opened the rows, the men should follow with hoes, and thin the Roots to the proper distance: 8 inches for Carrots; 9 for Parsnips; 10 to 12 for Ruta Bagas; 12 to 14 for Mangold Wurzel. Leave wider gaps, rather than smaller than these.

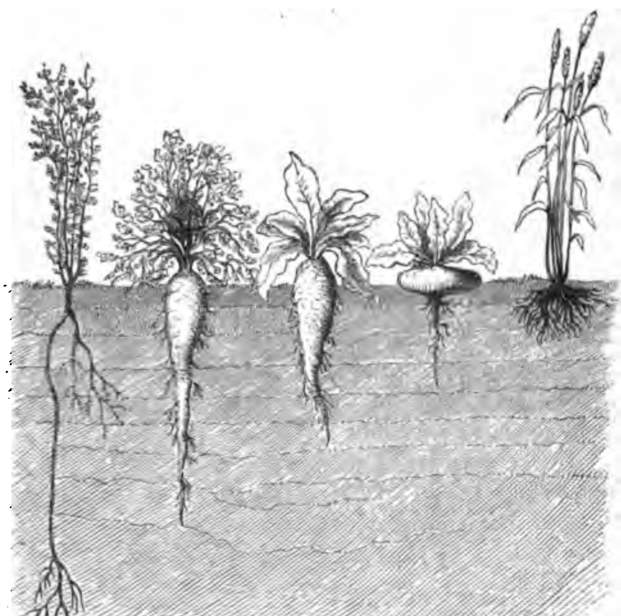
The "singling" or thinning may be done rapidly and surely by hoes, with a little practice; any man who can chop wood well, striking surely where he aims, can thin Roots. He must walk down the row sidewise, facing the row to be thinned. If his hoe is 4 inches wide, two blows will thin the plants to 8 inches, three blows to 12 inches. The remaining plants will fall over when deprived of the accustomed support from their neighbors, but will soon revive if the hoe has not touched them. Another man should follow the singler, and cut away any weeds which remain, and draw with the hoe a very little earth about the plants that are to stand. By the next day all these will revive.

The horse-hoe should go through the rows again as soon as the weeds show, and if many weeds have started among the plants they must be hoed by hand; after which the roots will outgrow and smother all weeds, and cover the ground too closely to allow any new ones to start.

If there is any market for the Radishes, or if the stock will eat them, they may be drawn after the horse-hoe has marked the rows, and before the Roots are singled. If there is a market near, Radishes will generally pay more than the expense of their seed, and the trouble of drawing, washing, and tying in bundles.

Carrots, Parsnips, and Beets, may be sowed early in the month, Ruta Bagas and Mangold Wurzel from the 20th June to the 20th July.

For Mangold Wurzel and Ruta Bagas, well-ploughed, inverted sod will answer very well, particularly if ploughed with the Michigan plough. Parsnips and Carrots thrive on a sod well turned with the Michigan plough, where the subsoil plough is also used. But for all these crops stubble land is best, as their roots penetrate very deep, and unless the sod is so placed as to rot rapidly, they will not thrive, and a deep soil, as shown by the cut, is a *sine quâ non* for successful Root culture.



I do not recommend for any of these crops that the land be cultivated in ridges. It is a practice brought from England, where rains are frequent, and the water must be hastened in its flow from the surface; we rarely have too much water, and wet land should not be devoted to this crop.

The rows of Carrots and Parsnips should be 20 inches apart, those of Ruta Bagas and Beets, 27 inches to 32 inches apart.

As these crops are not to be sowed till late, the ground on which they are to grow, whether stubble or sod, should be ploughed in the fall, or very early in the spring. Plough as early as possible, and leave it in the furrow. In June, there will be a good crop of weeds; cross plough and harrow thoroughly. Be sure that all your rows are perfectly straight. If you do not use a drill which will sow the seed and the artificial manure together, sow for Carrots, Parsnips, and Mangold Wurzel, 200 pounds guano or superphosphate to the acre; for Ruta Bagas, and other Turnips, 400 pounds bones, or 200 pounds guano or superphosphate, and then harrow. If the seed and manure are sown together from a drill, harrow first. When the manure is sowed broadcast, the seed should be sowed from a seed sower, which should be *set* for the kind of seed used. Secure a stick at right angles to the line of draught, and hang from its end a piece of heavy chain, which will mark on the soft earth a line parallel to the first row sowed by the sower or drill. Let the machine be drawn straight through the field in the line of the feering-poles, and return in the line marked by the chain.

The seed of Mangold Wurzel, if good, need not be sowed nearer than 6 inches; 4 inches is proper for good Ruta Baga. Carrot seed being generally poor, may be sowed 2 inches apart; Parsnips the same. To sow an acre, you need 3½ pounds of Carrot seed, 4 of Parsnips, 2½ to 3 of Ruta Bagas, 3 to 6 of Mangold Wurzel. For the latter, sow 500 to 1,000 pounds salt, broadcast. This crop has not been grown so extensively in this country as the others. The English plan of throwing the land into ridges, which has been found unnecessary for the other Roots, after trial, will undoubtedly be rejected in the case of Mangold, though it is recommended for it now.

The English farmers, whose Roots are in drills, find it a good plan to go over the rows and draw the earth from the roots, that it may not cramp them, as they get most of their size above the surface. Should it be found that they are thus cramped when sown flat, the plough could be run through the rows at the time of second hoeing, leaving the share close to the row, throwing the earth out a little into the middle; but it is doubtful whether the gain would pay for the trouble.

With sowing the Root crops the June planting ends, unless Millet is planted for fodder, which may be done as late as 1st July.

The Grass of the lawn should be cut with the lawn mowing machine at least twice in June, and may be fed green to the cows, or made into Hay. Other Grass will not be cut till July, as in a well-managed rotation there is no June Grass.

You may begin to cut Corn fodder as soon as the Rye is gone, if the Corn is large enough; if not, the lawn Grass will supply its place for awhile.

If you have any leisure, draw muck and other waste material to the yard, for compost. It would be a good plan never to return to the barn at noon or night without a load of some such material; in this way a large accumulation may be made at no expense.

Tie up the cows every night in the stable, and open all the windows and the upper half of the doors, for ventilation. The cows will be just as cool as if in the yard, and the manure will be saved.

Remember to keep the fowls close, else they will do much mischief.

CHAPTER LXX.

ORNAMENTAL GROUNDS.

I SHALL not enter into details with regard to making a proper plan for the improvement of your place, for as I have said, this is properly the work of the landscape gardener. Justice cannot be done to the subject in the limits of this book, and were it to be written out with all possible minuteness, there would be left unsaid much that can only be learned from experience.

Before making a plan, the landscape gardener will require a careful topographical survey of your place, which shall show exactly the boundaries, the situation of the buildings, of all prominent single trees, of all groups of trees, hills, valleys and the general changes of surface, the water-courses, springs, and ponds; and which shall give the levels of so much of the land as it may be necessary to operate on. And before this is made, he should himself walk over the place with you, and say what he thinks it well to do; and if he does not make his own survey, should carefully point out to the surveyor what he wants included in the survey. An accurate survey and a large amount of levelling are as important to the value of your plan, as for the plan of a railroad.

If your house is standing on your place, your adviser should go in and acquaint himself with the views from the windows, in order to know what objects it is desirable to show and what to conceal.

This preliminary survey will be expensive, but yet the cheapest thing for which you spend money in beautifying your place. On the plan, or a copy of it, the artist will lay down the improvements proposed; the plan of improvements will be made to a scale, and when carried into effect, the plan will fit the grounds, and mean what it appears to mean on paper.

The important features in your improvements are: —

1st. The point of entrance and the management of the approach.

2nd. The location and treatment of water, artificial or natural and the proper amount of drainage.

3rd. The location of flower-beds or flower-gardens.

4th. The location of kitchen-garden.

5th. The location of greenhouse, conservatory, grapery, and garden structures.

6th. The drive or walk.

By this name I designate a road or path which may carry one naturally and easily about the whole place in such a way as to display its beauty and open that of the surrounding country. If the place is large enough I should always make this path at least 12 feet wide, and 15 is better, to allow the passage of a large carriage. But if the limits do not allow of a carriage road, carry a footpath about so much of the place as it is desirable to visit, taking care not to cut up the surface more than is necessary, but to leave the land in as large masses as possible. *Never curve or distort it merely to gain length, never curve it where it would be better straight, and never make it straight where a curve would have more beauty, or would display the surface to better advantage.* But I have already said enough about paths and avenues.

The situations of the various comforts and ornaments mentioned will depend on circumstances, which cannot be readily foreseen. In our selection of sites we must be guided by the general principles already laid down.

Lawns. — In the fall I spoke of the necessity of thorough cultivation to a good lawn; but I do not consider that it is necessary to cultivate a lawn for a year or two in a hoed crop in order to reduce the soil to the fine condition best appreciated by grass. A beautiful and permanently satisfactory lawn may be made in a single season and economically, however rough the surface.

If you wish for a lawn this summer it will be necessary to grub and trench the surface, carefully throwing out all roots and stones, and mixing the manure as described in September. I think it unquestionable that a lawn well made and manured from the rough sod, from a bushy pasture or a forest, if well drained would be better than when first cultivated, for the crop we take off generally removes quite as much as it adds, if not more, whilst the after culture is the same in both cases.

Suppose a beginning to be made with a rough bush pasture, a piece of forest or a grass field. If you wish to kill the trees and bushes before you remove them, it is best to cut them in June or August, and burn them. Open a trench as before, and as you trench leave on the surface every rock and root. By trenching deep you can get under and around the roots, and take them out more easily. Before this or at the same time, cut the proper drains. If you begin with a good force of men as soon as the frost is out of the ground, the work may be done by the middle of May.

Cart the manure on to the field as the work goes on, and pile it, so that you can spread and dig it into the trenches. When the land is all ready, harrow or rake in a couple of hundred pounds of super-phosphate or guano and gypsum, with the Grass seed, and either three-fourths of a bushel of Spring Rye, a bushel of Oats, or three-fourths of a bushel of Barley to the acre. If the land is light, roll it. The Grain will be very thinly spread, and will germinate about the same time as the grass. When it is 2 inches high, as it will be in a fortnight, the whole lawn will be a rich green color. In a month it will be a foot high, and the young Grass among it fairly green. Send a mower over it, and cut the Grain rather high above the surface, say 2 to 3 inches. It will then start again, and although it will not grow so fast as before, in another month it will be fit to cut again. And though it is then July, the Grass will be strong and green, and in August or September the whole may be cut a third time.

Or, instead of sowing Grass when you plant Grain, sow the Grain more thickly (2 to 3 bushels per acre), and let it grow till it is 2 to 3 feet high; then roll it down and plough it well under with a deep tiller plough. The ground will then have been green from within a week of the sowing till the time of ploughing under. In either case, after rolling, and before ploughing, spread 20 bushels of lime to the acre on argillaceous, loamy, or sandy land, which will both enrich the land and hasten the decay of the green crop; harrow the land immediately, and either sow the Grass seed alone, or with Millet, 10 to 15 quarts to the acre; the Millet will be up in a week, and make the field green again; cut it for fodder as soon as it is high enough, or leave it for Hay. It will not cure properly unless cut by the middle of August or the very first of September, on account of its great succulence. Very few fodder crops give as good return as Millet. It may be sowed as late as the middle of July, and will throw up a fodder crop in August or September, of 3 or 4 tons of dry Hay. But remember that if you take this crop, you exhaust the land in proportion.

In either of these ways you may have a green lawn during the whole season, with the exception of an interval of two or three weeks, and I think either of them better than the Corn and Potato system.

When land is poor, and good manure is scarce, a different system should prevail. Dig and trench thoroughly as soon as the frost is gone, and sow Spring Grain of any kind very thickly. As soon as the Grain is in blossom, dig or plough it in together with lime (5 to 150 bushels lime to the acre; the larger amount if the land needs it, and has had none for years; oyster-shell lime is best); sow Grain again, Buckwheat, Oats, or Millet, and when that is well grown and presents a fair sward, plough it in; and manure each time with 300 to 500 lbs. guano to the acre; after the second time sow for a permanent lawn.

These methods of making a lawn are more expensive than Corn and Potatoes, but quicker and thorough; you are not laying down a Grass field; and remember always that no permanent evergreen, summer, and satisfactory lawn can be made unless the work is done thoroughly and deeply, and with a liberal expenditure. Made in this complete manner, a lawn will defy all ordinary vicissitudes for 10 or 15 years. It should be top-dressed spring and fall, with well-rotted stable manure, guano, ground bones, super-phosphate, or wood ashes.

Two divisions of the ornamental treatment of our place have been untouched, or barely referred to: Water and Plantations. They will be spoken of in the two months which yet remain.

During June our grounds will need some attention. All the permanent lawn should be mowed once or twice during the month. The walks must be constantly examined, to free them from weeds, and repair the damages from storms.

Watch the growth of the vines on the arbors and trellises, and train every shoot before it gets the wrong direction, or is too long to be bent. It is not too late to set out Madeira vines and Maurandya, which have been started in hotbeds, to cover naked spots. Much variety may be produced in prominent situations, by setting down wire baskets on to the turf, cutting out the sward inside the basket, and planting there greenhouse or bedding plants, Roses, etc. In the same way portable trellises of wire, of low dwarf, fantastic shapes, may be set about in appropriate spots, for Madeira, Maurandia, Ipomea, and the other vines which have been started before.

When these vines are used in wire baskets they both screen and ornament them by twining in and out.

June is the month for the purest delight in nature, and, busy as the farmer is, he may have ample time for enjoyment. No month is so rich in Nature's bounties. The fields are so yellow with Buttercups, that they seem to reflect the sun, whilst the air is vocal with the song of birds; now the days are at their longest, as though it were intended that there should be time for all men to do their fair share of work, and yet enjoy the beauty about them. Whoever is deaf to June, insensible to her promises and delights, is to be pitied, and it is in vain to appeal to him to become either the best farmer, or the best man. The generous promises and opportunities of this beautiful month are more worthily expressed in the following lines, by James Russell Lowell, in the "Vision of Sir Lanufal," than in any other words in verse or prose:—

"There is no price set on the lavish summer,
And June may be had by the poorest comer

"And what is so rare as a day in June?
Then, if ever, come perfect days;
Then Heaven tries the earth if it be in tune,
And over it softly, her warm ear lays;

Whether we look, or whether we listen,
We hear life murmur, or see it glisten;
Every clod feels a stir of might,
  An instinct within it, that reaches and towers,
And, grasping blindly above it for light,
  Climbs to a soul in grass and flowers;
The flush of life may well be seen
  Thrilling back over hills and valleys;
The Cowslip startles in meadows green,
  The Buttercup catches the sun in its chalice,
And there's never a leaf or a blade too mean
  To be some happy creature's palace;
The little bird sits at his door in the sun,
  Atilt like a blossom among the leaves,
And lets his illumined being o'errun
  With the deluge of summer it receives;
His mate feels the eggs beneath her wings,
And the heart in her dumb breast, flutters and sings;
He sings to the wide world, and she to her nest, —
In the nice ear of Nature, which song is the best?
Now is the high-tide of the year,
  And whatever of life hath ebbed away,
Comes flooding back, with a ripply cheer,
  Into every bare inlet, and creek, and bay;
Now the heart is so full that a drop overfills it,
We are happy now, because God so wills it;
No matter how barren the past may have been,
'Tis enough for us now that the leaves are green.
We sit in the warm shade and feel right well;
How the sap creeps up, and the blossoms swell;
We may shut our eyes, but we cannot help knowing,
That skies are clear, and grass is growing;
The breeze comes whispering in our ear,
That Dandelions are blossoming near,
  That maize has sprouted, that streams are flowing,
That the river is bluer than the sky,
That the robin is plastering his house hard by;
And if the breeze kept the good news back,
For other couriers we should not lack;
  We could guess it all by yon heifer's lowing, —
And hark! how clear bold chanticleer,
Warmed with the new wind of the year,
  Tells all in his lusty crowing.

"Joy comes, grief goes, we know not how;
Every thing is happy now, —
Every thing is upward striving;
'Tis as easy now for the heart to be true,
As for grass to be green, or skies to be blue, —
'Tis the natural way of living."

CHAPTER LXXI.

GREENHOUSE, CONSERVATORY, ETC.

JULY.—The cuttings, layers, etc., for the fall stock of plants, must receive constant attention; some will be well rooted for repotting, others must continue in the frames and seedbeds.

The sleep of the plants still continues, or rather, is now at its depth; to pursue the natural analogy, it is now midwinter for them. Pelargoniums are now out of blossom; cut back, make cuttings, and repot as directed before. Towards the last of the month, begin to repot the plants which need it, and whose growth has recommenced, and re-adjust plants, giving fresh earth when needed.

Examine the buds on the Oranges and other budded plants, and when they have well taken, cut them down.

Pot Roses and plunge them in the earth, or set in cold frames till fall. Make cuttings, and repot Neapolitan Violets; make cuttings of Azalea.

Continue to give abundant water to the plants and bulbs in flower in the greenhouse and conservatory, and pay strict attention to fruit in the graperies.

The retarding-house will be in its vigorous young growth now, and must not be neglected. Continue to propagate for the fall, sowing seeds of Mignonette, etc.

The Polyanthus, Primrose, and other seeds which were sown last fall, are now to be potted off for fall flowers.

Give occasional waterings when necessary, to layers of Pinks, etc. Well-rooted Chrysanthemums will need potting; sow seeds of Cineraria.

CHAPTER LXXII.

FLOWER-GARDEN.

WORK and enjoyment share this month in the flower-garden.

Remove all weeds as soon as visible; take up the bulbs as soon as ripe enough; pick off decaying leaves from Auriculas, Ranunculuses, etc., as they injure the plants if left; assort, dry, and lay aside the seedling Ranunculuses and Anemones.

The rosary will be in splendid condition the first of the month. As the plants go out of blossom, cut off the hips, and cut back Perpetuals for a new growth.

Verbenas will have begun to run in the beds, and should be pinned so as to fill out any shapes you please.

Geraniums will grow strong and rapidly. They must be followed daily and trained gradually; if carefully managed, they can be made to cover their beds entirely, and will be a mass of brilliant flowers in August.

Heliotropes may be trained and pinned down, but do not need it as much as Geraniums; they make more pliable shoots, which naturally incline to weep and cover the earth.

Salvias are easily trained so as to cover the beds. In July most of this work must be done, as the bending should begin with their growth and be concurrent with it. For the smaller plants, old rusty or imperfect hair-pins are excellent for fastening the shoots to the earth; they can be bought very cheap by the hundred. The stronger plants, like Salvia and Geranium, need long forked sticks, such as for layering.

Many annuals, like Cacalia, Mignonette, and others, weep readily and cover the ground, but others must be trained.

The reserve garden must be carefully cultivated in July, to give succession plants for August.

Carnations and Picotees will be in blossom now, and if there is a good collection, they will give a brilliancy to their section of the garden, second only to that of the Roses.

The variety of Carnations is very great, and as I have before said, the common kinds are beautiful and desirable, and by sowing the seeds, charming collections may be made, though only of common kinds. The choice varieties, which are the result of long and careful culture, you can hardly expect to get once in a hundred times. They are increased in numbers from pipings and layers.

"Carnations are divided into three classes: *Flakes*, *Bizarres*, and *Picotees*. Flakes have but two colors, and the stripes are large, going quite through the petals. Bizarres are variegated in irregular spots and stripes, and with not less than three colors. Picotees have a white ground, spotted or pounced with scarlet, red, purple, and other colors. These are again divided into Pink Flake, Purple Flake, etc., Scarlet Bizarre, Crimson Bizarre, etc., Purple Picotee, Yellow Picotee, etc."

These varieties are best grown from layers. Begin to layer the last of July or first of August, or when just in flower, that they may get well rooted before winter. Lay them in the ground, to be afterwards potted; if left too long, the wood does not strike so readily. Before layering, water the plants well; then take the shoot to be layered in hand; cut off all the lower leaves, leaving a few on the upper part; with a sharp knife cut into the stem below a convenient joint, and up through a joint; then bend down and treat like other layers. It is well to cut off the tongue of the layer, back to the joint, as it has to decay before the joint will callus or emit roots. The layers should be covered with about two inches of good compost. Do not water for a day or two, as the tongue should dry a little.

If there is more grass (technical term for young shoots) than can be conveniently layered, make cuttings or pipings of them.

Cuttings will take most certainly if set into a dungbed of moderate heat, and if any cuttings upon potting have callused and not rooted, if removed to a fresh hotbed, with a stronger heat, they will strike.

The best soil for them is well-rotted turf from an old pasture. A soil recommended by Hogg, is, "Two barrows light loam, one of leaf mould, one of old frame dung, half a barrow of old cow dung, and a quarter of a barrow of river sand."

When they are to be blossomed in pots, they are potted for the last time in March, in 11 inch pots. Let the soil be dry for a few days before shifting; set them into a dry and somewhat shaded place, and water moderately at first through the rose of the watering-pot. Tie the flower shoots up neatly to small green rods, or to stiff copper wire.

As the buds appear, cut out some, to insure the perfect development of the remainder. As they approach blooming, care must be taken that they do not break the calyx irregularly. All Pinks are very apt to split one side of the calyx, when the petals burst through the opening, and this spoils the beauty of the flower. To prevent this, when the petals first show, tie a thread, or better, slip an India rubber band round the top of the calyx; then with a sharp knife cut slightly the notches between its divisions. The edge of this notch is hard, and it is the difficulty of breaking it regularly that causes the flower to split one side. If cut a little, there will be no trouble.

Great care must be taken that wire worms do not get into the pots or around the young layers. If the plants are of weak-growing kinds, two may be potted for flowering into the same pot; but only one of the stronger varieties should be allowed.

Carnations and Picotees naturally blossom in June and July; it is difficult to force them, though the ever-blooming or tree varieties may be forced for winter and spring. For this purpose, a year's previous culture is necessary. After layering, induce growth, and as the shoots lengthen, pinch them back occasionally to render the plants stocky, and pick off buds. Treat like other plants, shifting occasionally as they grow. They will begin the second winter full of sap and buds, and will blossom very profusely. They will blossom the winter and spring after layering, if not prevented.

When Picotees are approaching maturity, if they are to be exhibited, the beauty of the flower is shown to advantage by cutting a broad ring of paper, and slipping it under the petals; the contrast brings out both color and form. When the petals do not lay over regularly, they may be drawn into place with delicate ivory pincers, all which will not reflex smoothly, being turned into the centre.

"A perfect Carnation is round; the outer or guard petals should rise perpendicularly inside the calyx, about $\frac{1}{2}$ inch above it; should then turn out at right angles and lie over it; should be thick and uniform; from these the other petals should retreat in regular, symmetrical circles to the centre, which should be well filled with them. Each petal should be flat, with only slight undulations in it, and its edge should be smooth, not fringed and rounded, without notch or indentation. This is the most apparent distinction between Carnations and other Pinks. The border of the Picotee petals, however, are minutely serrated. The colors should always be pure and clearly defined."

"When the layers are well rooted, they should be potted, if not layered into pots, and set aside in a cool place till winter, when they should be kept in a cold pit till towards spring (see March).

The varieties of common Pinks are Grass Pinks, well known, and often used for borders, Pheasant Eyes, and Cob Pinks. The last are the largest, and are supposed to be a cross between the Grass Pink and the Carnation. The early Red Pinks are probably a cross between these and the Dianthus Deltoides or Armeria.

They may be propagated by pipings and layers, like Carnations; layer rather late, (middle of August), that the plants may not get too strong. Set the new plants in a bed, if you wish to show a collection, raised 6 or 8 inches above the general surface of the garden; make it of rich loamy soil 2 feet deep; set the young plants one foot apart each way. As the winter comes on, cover with litter; in May, open out. As they show flower stalks, either set a stick to each, or set stout sticks round the edge of the bed, and connect them with wire, and tie the flower stems to the wire. When set among other plants, they must be covered with litter in the fall, and staked singly in the blossoming season. If not tied up they get top heavy, and often bend and break. The same care must be taken with the calyx as with that of the Carnation.

The Grass Pinks used for borders may be propagated most readily by slips or pipings, and if cut early in the season as May, and set out in the border, will strike and grow readily and blossom profusely the next year; some few even the same year. It is necessary in making such cuttings to remove some of the lower leaves, but in no case, whether Carnation or Grass Pinks, cut off or mutilate the ends of the upper leaves of the cutting or pip.

Towards the last of the month, repot the Auriculas which are to be repotted. During this process the roots may be divided to increase the stock.

"For full-sized plants in repotting, use pots 6 × 7 inches; for smaller ones, seedlings and offsets, 3 × 5. In repotting, the crown of the roots should be carefully examined, any rotten parts cut out, and the wounds dressed with powdered wood charcoal. When slips are taken, the cut portion of both parent and slip should be dressed with the charcoal."

Some cultivators do not think it necessary to shake the earth out of the roots oftener than once in three years; at other times they shave the ball down somewhat. But as often as once in three years, the earth should be shaken out and the roots carefully examined.

Oyster shells mixed with the drainage improve the plants. When repotted, set into a cool place, and keep cool till toward spring, and give them plenty of fresh air, but do not let them freeze. In February remove an inch of the top soil and replace with rather rich compost; bring near the light and heat; by March, flower-buds will begin to show.

Sow seeds in March for new varieties; the old plants will ripen seeds in June and July; as soon as the leaves decay, sort out the roots and lay them in a warm, light, and dry place, till well *ripened* and dried; then keep till March.

The following is an excellent compost for Auriculas:

"Two barrows of cow dung at least two years old, a barrow of leaf mould, one of pure light loam from an old pasture; mix thoroughly and add silver sand enough to keep the compost open and drainable. Before using it should be thoroughly frozen to kill vermin."

Hogg gives for compost: "1 barrow sound staple loam, 1 barrow dried night-soil, 2 barrows dung of sheep, cows, and poultry, one-fourth barrow sea sand. Leave for two years before using."

During July the earliest forced Dahlias will come into blossom; tie up to sticks carefully; liquid manure liberally applied just as the flowers begin to form will improve them wonderfully.

Remove all the buds which are inside the branches, and will not show to advantage, or from their position will be deprived of light. The other blossoms will fare all the better.

Prepare early in the month, beds of Pansies for autumn bloom. The plants used are those which were struck from cuttings early in the season, or were grown from seed. With care, they will blossom till winter, and if covered with litter will begin again early in the spring.

The natural enemies to the Pansy are the wire worm and grub, earwigs and slugs, which may be caught in traps of hollow stems of alder and artichoke, etc.

Should you want a few extra fine blossoms for any particular purpose, pinch off all the blossoms before they expand, for several days; the next will be the finer.

The best soil for Pansies is one-half bushel leaf mould, one-half bushel cow dung, well rotted, 2 bushels decomposed turfy mould, well sifted together and freed from worms. If the mixture is stiff, lighten with river sand. Flowers may be cut to advantage as fast as they appear. Plants which are kept for flowers should always have their flowers cut off as soon as they fade; otherwise they go to seed, and the strength of the plant is diverted.

When healthy plants, in a well-managed garden, begin their bloom, it is wonderful to see what a quantity of flowers they produce in a given time. A collection of Bengal or China Roses may have every blossom and half-opened bud cut at 4 P.M., and by the next morning at 8 there will be a large number of fresh buds. The same is true of all other flowers. Verbenas and Heliotropes planted in beds may be cut continually as long as any blossoms appear, and cutting only increases the tendency of the plant to flower. All our common plants blossom, as I have often said, from the new wood, and by cutting off the shoot which bears the flower we drive out others at its base.

I have said but little about the forms of beds in the flower-garden. It is a subject that has been so often treated, that it seems hardly worth while to enter upon it. Flowers are in themselves so beautiful that they always appear well; yet some attention to the forms of beds will add to their effect.

In small places the flowers, of various kinds and sizes, should be grouped together, for the sake of variety. There is not room enough to devote a large space to each kind, color, or size. In places where the flower-garden is extensive, the same desire for variety dictates that beds of particular colors and kinds should be contrasted with others of mixed character.

The shape of the small beds should be simple, and that of the larger ones marked with distinct indentations and curves, that the plants may readily fill them out. To cover acute angles with plants, and exclude Grass, is a very difficult matter.

The simpler the forms of the beds, the easier it is to give character and distinctness to the colors. I have already recommended the circle, either of a single color or of concentric rings. If the centre is large, and filled with a light colored or white flower, with a narrow ring of darker flowers outside, the bed will seem to rise out of the ground from the edge to the centre, while the opposite arrangement, that is making the outer ring the widest and lightest, will make the bed seem hollow.

It is a poor plan to put too many flowers together in a bed. A few, if properly managed, may be trusted to cover the ground well; and if many are planted, they are sure, as they grow, to crowd each other and spindle up and lose their natural proportion and symmetry.

For Pansies especially, simple beds should be made, as it is desirable to see the character of the flowers, and their being variegated forbids any clear effects of color. Verbenas being clear colored, may be placed in a bed of intricate shape, as the purity of their color will preserve and define its limits.

Scarlet Geraniums give color to any shape as soon as they are well grown. Heliotropes have a particularly good effect in large masses. It is hardly an effect of color, but rather of coolness. Their blue is very cool, and has a delightful effect to the eye, even in a hot summer's day.

Salvias are generally too large to be used for color alone. They should be set in mixed beds, where size is an aid to color, and yet their intense brilliancy makes them very effective, and in a large bed, with well rounded and decided indentations, a group of them is very fine. So, too, set at the point or edge of any group of shrubbery to which we wish to give character, they are superior to any other plant. The difficulty with Salvias (particularly with the Mexican Sage, the best one for out-of-door culture), is the lateness of the period at which they begin to blossom, generally not before the middle or last of August, and they do not attain full perfection before the danger of frost. In towns and cities, or in any place well protected from frost, the Salvia is a *sine quâ non.* Its color grows more brilliant as the cold weather comes on, and when October is in its glory, the Salvia rivals the trees.

The difference of temperature between towns or cities and the country is very decided, and hardly credible, even when we make allowance for the increase of heat caused by the collection of men and animals, and by the fire heat from house chimneys and manufactories. Most of the tender pillar Roses could be grown to perfection in the sunny court-yards of city houses, while they would never grow to be more than shrubs in out-of-town gardens, and I have often seen groups of tender exotics, in the front areas in cities, in November, in full bloom, when in the country they have been gone for a month.

The Heliotrope is as susceptible to frosts as the Salvia, but it blossoms so much earlier that they do not interfere with it materially.

A very beautiful annual bedding plant is the Gilia-tricolor. Plant the seeds in May, and it will grow with rapidity, blossoming but little until the last of August; it will then flower profusely, and the colder the weather, until the ground freezes up, the larger and more fragrant the flowers; whilst a bunch of Gilia in November will fill a room with its delicate and spicy odor. During warm weather the fragrance is hardly perceptible.

The Lobelia is a very pretty bedding plant. I mean the blue and purple kinds. The L. Cardinalis is a tall growing, splendid crimson flower, and should be planted among other flowers, but the other Lobelias may be set to fill beds by themselves, or be used to fringe taller plants. They are sufficiently different in color from the Heliotrope to contrast well with it, and they, too, last till very cold weather.

Nemophila is well known and much praised as an annual bedding plant. It needs a moist, rich soil, and must be carefully nursed to yield a large supply of flowers. It is better as a pot than a garden plant.

Nierembergia is recommended for bedding out. I do not like it for that purpose, but find it capital to plant among stones and rocks and to use as a hanging plant.

Candytuft may be used for bedding out in a succession-bed very well. The yellow grows tall, and has a curious, orange blossom, larger than that of any of the others. The white, purple, and crimson, planted in concentric circles produce a very rich effect. The plants must not be crowded, but set from 4 to 6 inches apart each way. The seed vessels must be cut off before they grow. A Candytuft bed does not remain in full bloom more than three weeks. It is a good plant to set in a bed as the bulbs are passing away, where the bulbs are to be reset in September, when the glory of the Candytuft is gone.

Do not neglect Petunias. They are such strong and coarse growing plants that we might at first doubt the possibility of getting much color from them, but they may be relied upon for that purpose, and for a long time. Do not get mixed seed, except for planting in a mixed bed. They are not good for small beds, and attain their full beauty only in the mixed bed, where they may be allowed to fringe some plants, and hang their blossoms over the edging, on the grass. They gain fragrance as the weather grows cold, particularly the white, and give it off freely on the cool nights of September, when they may be perceived at a great distance.

Calceolarias are very good bedding plants for the mixed bed, as they are inclined to be tall, but few of them will bear the heat of our suns and the dry summers; the common yellow is a very good variety; the flowers are small, but have a fine color.

Ageratum may be planted from seed each year, or started in the greenhouse and hotbed; it may be pinned down in a separate bed, or be grown in the mixed bed, where it properly belongs. It is in full blossom towards the last of the season, and continues so till hard frost.

Anagallis is a pretty flower and may be used like Lobelia; get it from seed in the hotbed.

Cuphea is much used for bedding; more for the color of its leaves, which are a dark, reddish green, than for its flowers, which though red, are insignificant.

Cinerarias are not as good for the garden as for the greenhouse, but they may be used in beds by themselves, and allowed to grow as high as 18 inches. Their shape and colors would allow of very brilliant effects. They are however averse to the dry heat of our summers and require a great deal of nursing.

Lantanas are excellent bedding plants. L. Sellowii is light pink, low growing and excellent for covering the ground with flowers. The orange, pink, and yellow Lantana is a large and coarser growing plant, and unless carefully pinned down should be set in the mixed bed.

The Maurandyas, purple and white, are vines, and very graceful over low wire trellises and screens. The flowers and foliage are both fine, and they begin to blossom as soon as they grow.

Several varieties of Mimulus are excellent for the mixed beds and for separate beds, when allowed to grow up 18 inches. M. atroroseus, dark rose; M. lanigii, salmon rose; M. lateritus, buff orange; M. pictus, rich crimson. If well managed they remain in blossom for a long time.

The varieties of Nasturtium hardly need to be described; their colors range from light yellow to deep crimson. The Tropeolum is of this family, its flowers are small and abundant.

Antirrhinums are not enough known or appreciated; they grow from 18 inches to 2 feet high, are hardy, and seed should be planted in August for the next year. Cover for the winter. Their colors are varied, some pure, some mottled and striped. Planted in masses they look well. The best varieties are propagated by cuttings as well as seeds, and it is only in this way that we can be sure of their color. They should be potted before winter sets in, and kept over in cold pits; give light and air in spring, and start a moderate growth under the sashes before setting out. They continue in blossom for a long time; there are catalogues containing the names of a great number of varieties valuable for form or color.

An admirable mode of planting these flowers is in a round bed set about 1 foot apart in alternate rows, in concentric circles, either darkest in the centre and shading to a white edge, or the reverse, producing the effect I have before mentioned. The illusion could be increased by having the darkest plants the lowest, and gradually increasing the height through the different shades. When in flower the green leaves are below, and the bright colors of the blossoms alone show on the surface.

In selecting Geraniums, be careful to get those which are sun-hardy. All the Tom Thumbs and Horseshoes will bear the sun, also the Rose Geranium; one or two of the variegated-leaved species are hardy, but their value is not in the bed, but as shrubs or among shrubbery where their green and white leaves are relieved against other foliage. The lemon-scented Geranium is of value as a green, for its fragrance. The oak-leaved, sage, and nutmeg, and others with fragrant leaves endure the sun very well, but all the choice fancy kinds are too tender.

The question may be asked what difference in planting there should be between the single and the *mixed* beds.

In the *single* beds all the plants should be of the same height and shade of color. When a house is elevated on a broad esplanade, which gives room for flower-beds, they should be of this character. Directions for making them in the lawn or garden have already been given.

The mixed bed demands a mixture of colors and a variety of sizes, and permits the mingling of different plants of the same color or size, in the same mass. Thus to get a mass or band of crimson or red, we may mix together, Geranium, Antirrhinum, Salvia, Candytuft, Lobelia cardinalis, etc. For blue or purple, Heliotrope, Candytuft, Lobelia, Antirrhinum, Ageratum, etc. For orange, Candytuft; for yellow, Antirrhinum, Calceolaria, Yellow Flax; for white, Candytuft, Petunia, Sweet Alyssum, Antirrhinum.

Mixed beds are generally more desirable than single ones, as the latter are difficult to keep in perfection for any length of time, and in *our* flower-garden I have therefore made use of them.

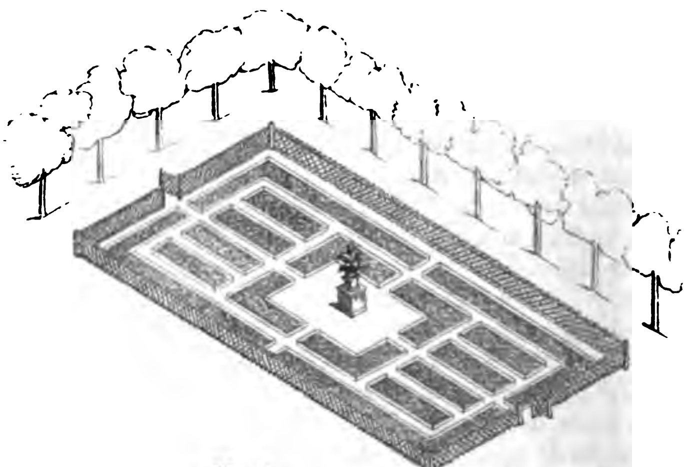
It is not unusual for those laying out flower-gardens to copy designs from books, forgetting that such designs, if ever good for any thing, were intended originally to suit certain peculiar localities, and that they cannot properly be transferred to different ones. Unless you not only make your bed the same shape with the original one, and plant it with exactly the same plants, but also make its surface and surroundings the same, and the point of view from which it is seen, you cannot expect to attain the intended result.

Sometimes designs are made up with directions for staking, planting, etc. At one time a man made a large sale about Boston of separate patterns of this kind. Such plans are nearly worthless, not only for the reasons above stated, but because they are generally too intricate to be used to any advantage in ordinary gardens. They are copied from the geometrical plans of European gardens, which were made up without regard to cost, and very probably, also, with little regard to taste, intended merely as accessories to some extensive place, and wholly subordinate to some grand architectural design. Probably much of the plan was worked out with colored stones and gravel. Then, too, such elaborate designs require perfectly level ground, while generally the beauty of a flower-garden is much increased by unevenness and irregularities of surface.

So that a design which looks very pretty on paper, and may have been well enough and harmonious in its original position, will be often stiff, awkward, and bad when transferred to another, and would be condemned even by its designer.

It seems a simple thing to design a group of beds, and so perhaps it is, but it is not so easy to adapt such a group to any particular spot.

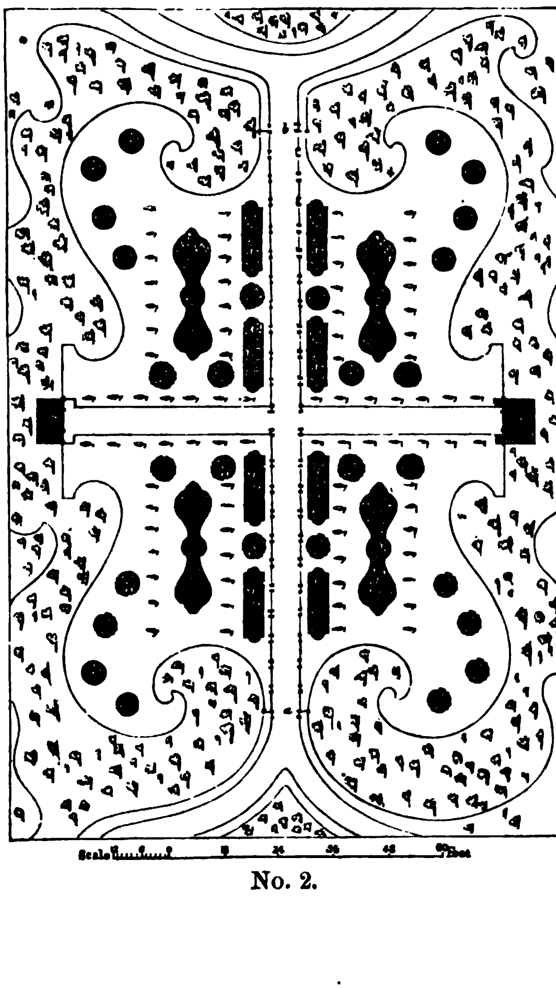
Designs for Rose-gardens, or rosariums, stand in rather a different position from those for other flower-beds, and I shall give some, as I promised in June. In these the exhibition of the single plants with their peculiarities, and of the full beauty of their blossoms, is the great object; accordingly the general effects of form and color in the mass, are of secondary importance. Roses in themselves are eminently graceful, even when elevated on standards, yet often the most formal groupings are necessary to show them to the best advantage; the combination or group varying with the especial effect to be produced.



No. 1.

In a general collection of shrubs we seek for a *tout ensemble* to which color, form, variety of foliage all conduce; but in a collection of Roses intended to do justice to individuals particular care must be taken to bring together only those plants which are especially able by color or habit of growth to develop the peculiar excellencies of the other members of the group.

The most remarkable Rose-garden in the world, considering its size and publicity, and the number of specimens, is the *Jardin du Luxembourg*, at Paris. It is depressed below the public promenade, so that it lies beneath the eye of the visitor, and the flowers are massed with a view to this fact. The Roses are planted in long parallel beds, edged with Box, 7 feet wide, containing two rows of plants, dwarfs and standards alternating, and the dwarf of one row



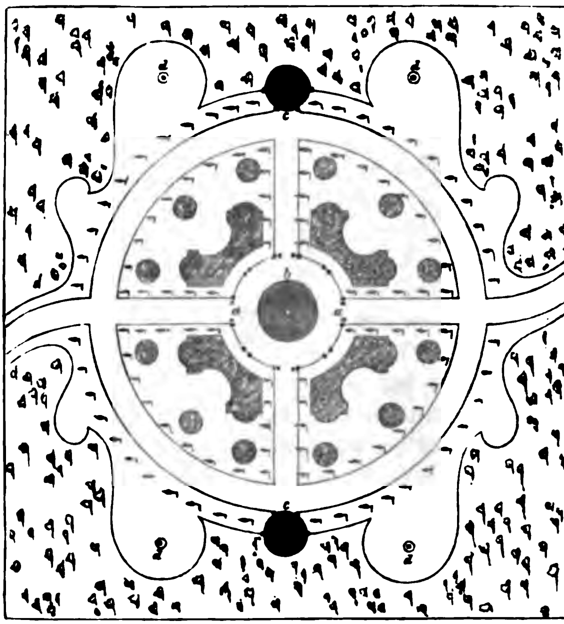
No. 2.

corresponding in position to the standard of the other. In this garden there are 1,800 specimens.

The ground plan, No. 1, taken from Paul's "Rose Garden," shows one of the Luxembourg gardens.

No. 2 is a design made for W. Paul by two distinguished English landscape gardeners.

No. 3 is another, made by the same persons, for Mr. Paul.



Scale ... Feet.

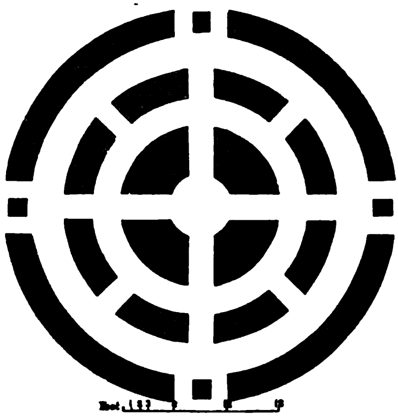
No. 3.

They say: "In the designs for rosariums we have arranged the whole of the beds and standard Roses as near each other as they should be placed, even in the most limited situations; but in situations where a little more space of lawn can be allowed, it will be better to keep them more apart."

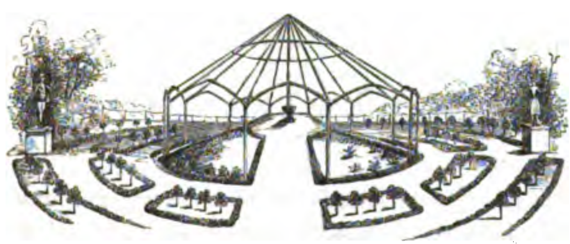
"The arcades *a b*, in No. 2, *a a*, in No. 3, are for the purpose of exhibiting climbing Roses, which, we need not say, will produce a very imposing effect." *b*, in No. 3, an aviary; *c c*, covered seats;

d d d d, Weeping Roses, the outside of both surrounded with shrubs. "In order to make the rosarium as interesting as possible, the beds might be planted with bulbs to precede, and annuals to succeed, the Roses."

Nos. 4 and 5 are ground plan and elevation of a Rose-garden of John Warner, Esq., at Hoddesdon.



"The earth in the four beds which compose the inner circle is raised about 4 feet above the level of that which surrounds it, and upon this is built a temple, the frame-work being formed with iron rods. It is covered with Climbing Roses of various kinds. There are eight plants in each bed. The temple is shown when the Roses have been pruned, but is quite covered with them in summer. The diameter of the first circle is 26 feet, of the whole 48 feet. A hedge of Scotch Roses



surrounds the whole, over which we look upon an extensive lawn, with various plants showing in the distance."

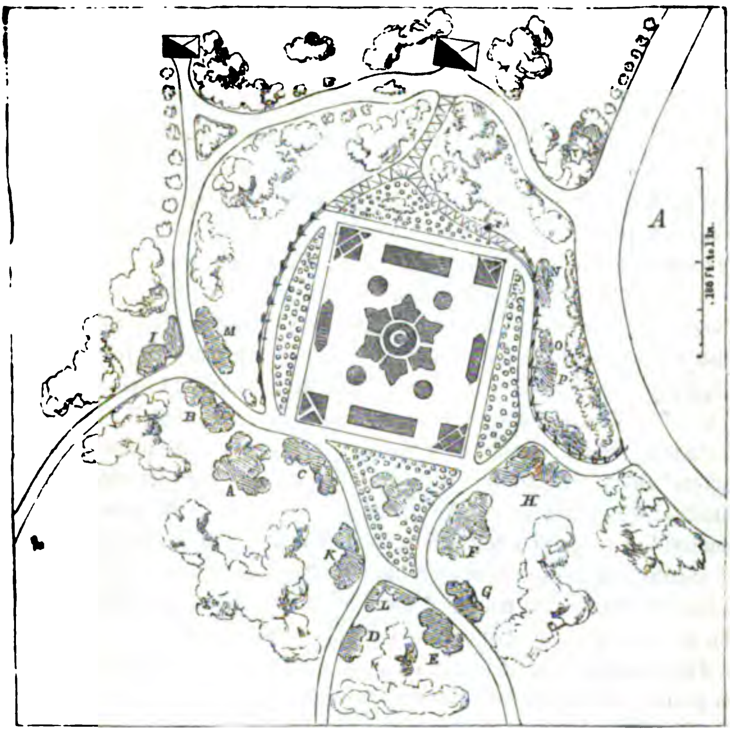
This is not a large garden, the whole number of Roses not exceeding 300, though I should think this number would hardly do justice to all the families. Our amateurs, who think of the prices they have to pay at nurseries for plants, may at first be discouraged by this number, but by ordering such plants as they want from English or French nurseries, they may reduce the cost very much. $20 a hundred would cover the whole expense.

I cannot say that either of the designs I have selected from Mr. Paul's book suits me, or would, in my opinion, answer for our limited gardens. The two designs I give are very different in character. A, represents part of a plan of several acres, two of which are devoted to house, shrubbery, rosary, and flower-garden; the latter is formal, and in its centre is a fountain. The flower-garden is about 3 feet lower than the house; the walk leading to it is covered with a wire trellis, to form an arcade, and is covered with Running Roses. On either side of the garden the walk is guarded by posts and chains for Weeping Roses; the index shows how the other Roses are managed. Some, as shown in the single specimens, are planted for general effect, without regard to families; others are arranged in families, which are grouped together somewhat according to their general character and resemblances. Outside the Roses are groups of shrubs and trees. B represents a small place, whose whole area is but one acre; it is managed upon much the same principle with the last, and the index shows how it is planted.

The treatment of the rosary has already been extended beyond its proper length, in justice to other subjects, but I cannot yet leave it. No class of plants deserves and demands more attention.

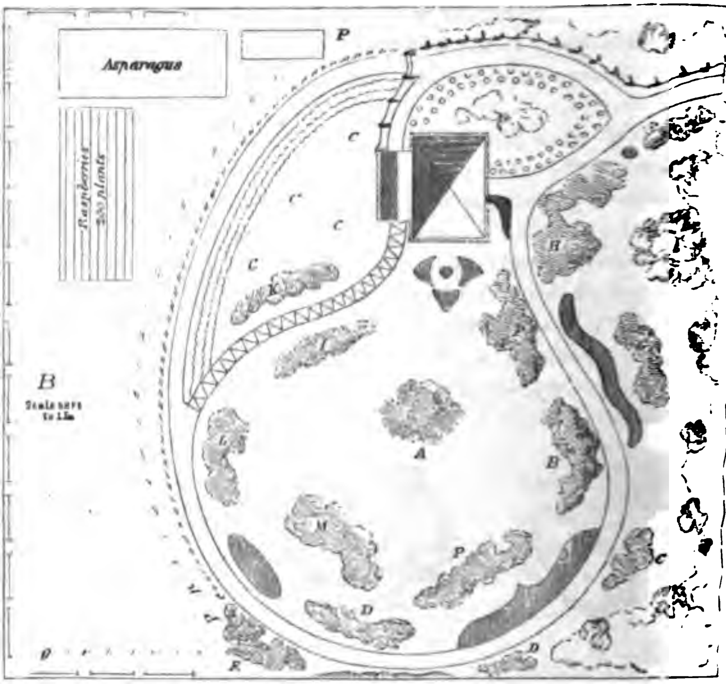
Each year new Roses are offered for sale of various degrees of excellence; most of them originated by French growers. The English do something in this way, but not so much, and Americans still less. Amateurs, accordingly, may find exercise for their time and energy in this direction. Our nurserymen are too much occupied in forming a general collection to devote the requisite time to improving the Rose. It is a long process; often several years from the sowing of the seed to the attainment of the perfect flowers, and during all the time constant care and attention is necessary.

The most promising field for effort is the production of Perpetuals. The list of these is large, but many of the specimens are of but little value; and we are especially poor in choice wall and pillar Roses.



Ornamental Trees.
Roses in Chains.
Roses on House.
Roses in Arcade.
Roses in Combination.
Roses in Families.

A Provence Rose.
B French Rose.
C Moss Rose.
D Scotch Rose, and Austrian.
E Hybrid Perpetual.
F Tea Scented.
G China.
H Bourbon.
I Hybrid Bourbon.
K Hybrid China.
L Damask.
M Alba.
N Evergreen.
O Noisette.
P Ayrshire.



Ornamental Trees.
Roses in Chains.
Roses on House.
Roses in Arcade.
o o o o Roses in Combination.
Roses in Families.
Espaliers.
P Pears.
p Peaches.
c Currants.
g Gooseberries.
Raspberries.
Strawberries.

A Provence Rose.
B French Rose.
C Moss Rose.
D Scotch Rose, and Austrian.
E Hybrid Perpetual.
F Tea Scented.
G China.
H Bourbon.
I Hybrid Bourbon.
K Hybrid China.
L Damask.
M Alba.
N Evergreen.
O Noisette.
P Ayrshire.

Before beginning the work of producing new varieties, the amateur must have clearly before him the object he wishes to attain. I will quote again from Mr. Paul, what are the points of excellence to be sought.

"Habit of the trees. Form of the flowers; color, scent. Freedom, constancy, and duration of flowering.

"Habit. The growth of a tree should be free. It is immaterial whether pendulous, branching or erect, as all are desirable; handsome foliage is important. The offspring of tender Roses may be rendered more hardy by intermixture with hardier sorts.

"Form. A Rose may be equally good whether cupped (1), globular (2), compact (3), or expanded (4). But of whichever form it may be, the petals should be thick and smooth, and the outline circular.


1


2


3

"Color. This, of whatever shade or color, should be clear and full. The thick petalled Roses usually present us with the richest tints; such are therefore desirable for this reason, as well as on account of holding their flowers perfect a longer time than others. Vary the colors as much as possible.


4

"Scent. All Roses should be sweet; there are indeed but few kinds that are scentless, though the degree of fragrance varies much.

"Freedom, constancy, and duration of flowering. Some Roses are most profuse bloomers, presenting a splendid effect on the tree, but separate are poor and flimsy. Others produce a less quantity of flowers at one time, but a regular succession from which a good Rose may be gathered at almost any time during the season of flowering."

Then the flowers of some are very transient, lasting but a day, others will retain their form and color for a week. These properties are inherent, for all kinds are not influenced alike by the state of the weather.

We should seek to combine the varieties which possess the above named qualities in an eminent degree.

The next question which arises is; do certain properties proceed more from one parent than another? if so, which, and what are they? It is the opinion of some vegetable physiologists that the offspring assumes the habit and foliage of the male, while the flowers are influenced more by the female parent.

This, however, is not proved, and all such questions are to be met and settled by each person for himself. One thing is certain, that some varieties produce seed more freely and certainly than others, and therefore in beginning to improve you must plant in light, deep, well-drained soil, in separate localities, the plants of different varieties most inclined to produce seed. These do not require the same amount of cultivation as those which we grow for flowers; indeed they incline more to seed if not vigorously pruned. As flower buds show, remove most of them, so as to give those that remain a larger supply of sap, in order to ensure more perfectly developed seeds. When the bud expands, hybridize as previously directed. After this operation shelter the impregnated Rose from the wind and rain for a few hours; the pistil being fertilized, the Rose will soon lose its petals, and the seed vessel will continue to grow. Give it all the care it needs for the rest of the season, watering if there should be a drought. When the hips are ripe, and have turned from red to black, cut them off, put them into a glass vessel, and set it in the sun, or hang them up in paper bags in a dry place, till they are perfectly dry. Keep dry till used. The best way is to start the seeds in frames, but if we do not have room to spare, the hardy varieties should be sown in the autumn, that the hard shell may be affected by the frost; the rest should be saved till the last of April. Then select a place warm and sheltered, but open, well drained and airy; prepare a seed bed by thorough spading; lay the earth into narrow beds that the middle may be easily reached from either side. Sow the seed in drills 1 foot apart, and cover with about an inch of soil. Beat the earth compact, and water the bed a little; strew over the bed lime or soot to keep away slugs. Rose seeds germinate with difficulty, some not appearing till the second year. Their germination may be hastened by soaking in hot water, or by exposure to frost in the bed. I should have mentioned that before sowing, the seeds must be taken from the hips, which are often very hard and hold the seed tenaciously, and must be broken in pieces by hand, or soaked till they are soft enough to allow the seed to be taken out. When the plants get above the surface, protect against birds and worms. Watch the bed carefully, weed the rows, loosen the earth about the young plants with a sharp, fine pointed stick, being careful not to start the hold of their roots. Forward the growth of the seedlings in every possible way, by weeding, hoeing, and liquid manure. They will soon grow rapidly, and the foliage of each will assume its peculiar shape, which will enable you to decide to some extent to what family it belongs, though the flower may sometimes contradict the leaf.

As they grow through the season, the Remontants will be very likely to throw out flower buds. If the plant is strong, and it is not too early in the season, let the bud develop; it will show the color and character of the flower, though not its perfection, which can only come after culture. But if the plant is weakly, or the season late, pinch off the bud. The summer Roses will not show buds for a year or two.

When the plants are well grown, by the last of summer, carefully transplant into new beds, still keeping the different varieties separate. Transplant with care, in order not to disturb such seeds as have not germinated. On the approach of winter, cover the seedlings with leaves or straw, not too thickly, but enough to protect them from the sun and frost.

The next year prune somewhat, guided by the growth of the preceding year. The Remontants will be likely to blossom in June. If so, mark those which show most promise, and when their buds are well established, bud into strong stocks, as the Dog Rose, or Sweetbrier. This will bring the Rose to perfection much sooner than the parent plant.

You see this will be a work of several years, and after all, you may not get any improved kinds. But you must not decide against the seedlings until the most promising have been well manured and cultivated for as many years as those which have been named, and have taken high rank, as the after culture of seedlings often produces marked changes in their character.

To succeed well, the cultivator should each year plant some seed, that there may be something coming on each year, and that there need be no awkward gaps. Should you succeed and get a first-rate new Rose, you not only will have the satisfaction of success, but you may have the profit of a large pecuniary reward, for they command high prices.

Remember always that you cannot have perfect Roses without great care and attention. You must study varieties, and cultivate and prune accordingly. One kind will be killed by the very treatment that will perfect another. One Rose may be forced into blossom by vigorous pruning; another would be driven by the same, from flowers to leaves. In my first analysis of Roses, I gave some directions for pruning the different families; I will now show you how Mr. Paul prunes, premising that I have no room to specify the varieties to which the different kinds of pruning are best adapted; that must be decided by each person when he has his Rose before him.

If you buy a Rose, give it a good situation and good culture, and when it makes its growth you can see how to treat it.

Weeping Roses, like the

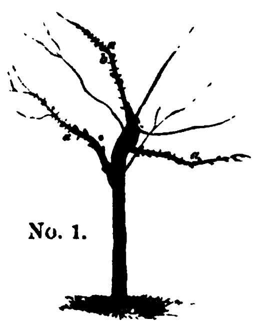
accompanying cut, are so beautiful that it is hard to decide between their claims and those of the Pillar Roses, of which we had a specimen in June; and we turn from them to such standards as our next cut presents, bewildered at the sight of this new competitor for the palm; and for my own part, I give the preference to the dwarf over the standard at least, and I especially wish to see naturalized the Evergreen and the Trailing Roses, which trail over rocks and creep up tree stems as freely as Woodbine, or Celastrus scandens. Why should they not be grown here as well as in England?

The Wall Roses which we ordinarily cultivate, the Prairies and Boursaults, are not equal to Noisette, Ayrshire, Multiflora, and Evergreen, for beauty and variety.

The following directions for pruning, and plates are chiefly taken from Paul's "Rose Garden."

Long pruning is the treatment mostly applied to the Hybrid Chinese, and the vigorous varieties among the Moss, Damask, Noisette, and Perpetuals, which form large heads of rather loose, but not ungraceful, growth.

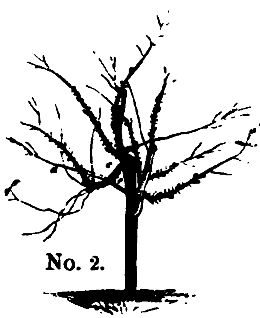
Suppose that we have a standard Rose with two buds, and it is in the spring, after the buds have made their first growth. "We shorten the shoots that remain at the termination of the dark shadowing, *a*, No. 1. Seven shoots is the greatest number that should be suffered to remain on the young plant, and generally even a smaller number is preferable. One or two should rise perpendicularly from the tree, and around this or these, all others should be regularly disposed, and the more equal and greater distance that can be contrived from shoot to shoot, the better. The shoots, whenever they arise, should have a tendency to grow from the centre, for if they grow towards it, they will eventually cross each other, forming a confused and crowded head, No. 1."



No. 1.

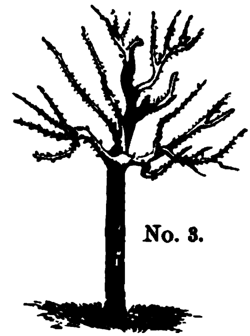
"When shortening in, the lowest shoots should, where practicable, be left the longest, and others may be shortened in closer and closer, as we rise towards the summit of the tree. The centre branch will, from its position, command a fine supply of sap; it is likely that it will maintain its ascendency. Now the shoots shortened closest will (other things being equal) produce the strongest growth, with the greatest tendency to arise perpendicularly, and thus the head is formed as desired. In shortening the shoot, we should insert the knife at *b*, on the opposite side of the shoot to that on which the bud next below is placed, and we should cut in a direction slanting upward, about one-eighth of an inch above the bud."

"No. 2 represents the tree after its second summer's growth. To prune properly, you must not only look *at* the tree, but *through* it, and from many points."



No. 2.

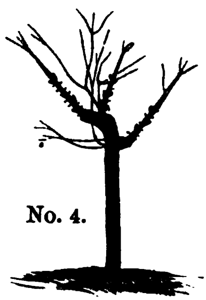
"It will be observed that the shoots are left of greater length than the previous year's pruning. 1st, the plant being established, will have a greater command of food from the soil. 2d, having been put in the right course for formation last year, in this pruning we have an eye for flowers. The centre shoot, left last year, is shortened, in order to keep the head compact. No. 3 is a fair illustration of a full-grown tree to which long pruning has been applied.



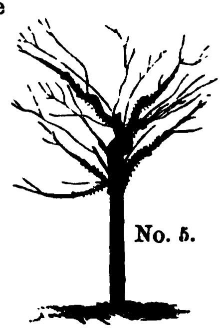
No. 3.

"The Damask Perpetual, the Chinese, the Tea-scented, the moderate-growing French and Bourbon Roses, are to be close pruned. No. 4 represents a plant of this description.

"Here we have a crowded head the first year. The shoots are of less length than before, but more numerous. Thin as before, but less severely. The shoots may stand closer to each other here, because those they give birth to will be less robust, and will produce

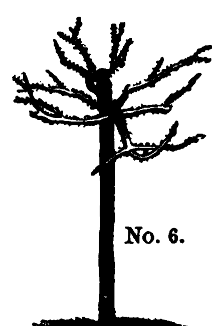


No. 4.



No. 5.

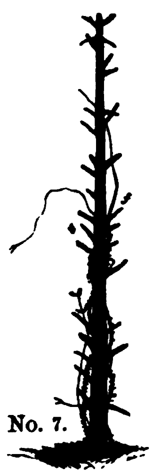
smaller foliage. The shoots left after thinning, are shortened in closer than in No. 2. If a summer Rose, it will not bloom the first year, but if an autumnal, it will assuredly bloom the first autumn, and probably during the summer. No. 5 represents this tree taken from another point of view, as it appears the next year. We thin out in autumn, the shoots shown by the single lines, and shorten where shaded, in spring, as before. This we do, on the supposition that it is an excitable kind; if not, we complete the operation at once, by



No. 6.

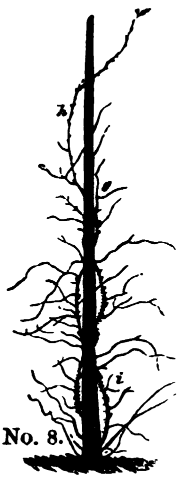
shortening in the autumn." "Most persons prefer plants budded in two places; we have therefore given examples of such; for my own part, I like a plant with a single bud best. It is enough for every purpose, and the head is more easily fashioned."

"No. 6 represents a perfect tree, which has been *close pruned* for several years." It would seem that a modification of long and close pruning would be necessary for some varieties, and so it is; but practice alone can inform us correctly which they are. The plan of pruning must be regulated in some measure by the object sought. There are particular forms which Roses are capable of taking, and they can be led into these by pruning and training. No. 7 is a pillar Rose, with five shoots. It had only three when planted, and these were soon cut close to the ground, to induce a vigorous growth. We now cut the three shoots shown by the single lines, and shorten the others to *f*, as indicated by the shadowing. After pruning, the branches should lie at full length on the ground, and be fastened down with little pegs, to prevent them from blowing about. Owing to the recumbent position, the buds will break regularly the whole length, and by the end of April they may be tied up to the pole, either in an erect position, or twined about it. A good stake answers every purpose for the first two or three years, when the pole may be set (Red Cedar), with the branches cut off at irregular distances from the stem."



No. 7.

"No. 8 shows the same plant the next year. We begin to prune at the bottom of the pillar, by thinning out the vigorous shoots. This must be our aim, for it is easy enough at any time to extend the growth, and thus increase the height. We ascend the pillar, thinning more thoroughly as we approach the top. There we select one or two of the best shoots, to continue the ascent, and tie them up. The small laterals are now cut back to 3 or 4 eyes. If any spot is thin, we cut back to 1 or 2 eyes, and thus get strong shoots to fill the vacancy the next season. By the third spring we find them of considerable height, and in every condition to produce an abundant bloom."



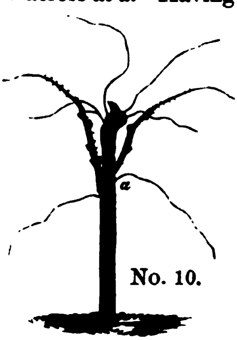
No. 8.

"We continue this treatment till the pillar is covered; it should not be more than 12 feet high. Pillar Roses send up strong shoots from their roots each autumn; these should be cut out; but one or two may be left to replace old shoots, now losing their vigor. The old branches will not maintain their vigor for many years, and must be replaced. Keep the poles sound. No. 9 represents a perfect pillar Rose; its main branches have not been twined about the pole, but the practice is a good one."

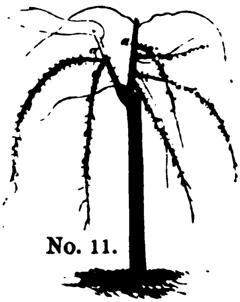
No. 9.

Climbing Roses require about the same treatment as the pillar Roses, with rather less pruning. Close pruning is not desirable for either kind, after the plants are well established, if we want masses of bloom.

No. 10 gives a fair specimen of a Weeping Rose one year after budding. Cut the shoots in close the first time, to induce vigor; we remove the upper bud entirely cutting the stem across at *a*. Having removed the upper bud, we thin out the two shoots marked by single lines, and shorten the others to the dark shading. The new shoots will push from them vigorously, and soon reach the ground. No. 11 represents the tree the second year. Continue the operation as before, but shorten less. Single flowers will be occasionally produced, and the following year these short, bloom-bearing branches may be spurred to about two eyes. After this there is little difficulty in bringing he tree to perfection. About the second or third year it is necessary to attach a

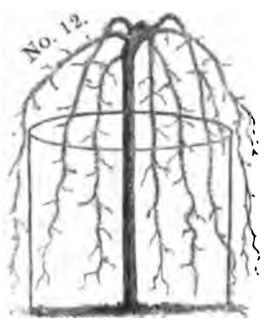


No. 10.



No. 11.

hoop to the head of the Weeping Rose, to keep the branches from injury by the action of the wind, and to assist in managing them properly." No. 12.



"After a Rose-tree of any kind is trained to the shape desired, if it is healthy and vigorous we prune, so as to increase the size each year. This *must be* done with vigorous kinds, or they are over-pruned. It should be done with the moderate growers, for as the roots extend their growth, and the stem increases in size, the plant is capable of supporting a larger head, and perfecting a greater number of flowers. This increase of size must be accomplished by *thinning;* thin out well, *leaving shoots at the farthest limit of the plant, that is consistent with its being well filled from base to summit.* In pruning Roses that have attained some age, it may be necessary to remove a branch or two occasionally, to keep the head from becoming straggling and misshapen. A saw, sharp, fine-pointed, and close set, will be found useful here, as well as in removing small shoots, which from this position it may be difficult to remove with the pruning-knife, and also for cutting away dead branches. After using the saw, dress the wound smoothly with a knife."

No. 13.

"No. 13 shows an old plant whose head is dying. To recover such plants, cut back as shown. To remodel the tree, the main lower branches must be cut well back; the lower part of the branches will show no apparent buds, but they exist latent, and by cutting back they will be forced into activity."

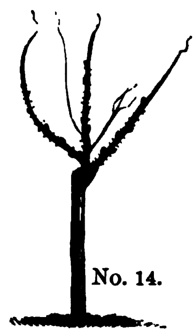
Trees that have become weakly, are much improved by close pruning; so are those small growing kinds, which flower so constantly that it is rare to see a shoot that is not terminated with flowers.

To do justice to autumnal Roses, they should be pruned a second time in summer, just after flowering; or, if the summer flowers are not much valued, just before flowering; by this practice their vigor and beauty will be much increased.

But while thinning and shortening are all important, disbudding is a yet more effective agent for producing flowers in the finest possible condition, for keeping the plant in full health and vigor, and for bringing it to its highest point. It is evident that the more vigorous in habit a plant is, the greater the space to be left clear from bud to bud, to allow shoots room to develop.

Young plants, judiciously disbudded, become more finely formed than by thinning and shortening alone.

No. 14 shows a variety of Rose which is very thickly furnished with buds. It is apparent that all these buds cannot be developed. To decide which to remove, remember that *the tendency of all buds should be outward; and the farther apart they are*, with in just limits, *the better*. Should two buds threaten to cross or crown each other, the one taking the least favorable course of growth should be removed.


No. 14.

"The summer kinds, disbudded or thinned in summer, usually continue to elongate from the ends of their shoots; the autumn push forth the entire length of the shoots when the second flowering is complete; the trees are improved in both cases, for the shoots grown at this season of the year will produce the finest flowers the next year."

CHAPTER LXXIII.

KITCHEN-GARDEN.

HOE the advancing crops, to kill the weeds and stir the soil. Watch weeds narrowly, for each day one grows your land is so much the poorer.

Plant out the last Celery, and if the first planted is well grown, hoe it a little.

Gather the Peas and Beans as they are fit for table. String Beans will be fit for the table by the middle of the month. As the early Lettuce goes out, other Salads will gradually take its place.

Thin the Gooseberries the first of the month, and use the berries you remove for cooking. Those that are left will grow the better. If you wish to increase the size of any particular Currants, pinch off the end of the shoots an inch or two beyond the berries; this will throw the sap more abundantly into the fruit, and increase it very much. The Currants will be red and nearly ripe by the middle of the month, but very sour; the longer they hang on the bushes the sweeter they become. The white varieties will be found sweeter than the red, at the same stage of maturity.

As soon as the Strawberries are entirely gone, weed the bed thoroughly, and you can have a new bed with but little trouble. If the bed is large, mark out through its length by the garden line, sections from 2 to 3 feet wide, and 18 inches apart. On these sections wheel a little old manure, lime, and ashes; dig the whole in, vines and all, very deeply; trenching will *pay*. The plants left in the rows will immediately throw out suckers into the new earth from both sides, and will before autumn entirely fill it. When it is full, that part of the bed that was at first left, may be dug up and kept open for the next two years.

Covering the bed with a mulch of tan in the autumn or early spring, is thought to conduce to the welfare of vines and fruit; it will be dug in at the present time, if a new bed is made as directed.

The Raspberries have been growing with rapidity; it is the new wood, or the spurs which have branched out from last year's canes, which will bear fruit, but it is the new canes which have grown this year which will bear fruit next. These canes should be tied up as they grow, and before laying down in the fall all that are not wanted for next year must be taken up. Those taken up can be planted in trenches in the cellar, or buried in the open ground, to be planted out anew in the spring. As soon as out of bearing, cut out the old wood which bore the fruit.

Thimbleberries will ripen a little later than Raspberries. They send up new canes for next year's growth, early in the summer. But unlike those of the Raspberry, these canes continue to grow till they reach over to the ground. The extremities will then, if allowed, send out roots, and thus make new plants, and this is the natural mode of increase. If we prevent this by tying up the long shoots to espaliers, we only injure ourselves.

Cultivated Blackberries will ripen the very last of the month. The long shoots should be trained as they grow, horizontally to trellises, and after a good growth has been made, the extreme end may be pinched. It will bear fruit from new spurs, which will start next year from the canes of this, and by training the shoots down this year the sap is made to settle more into the eyes, and makes fruit buds of them. This berry is very much inclined to run to wood, unless checked by this kind of training.

Sow Peas the last of this month, if you wish to have them in the autumn, but you must not expect a large crop. The earlier varieties are the proper kinds to plant.

The general crops heretofore mentioned must be carefully watched and hoed. Vines of all kinds are benefited by hoeing, but care must be taken not to bruise them in the process.

Pickle crops may still be planted early in the month.

Artichokes will be getting fit for eating now, and must be used at once. Some Okra will be fit to use the very last of the month.

Early Potatoes, planted in the open ground, will be ready to dig the third week in July, if not earlier, and after that you may rely on them for the table.

Summer Squashes should be used as soon as they are as large as your two fists. They must be taken young to be delicate, and if left till old are not acceptable even to hogs.

The latest Cauliflowers, those which are to be taken into the house for winter, must be set out now, before the end of the month.

The early Onions, both those planted from pips, and those in beds carried through the winter, will be fit to pull the middle and last of the month.

Early Cabbages should not be pulled up, but cut off the stump, which, if left, will give new growth for greens till late in the autumn.

Sow some Spinach for autumn use. Transplant Endive, and sow small Salads from time to time; the last of the month sow Endive for winter.

Hoe Sweet Potatoes when they want it; weed and hoe the Root crops for the last time; after this they will cover the ground and kill all the weeds themselves.

Attend carefully to the espaliered fruit. During the month the Cherries, both standard and espaliered, will be ripe and gathered, and the other fruit on the espaliers will mature rapidly. Thin as necessary from time to time, and disbud. Remember that disbudding and pinching off will save much other pruning.

The Pears, etc., in the orchard, both standards and dwarfs, must be watched with care; thin much and often. You may rely on gathering from one to six dozen from each tree, and some large standards may bear several bushels. But you should leave only fruit buds enough to produce fine fruit.

July is a month for doing odd jobs about the kitchen-garden, and care should be taken to keep it all neat and tidy.

Next month will be time enough to plant seeds for autumn and winter vegetables. In July, if the bark will slip freely from the wood, Cherries, and other stone fruits, as well as Pears and Apples, may be budded, but August is likely to be a better time. I will then give directions in detail.

I have deferred till now, a description of the growth, propagation, and pruning of the Currant and Gooseberry. This is not a difficult or intricate business; but upon its being well done, depends in a great measure the success of these plants.

Figs can never be cultivated in this latitude upon a large scale, for our winters are too severe, but as curiosities they are desirable, and in a good location, with great care, a few specimens may be made to thrive and to ripen fruit.

Gooseberries are not so often cultivated as they ought to be.

The difficulties in the culture of the Gooseberry are mildew and uncertainty of crop.

The mildew, which seems almost enough to condemn them, is peculiar to some varieties; others are nearly exempt, but all are liable to it when in too wet or too shaded places, and when not well pruned.

The want of sufficient pruning is also the cause of the uncertainty of the fruit.

Most of the choice varieties come from Yorkshire, England, which is famous for Gooseberries. By buying the best Yorkshire varieties, which are said to be exempt from mildew, and planting in well-drained, deep, rich soil in an open, airy situation, and pruning well, you secure a good crop.

They must be pruned once or twice in the fall, winter or very early spring, and in summer. At the first pruning cut out at least one-half the bush, removing old wood rather than new when you can. By pinching back and thinning out in June, the size and flavor of the fruit is increased. To secure the finest desert fruit, the berries should be well thinned when about half grown; these "thinnings" are excellent for sauce and pies. It is a peculiarity of this berry that the same bush rarely produces the largest fruit two years in succession. Do not expect fine fruit unless you give plenty of manure.

If it were better known it would be a favorite; and undoubtedly, by hybridizing the English with our native varieties, some might be produced which would bear abundantly and be free from mildew. We have two native Gooseberries which are very palatable; one, Ribes' hirtellum, is small, berries not more than half an inch in diameter, very sweet, of a dark red color, and each bush bears enormously; I have gathered two quarts from one wild bush in a hedgerow; the other, Ribes' cynosbati, is a much stronger and coarser variety, berries $\frac{1}{2}$ to $\frac{3}{4}$ inch in diameter, covered with long, strong prickles, a good flavor, rather lighter red than Hirtellum, excellent for sauce, etc., and the bush large-growing.

The Gooseberry may be increased by seeds, cuttings, and suckers, but the latter never make good plants, while the first mature slower and often differ from the parent.

Cuttings should be taken from the wood of the current year with a heel of older wood in October or March; if in October, keep them till spring in a cool place not too dry; then plant in a border, moderately shaded, light, deep, and rich; but first cut off all buds which will be below the surface after the cutting is in place, otherwise they will come up as suckers some time or other. The medium-sized fruits are generally higher flavored than the larger.

In short, if you want good Gooseberries you must make yet another draft on your patience, and probably by this time you agree with me, that this same patience is an essential quality in a gardener.

Currants. — The Currant needs less care than the Gooseberry, and yet it demands great care and attention to bring its fruit to perfection. It is always unwise to plant the suckers of Currants, as they continue to sucker and bear but little and poor fruit. The argument in favor of using suckers; viz., that they are the plants' natural means of increase, is of no weight, as Currants can be propagated about as easily as Potatoes. Make cuttings of the last year's wood in the spring, or of the current year in October or November. Make the cuttings 4 to 8 inches long; cut off all buds which would come below the surface when the cutting is set, and set them 2 or 3 inches deep in a garden border, moderately shaded, light, deep, and rich. They will be well-rooted plants in the fall, and may be permanently planted out then, or in the next spring.

Currants are much benefited by thorough, but not severe pruning. Cut out about one-third of the old wood each year, and in June or July pinch back the new shoots a little; this increases the size and flavor of the fruit. The old Dutch Currant was formerly the favorite, but is now gradually giving way to new varieties; one of which, which promises to supplant all others, is the Cherry Currant, whose fruit is as large as a Mazzard Cherry and yields enormously.

No more profitable fruit can can be grown than improved Currants. As a table fruit they always sell well, and the demand for Currant jelly would be great could it be sold low enough to come within the reach of people of moderate means. I know that the fruit is not the most costly ingredient in the jelly, but its price must be counted as an important addition in the cost of the whole.

It is never wise to continue to cultivate the same bushes more than 8 or 10 years; more fruit can be got from younger plants. Mulching improves the fruit and enables the bushes to hold their leaves later in the fall. They are very grateful for generous dressing of manure well dug in.

CHAPTER LXXIV.

THE FARM.

Hot weather has come, and with it the hurry and chief harvest of the year, on all farms which have a large acreage of Grass or Grain.

Haying has more admirers, and is more dreaded than any other farm work. Some persons enjoy it, others detest it. I do not think it very hard work, on the whole. Coming in hot weather, it does, indeed, demand much endurance, and hand mowing is very tiresome except to those who are really adepts in it; in fact it is an *art* which can only be learned in youth; it requires a peculiar and elastic motion, best acquired by growing boys, and it rarely happens that one who makes his first attempt in his manhood gains any skill in mowing. But it is to be hoped that the days of hand mowing are on the wane, though the time can never come when it will be quite abandoned. The bulk of the work, however, can and should be done by machines.

But there is much other work to be done before we come to mowing, and while we are about it, and we will consider this first.

All the crops should be hoed a second time before haying is begun.

Corn is high enough to cover and shade the ground, and the Root crops have advanced to the third leaf, unless it be the later sown kinds, like Ruta Bagas. The Roots sown early this month, or late in June, should now be cleaned and thinned. If guano was sown with the young Turnips, the plants will soon hurry by the danger of the fly, and get their rough leaves.

It is because the Root crop demands care during haying, that New England farmers are so much prejudiced against it. The practice of good farmers has been to finish all their other work before they began haying, that there might be no interruption in getting that important crop; any work which cannot be so disposed of is very annoying to them, and they are not willing to entertain the idea of a crop, the most difficult work of which comes just in the heat of haying.

It is the custom to hoe the weedy crops on dark days, bad hay days, but it is a gain only in appearance, for weeds cut in such weather are sure to start again.

Haying should be over by the end of the first fortnight in July, the time for cutting varying a little with the variety of Grass. The bulk of experiments unite in setting the flowering season as the best time for cutting, as the Grass then contains the largest amount of untransformed sugar, starch, and gluten, and makes the most succulent and nutritious Hay. The weight, however, after drying, is less in comparison with the bulk, than when it is cut after the seed is nearly or quite mature.

We do not cultivate the Grasses for seed, but for straw, and should try to get the forage in its best condition for feeding out. Were we cutting the Hay to sell, on the rule "caveat emptor," it would be wise to let it ripen before cutting, as it would then be heavier and more profitable. It is a question whether farmers are bound to sacrifice their own interest to the supposed interest of others. If the over-scrupulous farmer were to carry to market a load of Hay cut at what he knows to be the best period, and consequently of light weight compared with its bulk, the purchaser would pay no more per ton than for Hay cut when the seed was ripe, and consequently weighing more than the other, and he would laugh at the farmer if he asked more than the market price of the latter for his superior Hay. It is much to be regretted that some standard cannot be fixed to regulate the sale of Hay, and enable both buyer and seller to get their dues.

The application of my remark that haying should be over in a fortnight, depends a little on the weather; but, with modern improvements, a very little. To begin with, Hay should be cut with a mowing-machine. These machines have been brought to such perfection that it is easy, with a pair of horses, to cut at least an acre per hour; some teams do much more. Therefore the farmer need not begin his hay-day blindly; he can afford to wait till the sun has fairly risen, dispelled clouds and fogs, and dried the dew. The dew being thoroughly dried off expedites the making of Hay very much. When a swarth is cut wet and laid in the sun, the upper side dries, but the lower remains wet, and must be turned before it can feel the sun; and until it is dry the other side cures but slowly, the evaporation of its juices being prevented by the steam which rises from the under side. But when the dew is off and the ground dry, the swarth laid over begins to evaporate its juices at once. Do not suppose that standing grass is as long in drying as mowed grass, for it admits air freely among its stalks.

Many days in haying-time begin with clouds and fogs, which puzzle the most weather-wise farmer; it is impossible to know whether they will break up or thicken. Now the scythe cannot be withheld till this is decided; its work must begin at 4 A.M.

The mowing-machine, however, cannot be used everywhere. Many mowing fields are too rough for it; but this is the fault of bad farming, — slovenly, ordinary New England farming, which neglects to drain and clear, and is careless about manuring. The farmer who condemns a mowing-machine because it fails in his hassocky, rough, stony field, condemns himself and his farming; and were he candid he would confess it. A field so cultivated as to admit of the use of a machine, pays for the extra labor by the increased crop, at least one-half ton per acre. Had I time I could prove that the space occupied in a rough field of loose surface stones, pieces of wood, and hassocks, is more than enough to shut out this amount of grass.

But supposing our land prepared for the machine; we send it into the field at 9 A.M. We have no enormous gang of haymakers to be fed, treated, lunched, coaxed, and driven. One man or boy drives the machine, which cuts and spreads the grass evenly. Two others are removing the hay-covers from the hay cut yesterday. By the time an acre is cut, one or two other men begin to open the hay that has been uncovered. In two or three hours the machine cuts as much as we can manage to-morrow. If we have a hay-tedder or spreader, we put one or two horses into it, and drive over the field, turning the hay ten times as fast and well as if done by hand, and at one-tenth the cost. It can be easily turned before dinner. The men who turned the hay may load some that is well dried, or may be employed in weeding.

After dinner the horse-rakes go to work, one or more, according to the amount of hay down. They first rake the dry grass into winnows, while the tedder is turning the grass cut in the morning. As soon as this is done, the horses are put into the hay wagons, and we load them with the winnowed hay which was perhaps cut yesterday, and at farthest the day before.

By 3 P.M., the horse-rake is again at work on the morning's cutting, while it is still hot. There are many varieties of horse-rake; which is best must be decided by the purchaser. On a clean farm the spring-toothed is most convenient, and costs no more than the others, but it needs two persons to manage it; Delano's "independent-toothed" is a good rake, and one man can manage it; but I prefer the "improved spring-toothed," also managed by one man, who rides, and elevates the teeth with a lever.

When the hay is raked, cock it and cover with hay-caps. The great gain made by using them is not half understood. Everybody knows that hay heats somewhat when cocked up, and would cure were it not that the night air and dew cool it. When covered it is neither cooled nor damped, yet its own steam or vapor passes off rapidly; consequently it makes nearly as fast by night as by day and is not injured by showers. Many reliable instances are given where Hay, cut and covered as here described, was left out in two or three days' severe rain, and found perfectly cured in the cock when the storm was over.

In all cases it is well to invert the cock in the sun for an hour or two before getting it in, that the bottom Hay may have a chance to evaporate any moisture it may have taken from the ground; but repeated and careful trials show that Hay put in cocks which would make 50 pounds of dry Hay the same day on which it was cut, covered and left to dry without being opened for two or more days, will cure into the best quality of Hay, — better in all respects than that made in the ordinary way. . For the bleaching and scorching of the sun removes many of the essential oils which give the Hay its peculiar fragrance and sweetness; while repeated turning breaks off all the delicate leaves and flowers, leaving only the coarser and harder parts, which are not easily broken and are much less nutritious. Rain, too, injures Hay that is not covered, very much; it changes its color, washes away the wax, which is very valuable, dissolves much of its essential oil, sugar and starch. The injury is in proportion to the extent of wetting.

Obviously, the process of making Hay is hastened if there is no dew to be dried off it; and if it is cocked up when heated by the sun, and covered so that it cannot cool fast, evaporation must continue, and when it is re-opened to the sun its drying does not *begin*, but is hastened.

Clover hay is most injured by repeated turning, its leaves and flower being so tender as to be broken by the least movement.

Hay made in the cock is nearly as green when fed out in winter as Rowen, or even as when cut; and Clover made in the cock does not lose the color of its blossom. In midwinter I have seen Clover-heads in Hay thus made, which at first sight seemed just picked from the field.

Those old-fashioned farmers who were accustomed to spend just so many days in making their Hay, who left it two days at least after cutting, and expected it to "look dry" when carted to the barn, would be frightened at the appearance of a barnful of well-made Hay. It would be so green that they would think it must have heated.

Well-dried Hay does not need much salt. 2 quarts to the load, or 4 to the ton is plenty; some salt is desirable to increase its relish, but it is very easy to put in too much. Hay should never go to the mow till it is dry enough to keep well without the help of salt. If it must be got in green, pains should be taken to ventilate it; and in large, deep mows and bays it is an excellent plan to build a chimney of Straw or other material in the middle, as in our plan of the barn.

To do this, bore through the floor in the middle of the space for the bay or mow many 3 inch augur holes within a circle of 3 feet diameter; set several bundles of Straw on their buts over these holes; pack Hay closely round these bundles, and when it is level with their tops set other bundles above them, but down; or you may draw up the first bundles a little after the Hay has been filled in hard around them, continuing the process till the mow is full, when the Straw may be left at the top or removed. The hole may be gradually narrowed as the mow rises. The cool air of the cellar will rise though the holes in the floor, as the escape of heated air from the Hay makes a draught through the chimney, and will ventilate and cool the mow. Do the same when you make a stack. After some months a cover may be put under the holes in the floor to exclude air.

A better way is to hoop a headless barrel on its inside, remove the outer hoops with the exception of those at the top and bottom, secure to the inside some ropes or straps, by which to haul the barrel up as the stack or mow rises, and use it as you would the straw bundles, it will last for years. A make-shift way is to set several poles on end in the middle of the stack, fastening their tops and spreading their lower ends. In our barn a permanent lattice-work chimney is built from floor to roof.

It does not hurt Hay to heat a little just enough to warm the mass, but if it becomes smoky it loses both in value and weight, though some farmers say that smoky Hay is just as good to feed out, though it does not sell well; they tell too much for their own argument; if smoky Hay wont sell, it is because it is not so good. Milch cows seem to yield as much milk when fed on it, but it does not fatten cattle, and it hurts the wind of horses.

There are many kinds of hay-covers; some of plaited rushes (imported from China), some of tarpaulin, some of duck, some of cotton cloth soaked in oil and beeswax. The *best* are the cheapest, and are made at some cotton mills for the purpose. They are of strong, closely woven, unbleached cotton; about 4 feet 6 inches square is the medium size. The largest covers are best — large enough to cover a 50 pound cock of dry Hay. The cloth should be chemically prepared to prevent its mildewing, and is then better than if oiled, for oil tends to decay the fibres. Into each corner tie a stout piece of tarred twine, in the loose end of which put a loop.

The easiest way to fasten the twine is to take the corner in the left-hand so that a few inches of it project over the cloth by the string; now double the end back into the hand over the string;

take the looped end of the string and tie it round the doubled end of the cover, in a noose or slip knot, and draw it tight. It will hold the corner more securely than any string you can sew on, and is quite as good as eyelets set into the corner (into which a string must be fastened afterward), and much cheaper. Have ready some stout, well-seasoned forked sticks of hard wood at least 6 inches long; hook the stick into the loop and drive the sharp end into the ground, when the cover is to be pinned to the ground. Iron pins permanently fastened to the loop are better but more costly. The wooden pins may be permanently fastened also. When you are about to use the covers, remember that a little care saves much trouble, and have ready a pile of them in the barn-floor. They may be bought fitted for use at 75 cents and needing only the strings and pegs for from 40 to 60 cents apiece according to quality. When ready for use they should be folded compactly. When wanted in the field pile them evenly into a wagon, hand-cart, or wheelbarrow and leave one to each cock; as the Hay is cocked up, some one should go over the field, spread the cover over the cocks, and pin the corners firmly to the ground. If this is well done they will, as I have said, bear a three days' rain; they shrink under rain and shed it like a roof. When the cock is uncovered, a man or boy should go round and refold the covers, a work which will not take one-half a minute for each. If this is done the pins are all secure, and the covers in a portable form. If a shower comes up it is a short job to send a horse and cart or men with a hand barrow round to collect and take them quickly where they are needed, and when unfolded there is no confusion, entangling of strings, or loss of pegs to prevent putting them on rapidly. If not well pinned down they are liable to be blown off, or cannot be drawn out tight enough to turn rain well.

Their use is not confined to the hayfield; for Rowen, stooks of Grain, shocks of Peas and Beans, Corn stover, piles of Apples, they are equally good, and when once introduced on a farm they are in as frequent demand as the shovel or wheelbarrow, and could be as ill dispensed with. I think they more than save their cost in a single season. If you cannot afford to buy a hundred, get a few at a time, and as you learn their value you will buy more. In winter dry them well, fold and store in a dry place.

With the aid of mowing machines, hay-tedders, horse-rakes and hay-covers, the uncertainty and difficulty of the Hay harvest is removed, and it may be undertaken and carried forward with speed and security.

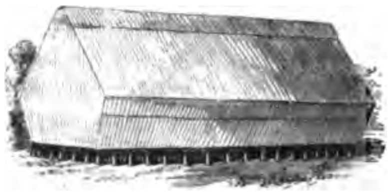
No good haymaking or "tedding" machine of American invention has yet been offered for sale; the English machine although efficient is costly and very heavy. It is the only apparatus connected with haymaking that remains to be highly improved. The time spent in turning Hay, shaking out swarths, etc., is a very considerable draught on the busy hours of haying.

A large fork, much like a dirt-scoop, has been invented, which can be shoved into and under the load, and then attached to a rope and pulley, so that the whole load is taken up and placed on the loft at one movement. Such an apparatus can hardly come into general use on small farms, as it involves considerable preparation; but some arrangement of grapnels might be devised for raising large masses of Hay at once.

With us the practice of securing Hay in stacks is not at all common where barns are available, — not so common as it might be, with advantage, I think. They are quickly and easily made, and Hay well secured in them keeps sweet and fragrant till spring.

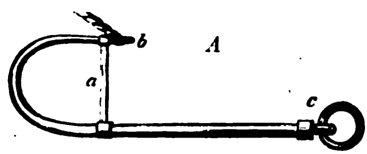
As a preparation for the stack, *stathels* (short piles) should be driven into the ground, or a low trestlework erected, strong enough to bear the weight, and high enough to protect the bottom of the stack from wet. When you determine to make a stack, endeavor to have ready the amount of Hay which will make it, or else be provided with a tarpaulin or sailcloth large enough to cover the stack, when suspended above it. Pitch the Hay from the loads to a man standing on the stathels or stack buts. With a fork he lays it round regularly, if the stack is to be round, along, if it is not, treading it well as he lays it, spreading it a little

as it rises, so as to make a round stack, egg shaped, a long stack something like the bottom of a ship, or the sides of a good home-made loaf, and contracting it again with an opposite slope for a top or roof to shed rain.

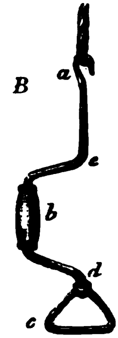


When the stack is finished, leave it for a few days to settle and shrink; then trim it well, and if straw can be had, thatch it; if not, take Ferns, Rushes, meadow Hay, or any long Hay, and beginning at the eaves, lay it quite round the stack in parcels, like shingles, rising tier by tier, and binding each tier as you go. Crown it with long straw doubled over the ridge. This, if well laid and secured, will shed rain.

To secure the whole, make a Hay rope, which is done by twisting long Hay together, one handful into and over another, twisting thoroughly. This method is very rude, and a rope much stronger may be made by the aid of throw crooks. Various forms of these are in common use. "A is a home-made crook of stout ash wood,

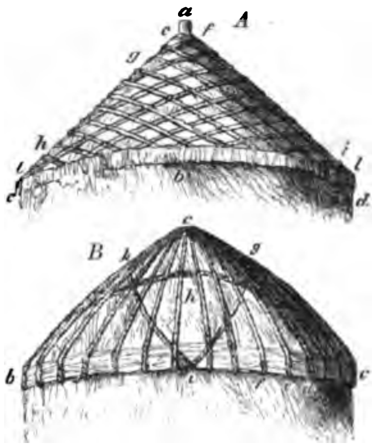


3½ feet long, the bent part of which is thinned off till able to be bent to a curve, and is there retained by the iron stay *a*, the part *b* being left beyond the stay as a point of attachment for the rope. The end *c*, is furnished with a ferule and swivel ring, by which it is either attached to the person by a cord round the waist, or held in the hand. B is a better form of the crook, where the strain of the straw rope is in a straight line from the hook *a* along the spindle *e* to the handle *d*: the left hand holds the swivel ring *c*, and the right hand causes the part *e b d* to revolve round the line *a e d* by means of the handle *b*, which is covered with a loose hollow cylinder of wood, the rest of the instrument being made of iron."



When the rope is made, drive a pin firmly into some sheltered part of the stack, to fasten the rope to, and finally bind and tie the whole together.

The cuts show different methods of roping the roof of a stack.



When you wish to use the Hay, begin on one side, and with a Hay knife cut off large slices at once, and haul them into the barn. By cutting large slices quite down to the ground, you will prevent the rain getting in, and will preserve the soundness of the stack.

The important points to be remembered in stack-making are to tramp and lay the Hay well. Salt as for Hay in the barn.

I think it would often be better economy to stack Hay than to enlarge our barns. But if you stack, remember to cut off the Hay and carry it into the barn, and not turn the cattle out to feed and shiver in the cold stackyard.


BOSSES, STATHELS, OR TRESTLES, FOR GRAIN STACKS.

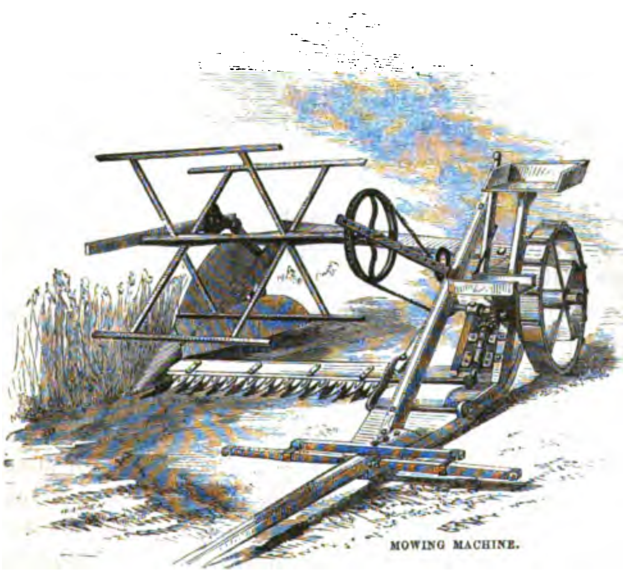
Some European farmers dig large pits and pack Grass into them as compactly as possible, salting freely, and covering over so as to shut out air when filled. The Grass keeps greener, and they think sweeter than under the common methods; but the amount of salt must be injurious. Hay or fodder too much salted acts on animals as a cathartic, purging them violently, and awakening an inordinate and unwholesome thirst.

Grain may be stacked like Hay, but greater care is necessary in laying it in order, to secure it from rain. Hay may be packed uniformly, but there is danger that open spaces will be left between the bundles of Grain. " The stack should be built in this way: set up a couple of sheaves against each other in the centre of the stathel, and another couple against their sides. Pile other sheaves against these in rows around the centre, with a slope downwards, towards the circumference of the stathel, each row being placed half the length of the sheaf beyond the inner one, till the circumference is completed, when it should be examined, and where any sheaf presses too hard upon another, it should be relieved, and where a slackness is found a sheaf should be introduced. Continue the stack around, laying each sheaf over the interstices of the two below close to the last one, pressing it in with the knees, as is represented at *h*. When the outside row is thus laid, an inside one is made with sheaves, whose but ends rest on the bands of the outside row, thereby securing the outside sheaves in their places, and at the same time filling up the body of the stack firmly with sheaves. A few more sheaves may be required as an inmost row, to make the heart of the stack the highest part. It is an immense benefit to a stack to have its centre well filled with sheaves, as it is the heart sheaves which retain the outside ones in their places in the circle, with an inclination downward from the centre to the circumference, and it is this inclined position of the outside sheaves that prevents the rain finding a passage along the straw to the very heart of the stack, where it would soon spoil the grain." "As

the stack goes up the pitcher should preserve its shape, by shoving in the but of any sheaf which projects too far, or by pulling out any which are too far in." "The eave of the stack is formed according to the mode in which it is thatched. If the ropes are to be placed lozenge-shaped, as shown, the eave-row of sheaves is placed just within the topmost row. If the thatching-ropes are to run from the crown of the stack to the eaves, the eave-sheaves are made to project two or three inches beyond the topmost row of sheaves."

To fasten a rope, draw out a handful of straw from a sheaf, and wind the rope around it, and then push the end of the rope between it and the stack, or make a tie to the rope itself. Should a stack lean, prop it with stout stakes.

In commending mowing-machines, I said some hand mowing must be done; there will be corners out of the reach of the machine, headlands, etc., which must be cut by the scythe, so that it is necessary to hire at least one good mower.



MOWING MACHINE.

If a farmer cannot afford to buy a mowing-machine, he can combine with several others to do so. The same machine, horses, and driver can easily cut the grass of three or four farmers, by a little management. I know an instance of three farmers, living nearly two miles apart, owning a machine together, with which they have done all their mowing during the past three years, with speed, economy, and comfort; and between them they saved nearly its cost the first year. Such a partnership between obliging, neighborly people may often supply the want of individual capital.

As soon as the Hay is out of the fields, turn the water of irrigation on to them, and allow it to stand for a few days at a time; its use now will give a second crop nearly as large as the first.

The management of irrigation must be decided by experience. Some persons recommend letting on the water as soon as the Hay is off; others advise leaving the grass to make a start. I should use it as soon as a field was cut, first dressing with one or two hundred weight of guano or super-phosphate of lime.

If you have liquid manure carry it out on to the grass, and you will receive an enormous return.

Farmers who have tried a liberal top-dressing of compost just after cutting their grass, affirm that they get better returns from it then than at any other time. I confess I do not see how this is possible, for it seems to me the dry, hot weather must reduce the value of the manure to that of so much mulching.

So soon as the grass is gone, and even before, you must begin on the grain. Do not leave it till fully ripe; the straw should be yellow at the bottom, but not all along the stem. Try the grain; squeeze a kernel between the thumb and finger; if its contents squeeze out in a dry and mealy condition, it is fit to cut; if quite milky, it should stand longer. There is a great loss in leaving it till fully ripe, from birds, and from the amount which shakes out of the ear while harvesting. And besides, careful experiments are detailed in Stevens' Book of the Farm, and elsewhere, which show that grain cut from 5 to 10 days before it was fully ripe, proved of much better quality than a portion of the same crop, in the same field, which was left till fully ripe; so that even if the whole of a "dead ripe" grain crop could be saved, its greater bulk would not atone for the loss in quantity and quality of the flour and meal made from it.

The winter-sown grain is the first to ripen; the earliest summer-sown is next.

Barley and Oats may be allowed to stand later than Wheat and Rye, because they ripen more slowly and are less valuable. But Oats cut a week or two before they are ripe, dried as Hay, and fed out in the Straw in winter, are often found to make superior Hay and Grain for horses.

Grain should never be reaped where it is possible to use a cradle or scythe, and large fields should be harvested with a reaping-machine. It is said that reaping saves more of the straw, but it does so at a cost generally of double or treble its value in labor. When grain is badly lodged it must be reaped, for neither the cradle nor scythe can go through it; but all grain in good condition can be mowed evenly, and laid ready for binding, with the common scythe, and, after a little practice, at much less cost than with any other hand implement. Mowers, cradlers, and reapers follow the same method; viz., cut the grain and leave it, the two former in regular swathes, the latter in bunches or bundles. Leave it thus till noon; then turn it, and leave again till 3 P.M., when all hands should be sent in to bind it into sheaves.

To do this rapidly, let one or more men precede the binders, and with hay-rakes draw together enough grain to form a good-sized sheaf (the size must be determined by the length of the straw which is to bind it). The binder takes in his right hand a handful of the larger straw, then gathering up the grain into his arms he passes the straw round behind it, and brings the ends together in front, where he crosses them upon the grain with some pressure. Then laying the bundle upon the ground, he presses it close with his knee, and tightly twisting the ends of the binding strand round once or twice, he finishes by tucking them under the band. If tightly held and twisted the band will hold well; and by it the sheaf is now to be managed.

Other men should follow the binders, and gather the sheaves into stooks. The stook is made by leaning several sheaves against each other, and others against them; over their tops lay 2 or 3 sheaves; lay them firmly and well balanced, so that they will shed rain. Another way of protecting the stook (which must then be made rather small), is to set over it a large sheaf, head downward, and opened out so that it will embrace the whole top of the stook. Or they may be protected with Hay-covers, which is the best plan. Leave them to dry thoroughly for a day or two in fine weather, longer if necessary; but the longer they stand the more liability to injury by rain, and to loss from plundering birds, and from loosened and fallen kernels. The grain may be removed at once to the barn, if you have a place there for it where there is free air. The best place is above the barn floor overhead; lay poles or timbers across the beams, with such an interval between as will just support the sheaves. Thus stored, the grain is sure to be well aired and dried and the method is therefore good for grain too green to be mowed or stacked.

All grain — even Oats — should be thus carefully harvested; it then brings a price high enough to more than pay for extra labor; the straw is not soiled or broken, and both spends and sells better.

When the hurry of harvest is over, thresh; the sooner the better. To thresh by hand, sweep out the threshing-floor clean, pitch down into it as many bundles as its width will accommodate; lay them in two rows, buts out. The best place is the floor of the Hay barn, where large doors can be opened at each end and allow a free circulation of air to remove dust and cool the workmen. Lay the sheaves with the knots uppermost, as there are heads in them which must be threshed. When the grain has been well threshed, the bundles should be untied, and turned over so that the flail may do thorough work. This over, tie the bundles up again, and fork them away into the loft to be sold or used; sweep the Grain to one side, and clear the floor. If let out, it should be by the bushel, and the straw be well inspected afterwards to insure thoroughness.

I need not describe the *winnowing* machine. There are threshing machines worked by horse and steam, which can be used to immense advantage on large jobs, and farmers may find it well to have one in partnership.

Grass for seed is to be treated like that for Hay, till nearly ripe, when it should be cradled or mowed, and otherwise treated like grain.

No grass should be cut for seed unless free from all weeds and bad grasses. You have had an instance of the number of weed seeds in two pints of Dutch clover, the seed of which is pretty large, — 25,560 and 70,400 to the pint, or an average of 50,000. In Herds grass there is undoubtedly as large a proportion of weed seeds as the Dutch clover; and therefore, when we sow one-half bushel (32 pints) of Herds grass (to an acre), we sow the seeds of about 1,000,000 weeds. In (a bushel of) Redtop my experience would show a still larger proportion, and I do not doubt that in general we sow 4,000,000 weed seeds to the acre. What wonder that we have trouble with weeds in after fallows.

Any land which you wish to sow with Millet may be sown as late as the middle of this month, with the certainty of a good crop of fodder grain of 3 to 5 tons per acre, in September. Grass seed sown at this season with Millet, does well. Sow with them 1½ pounds common purple topped or flat Turnips to the acre. They will make their growth in the young grass after the Millet is removed, and will yield 200 to 400 bushels to the acre, not, however, without drawing their support from the land; every crop we grow reduces the fertility of the soil, but I assume that we cultivate so well that we wish to get all the crops we can, and that the Turnips are manured for, and will make manure in return. If we get a poor crop of grass, it will be because we have not manured well, or because the land is in bad heart, — which is our fault and bad farming.

During the dry weather that follows haying, there is time to repair ditches and to begin or continue underdraining. On most farms there is a lull of work at that time, the breathing space between two harvests.

CHAPTER LXXV.

ORNAMENTAL GROUNDS.

THE care of finished grounds during summer is light work. Our time is occupied either in devising new improvements or in enjoying the results of our labors.

Although I have at different times referred to nurseries, seed-beds, varieties of trees and groups, only general principles and hints have been given, and there is need of more detailed directions before we close our year.

Seed-beds and nurseries are of course to be made in the fall and spring, — in the fall, for all plants having a hard, bony seed. It is not well to plant at first in the place where they are to stand for several years, for most plants incline to a few long roots, often to a single *taproot;* those with hairy or fibrous roots are the exceptions. All the skill of the nurseryman is to be directed to checking this tendency, and inducing the plant to make fibrous roots.

Evidently a plant with but few roots, and those not fibrous, is not likely to flourish when transplanted. Some of its roots are broken, and in its new quarters, however much food there may be, it has but few mouths to eat with.

Walnuts, many kinds of Oak, Beeches, Chestnuts; among fruit-trees, Pears and Cherries have hard-shelled seed, and few, or tap-roots.

A germinating seed sends a little root, the radicle, into the earth, and a little stem, the pumule, into the air. The root like the stem grows from the end; but not by successive buds formed one year to be expanded the next, but by successive elongations. This elongation takes place only in obedience to the demands of the plant for food, and the natural tendency is to go straight down like a carrot, when there is food enough; side roots are sent abroad only when the taproot meets with a check or scarcity of food.

Consequently when we try to remove such a tree, we find the central root running down, sometimes 5 feet into the earth with scarcely a side root. To transplant the tree is plainly an impossibility. We cannot dig up the deep roots, and if we could, we could not plant them again properly.

This is the main cause of the general failure in transplanting such trees from the forests or fields where they have grown from infancy. The thing is nearly impossible, no matter how much care is taken. This being the natural growth of the tree, it has been reasoned that any attempt to prevent its forming a taproot would result in checking its growth, it being a plain violation of nature's law. It is true that if we change the habit of the tree's roots we injure the tree, unless we so conform other circumstances to it as to make good what we take away. For instance, a tree whose roots go down 5 feet into the soil, only throwing out a few fibrous side roots, draws all its support from the soil contained in the inverted cone covered by its branches, through which the roots choose to extend, multiplied by 5 feet. Suppose its branches to extend 50 feet in diameter; the superficial area is about 1,900 which multiplied by 5 gives 9,500 cubic feet. But this is the amount of earth contained in the solid entire cube, and which abstractly considered it is necessary to allow to support it in full vigor. If now you divert the taproot, cut it off or bend it so that surface roots shall take its place, which do not dip more than 2 feet down, the diameter through or over which they can be allowed to range must be increased; a circle with a diameter of 50 feet will no longer unquestionably feed the tree; it must be enlarged three-fifths. Or to change the form of statement the trees could be within 25 feet of each other while they had taproots, but after the change the distance between them must be at least 40 feet to insure the same amount of food. I do not give these as the proper distances, but as illustrative of the relative needs of taprooted and fibrous rooted trees. And I do not mean to say that no trees should be planted nearer than they will bear to be when well grown, nor in the first case will the roots ramify through the 9,500 cubic feet; there may be as good reasons for planting close as for planting wide. But this may be stated without modification; viz., if a given number of feet of good soil are necessary to the perfection of an average specimen of any class of trees, all other trees of the same species to attain perfection need the same amount of the same quality of soil,—or more if it be poorer, less if it be richer. For the sake of shade, fine groups, timber, or screens, we may plant closer, and in that case manure will do much to supply the want of room.

To return now to the seed-beds. Make them for all kinds of trees, so that you may have an abundance of such as you wish after all the losses of growing, etc. Make the beds from 3 to 5 feet wide and as long as you please; dig them deep and manure well; rake fine. With a dibber make holes for all largish nuts, acorns, etc., one inch deep and as many inches apart as their size indicates; drop one nut or seed into each hole and cover with earth. Make the rows across the bed. Smaller seeds may be sown in drills and covered from one-half to one inch deep, according to size. All berries enclosing seeds, like Haws, Black alders, Barberries, etc., may be put to soak for some hours or days in lukewarm water in a warm place, and as soon as they are softened to a sort of pulp or pounce, they should be mashed and strained through one of the coarser kinds of fine sieves, then washed several times till clean, and afterwards rolled in ashes or plaster to dry and separate them. Or you may drop one berry in each dibber-hole, the holes being 3 to 4 inches apart, from each berry; three or more plants will probably start and may afterwards be transplanted.

In the same way treat other seeds. Allow the bed to freeze and thaw, as the alternations break the shells of the seeds and free the germs. Early in the spring loosen the earth between the rows with a handfork. When the plants appear, keep the bed free from weeds, and the earth light, loose, and well watered.

The next spring transplant to another bed and put them 6 to 9 inches apart, rows 2 feet apart and still running north and south. Mulch in summer, and cultivate them in this bed, till they grow crowded, when they should be removed to their final position.

When this is done they should be examined again, and any tap-roots which have formed should be pinched off.

Some trees like Hemlocks, no matter at what age, when taken from fields or pastures, have only a few finger-like roots; those which live after being removed to a good soil and cultivated there for a year or two, will make an enormous quantity of fine, hairy roots, and may be transplanted anywhere with safety.

A few seeds thus planted and cared for will save hundreds of dollars to a person planting largely.

A more rapid way is to buy seedlings of a propagator who will sell them for a trifle per hundred. Set them out in the second year from seed. But banish from your mind the notion — which has been known to creep in — that after doing this and using what you want, you can sell the rest for enough to reimburse the outlay. Such a practice is detestable and fills one with care and worry. When he looks at his young plants he thinks — not of their beauty — but of the money they will bring; instead of using the best, he acts like poor country farmers, who feed their family on the refuse of stall and field and sell the best. If you would get real enjoyment from your young plantations, propose to yourself to use what you want and give away the rest. There is no gift more appropriate or beautiful to a neighbor than a few choice trees, shrubs or flowers, which he may be too poor to buy. If you make a speculation of it, the cost of the plants which you use may be small in money, but it will be great in trouble and aggravation.

In forming your collection you should be influenced very much by the consideration of the soil you have to deal with, the character and species of the trees and shrubs already growing round you, and the requirements of the climate. If your place is to be your home in winter as well as summer, the plantations must be made with a view to their effect in the one season as well as in the other.

It is common to set more value on strange trees than on the native trees and shrubs about us. In some cases the preference is well founded; as for instance, in a region like the most of Plymouth County, Mass., where the principal growth is White and Yellow Pine, and Birch; here the eye naturally tires of the monotony and longs for variety. A judicious intermingling of strangers enlivens the landscape and increases our love for it; giving us not only the imported beauty, but by contrast, an increased enjoyment of the beauty of the native varieties.

This reference to the woods of Plymouth County is not by way of sneer or depreciation, for few trees are so beautiful to me as the American Pines. The White Pine is the organ of the forest; its cool, shady depths and gentle music in summer, when played on by the zephyr, are most inviting, while its sublimity when snow-laden, and resonant with deep, bass vibrations, giving utterance to mighty hymns of praise under the heavy hand of the storm-wind, impresses the most insensible mind. Considering its adaptedness to all situations, its shade and coolness in summer, its shelter in winter, the enlivenment it lends the wintry landscape, its grace, dignity, and variety, I think it cannot be much surpassed. I cannot call it the king of evergreens, for to me that place is the right of the perfectly developed Hemlock, but it is second only to the Hemlock, and in music and voice is its superior.

The size of your place must also have much to do in deciding your selection of trees and shrubs; if it is large, trees should predominate over shrubs; if small, shrubs must be the leading feature, trees being used only for relief and shade. Upon the size, too, must depend the influence which is exerted by the natural wish to collect many specimens as a sort of arboretum, for purposes of pleasure, instruction, and curiosity. This is out of the question in a small place, and should only be indulged in on a place of several acres.

What then do I call a small place? It is difficult to answer, so much do standards vary. Ours is a large place. Half an acre, an acre, two or even more acres are small under certain arrangements; if the larger part of a place of a few acres is devoted to vegetables, crops or flowers, then the place is small.

It is already plain, that in my estimation the useful is somewhat subservient to the beautiful. I would have grounds so arranged that the surface devoted to culture of any kind should be much less than that devoted to *permanent beauty;* meaning by permanent beauty that which comes from well-arranged and established lawns, plantations, and shubberies, in contradistinction to the more fleeting attractions of flowers, orchards, and general culture.

In the "village-garden" I endeavored to state my views about selecting and grouping trees and shrubs. I have no space to mention all their varieties, much less to enter into particulars on their merits, and the peculiarities of the groups which can be formed from them. The best way to master the subject is to study nature, and upon this I insist as the indispensable basis of good planting. Whoever sneers at the woodland and meadow that surround his home, and seeks new varieties of trees, unless he have real genius or great familiarity with the imported varieties in their natural habitat, where they have attained all the luxuriant beauty of our best natives in wood and hedge, will surely produce awkward and artificial results.

However liberally you introduce foreign trees, retain a large number of the native and common kinds, that they may connect the home-place with the general landscape, and let the strangers be subordinates to enrich and diversify, rather than to predominate.

The following trees have been widely introduced and profitably grown by nursery-men to the exclusion of much finer *native* varieties. The opposite list contains American trees and shrubs quite as good, often vastly better:—

Foreign.

Ailanthus, bad as possible.
English Ash, good.
" Elm, "
European Elm, "
Abele or Silver-leaved Poplar, bad; leaves out late, and loses its foliage.
Scotch Larch, very good.
European Linden, very inferior; loses its leaves early, much attacked by worms, etc.
Norway Maple, good,
European Mt. Ash, ordinary.
English Oak, very good, but of slow growth.
European Sycamore, tender, not very good.
Weeping Willow, firstrate as an occasional tree.
Scotch Pine, very good.
Austrian Pine, "
Norway Spruce, firstrate.
Of these trees, particularly of the poorer kinds, thousands of dollars' worth have been sold; of the best American kinds comparatively few.

Native.

American White Ash,
" Red Ash,
" Black Ash, good.
Poplars of several kinds, all good for quick growth.
American Linden, poor.
American Larch, not firstrate, but of quick growth.
Maple Red,
" Sugar,
" Silver-leaved, firstrate.
Oak Red,
" Black,
" White,
" Scarlet,
" Pin,
" Rock, very fine.
Hickory, 3 varieties, firstrate,
Buttonwood, once good, now poor.
Willow Water, good and not special in character as the Weeping, admitting of more general use.
Willow Osier.
" Golden, and many other good varieties.

All of the following are native:—

Horse Chestnut, indifferent to bad.
American Mt. Ash, very good.
Pine, White and Red, firstrate.
" Yellow, good.
Balsam Fir, very bad.
Spruce, Double White, good.
Tupelo, peculiar and very fine.
Liquid Amber, very fine.
Red Cedar, firstrate.
Arbor Vitæ, fair, occasional tree, excellent hedge.
White Fringe Tree, firstrate.
Judas Tree, good.
Tulip Tree, } good.
Magnolias, } good.
Virgilia euted, fair.
American Elm, firstrate; other varieties good.
American Cypress, good.
Kentucky Coffee Tree, much like the Ailanthus, but not so vile, rather tender.
Beech, firstrate.
Birches, "
Sassafras, rather hard to grow, but peculiar and desirable; its autumnal coloring very fine.
Butternut, not very good as an ornamental tree.
Chestnuts, very good.

and many others

Of our American trees the Balsam Fir and Arbor Vitæ, American Elm, Sugar and Silver-leaved Maples, have been largely sold; but the others in the native list are comparatively unknown.

We generally depend on the taste of the nursery-man, who prefers to sell the trees he can grow most easily, and thus a deal of rubbish has been foisted upon the public.

I have already said how beautiful I consider the American Elm. The maples are resplendent in the fall, but the Red Maple is the most beautiful of them, and well fitted for wet places; the Sugar Maple is very fine, but is too regular and with too little variety to be firstrate; the Silver-leaved makes a large, but loose and straggling tree; it is good for wet places. The American Oaks are particularly fine as a family, and as individuals. When properly managed in the nursery, they are easily grown, and quickly, notwithstanding the general opinion to the contrary. I hope to see the time when they shall be largely used as a roadside tree in our country towns; by any such roadside they would thrive, though they never will do well in cities. They are all hardy, and many individuals might be mentioned which have stood by our village roads since the settlement of the country, and are still full of vigor.

The Hickories come next for beauty. They vary much in character, but are generally most graceful; their branches drooping from top to bottom often remind one of the rippling leap of a waterfall; although the toughest of trees, and the very type of strength, they are never awkward or stiff; no branch is straight the curves blend together from little twigs and branches and stems, like harmonious music; their rich yellows in fall are the clearest and most reliable of autumnal colors.

Beeches are very fine, and if well treated when young, are easily managed and of reasonably quick growth; the branches and spray are very light and broken. The tree is said to be destitute of dignity, and to have no effect either grouped or single, but I cannot agree to this. However true it may be of the English tree, it is not so of our own, and it is on the dictum of English writers, and their indiscriminating disciples here, that the tree has been condemned. Its white bark broken with lichens, and the dark lines and scars of age and storms, is very attractive, and must charm the appreciative eye when seen gleaming through the leaves; it is always picturesque and full of variety. The ease with which characters may be carved on its bark, has given it the name of the "pictured tree." The Copper and Purple Beeches may occasionally be introduced with good effect; masses of them well blended with other trees would be fine.

The Birches are very fine; the common Gray Birch not so good, — but the Canoe, Paper, and Yellow Birches, are entitled to a first rank among our trees. I would rather use them singly than in masses. They are particularly charming along the banks of brooks or ponds, which return a beautiful reflection of the singular and pleasantly colored bark and the unusually graceful branches. They all do well in low lands. The Scotch Birch is an acquisition.

The Chestnut, fine, whether alone or in masses. The nobly rounded outlines and massed branches of a Chestnut wood, are always among the finest sights in a landscape; the foliage is as clear and vivid in summer as that of the Beech, and is a particular excellence in both, whilst in the fall they are the most conspicuous of trees. The Chestnut and Oak mass together in wood very well, and I know no better trees for this purpose in land that is rather level or rolling.

The Beech is seen to the best advantage along rocky ledges, or along hill-sides; Hickories either in level or rolling land. The Birch is finest in lowlands or on hill-sides, and when in groups, should always be massed with Evergreens, for the sake of the contrast in winter between their white and yellow stems and the vivid color of the Evergreen, through which they gleam like a lamp from a window at night. Elms never mass well together; they are best as single trees, in groups of from 3 to 6, or to skirt a plantation. Tupelo and Liquid Amber belong to one family, and their autumnal color is very brilliant. The deep crimson of the Tupelo gives it a conspicuous place in the autumnal landscape, its abundant berries make it a haunt for birds, whilst in branches and spray it is the most weird and picturesque of trees. Its contortions remind one of the Laocoön, particularly when festooned, as it so often is, with Ivy or Woodbine. The Liquid Amber masses well with round-topped trees, while the Tupelo should be alone or on the outer edge of groups.

The Judas tree, which is rather low growing, and of no particular presence, is, however, recommended by its abundance of red flowers long before it gets into leaf. So, too, the Fringe-tree and Virgilia; their blossoms recommend them; the former is rather a large shrub than a tree.

The Tulip-tree grows very large, and is fine in masses or single. Its curious flowers are its attraction to the mass, but its real merit lies in its architectural leaves, their clean and vivid appearance, and in its massive character.

The Magnolia never gets much size with us; the "Glauca" has beautiful flowers; Acuminata has pretty flowers and fine foliage, and is good in groups of round-topped trees.

The Tripetala or Umbrella, and the Macrophylla, are valued for immense leaves and flowers. There are several other varieties, all beautiful and conspicuous. Soulangeana and Conspicua are full of early flowers.

The American Mountain Ash, like the European, is valuable for its blossoms and bright berries. Rarely use it single, but plant it among Evergreens, where it may thrust its white blossoms and scarlet berries through their branches; the color of both is heightened and the effect always beautiful.

Our Willows have great variety of form, size, and color, and are valuable in plantations about water. The usual mistake is to suppose that they are *the* trees for water, and should always predominate in plantations in its neighborhood; no pond as large as a wash-tub but is wept over by Weeping Willows. The practice is disgusting. The Weeping Willow is really a fine tree, and occasionally looks well near a pond, over which it may lean, and where it may be mirrored; it likes plenty of moisture about its roots. But when this is said, all is said. It thrives perfectly in a deep, good, upland soil. On account of its marked character it should be introduced but rarely. Peculiar trees tire the eye unless they have a deal of variety, and when often introduced, although they bear a small proportion to the whole number of trees on the place, they control the general effect, and leave their own impression predominant in the mind. If you must use many weeping trees, vary them as much as possible. The Black Birch is a very graceful tree of this class, and is redeemed from being miserably lachrymose by its generally sprightly character and its little tassels of blossoms and seeds. The Weeping Beech is considered tearful, but its contortions never allow it to become sombre, and the same is true of almost all trees which have been made violently weeping by horticultural devices, such as the Weeping Ash.

The Golden Willow should have a place in every plantation of size, for the sake of its splendidly colored wood in the early spring. A group of these Willows, after they have felt the quickening of the early spring sun, and their sap has begun to creep, is perfectly resplendent, and in a violent rain storm beguiles us into the belief that over them the sun is shining.

The Black, Bay-leaved, Water, and many other Willows, are all good in their place. Some of them do as well in a sand bank, or better, than in low ground.

The Buttonwood is most often indigenous in wet lands, and although not so fine a tree as it was a few years ago, is still an acquisition, and we may reasonably hope that it will recover its health and re-assume a leading place among round-topped trees. Its scaly bark and white wood make it both curious and attractive. It, too, should be in the company of Evergreens, to bring it out in better relief. One objection to it is that its leaves come out late.

The European Sycamore is a Maple, and pretty; its dark green foliage and yellow blossoms recommend it, but I do not think either it or the Norway Maple equal to our own Maples, and neither is as hardy in this climate.

The American Cypress and Larch are two semi-Evergreens, as though nature had stopped with her intention but half fulfilled in their case, or the material had fallen short. The Cypress we need hardly consider; it thrives only in a more southern latitude; with us it lives and grows, that is all. But the American Larch or Hackmatack is too little known. It is as wild and unmanageable as an Indian girl; its luxurious picturesqueness of branch and top, when it has room to grow, are wonderful, and to me it is the most picturesque of American trees. If planted from seed, it will grow anywhere, and would often very much heighten the effect of glens, brooksides, or even groups of formal trees. When planted as a specimen tree, it should be in a spot to which it can give its own character; where the irregular surface needs, and is grateful for, the addition of the Larch. In groups, it should be planted in the middle, to draw up and give character to the whole.

The Scotch Larch, though picturesque and of quick growth, has never in this country acquired so fantastic and striking a growth as our own tree. Yet it is invaluable, and may be used to advantage alone, in groups with other trees, or in masses by itself. Both these Larches should be introduced where Evergreens and deciduous trees are mixed as a connecting link.

I had nearly forgotten to mention the Acacias and Locusts. Alone, or to fringe plantations, to impart wildness to a glen, the three-thorned Acacia is of great value, and it also has considerable dignity. No tree is like it; armed with terrible thorns, each bunch of which threatens blood and wounds to the intruder; in them some fanciful persons have seen nature's weapons, to prevent bears climbing to suck the honey of the blossoms, and to eat the nuts. It owes much of its beauty to its long white clusters of fragrant blossoms. It is desirable wherever it will grow, which it does best in light, deep soil, though it will grow in sandy places. The Locusts are so much attacked by borers that they often die in spite of the care of the cultivator. As timber it is of great value, being almost imperishable, and it is a good quality in it that it will grow in grass or pasture fields without injuring the grass; beneath its shade pasture always improves.

No doubt I have neglected to mention many excellent deciduous trees, but it would take so much time and space to enumerate all, that I should not think it desirable even if it were possible. The best of our deciduous trees I have mentioned, and even if you use no others you cannot fail to get satisfaction from plantations made of these.

But the Evergreens must not go unnoticed. The White Pine has already been described, but chief of Pines though it is, it is so *non longo intervallo;* the Red Pine (P. resinosa) comes close to it. This tree is but little known here, but it is very common in the northern part of the United States, in the forests of Maine, Vermont, and New Hampshire, and up the mountain sides of the whole northern continent. Its tufted foliage is like that of the White Pine, though longer, thicker, darker, in spite of there being but two leaves in a sheath; its wood is rough, scaly-barked, and reddish, and in the forest its stem runs up tall and stately like gigantic columns. It is fully equal to the Austrian Pine in foliage and color, and should be in every collection; and I hope it may yet be as common as the Balsam Fir is now, which is of all trees the meanest, least expressive, stiffest, most worthless. When young it is often handsome, and that it *may* be beautiful when old, witness the tree now standing on the old Gore Place, Waltham, Mass.; but for one such specimen there are ten thousand mean trees. No sight is more common in our New England villages than a little cottage close to the street, with two or more tall Balsam Firs tyranizing over it, giving no shade in summer, no music in winter, no beauty at any time; with their lower branches cut away to allow the inhabitants of the house to see out, they are like monstrous pompons in a soldier's cap.

Never cut the lower branches of an Evergreen if you set any value on its peculiar beauty! The habit of the whole class is to lay the lower branches on the grass, and present a succession of green, unbroken, to the very top. The Pines, as they grow old, acquire a new character. Their stems and branches become dignified and beautiful, often very picturesque, and a little judicious thinning may sometimes show this to better advantage. But never touch a branch of an Evergreen without first preparing yourself by careful and long thought and study and familiarity with the best specimens, for you can never replace the limb removed.

The Yellow Pine is inferior to the others, but about equal to the Scotch Pine. One superiority it has; it is most deliciously fragrant when shedding its leaves in autumn; then the air of a Yellow Pine wood is more delicious, fragrant, and balsamic than that of any flower-garden or greenhouse, even in their perfection.

The Arbor Vitæ may be planted along brooks and in rocky places, occasionally introduced into a group, used as a hedge; but when employed without discrimination it is bad.

The Norway Spruce is an unusually fine tree, and too much can scarcely be said in its praise, whether single, massed, or in mixed groups; it is eminently a picturesque tree. The White and double Black Spruce are nearly as valuable.

The Hemlock is the King of Evergreens. As a hedge nothing is more beautiful, particularly when it is gemmed with drops of rain or dew; when young its spray and color — especially the color of the new growth — are bewitching; it may be used as a shrub, a tuft, or a screen. In middle age it rivals the Norway Spruce in luxuriant picturesqueness, in variety and grace. But its triumph is in its old age; a solitary old Hemlock stands like a king; its stately stem, powerful branches, rugged, sturdy habit, claim notice and praise. Standing alone it is peerless and magnificent; and a Hemlock forest is all this, and in addition, *sublime*. Whoever has ridden along our northern mountains, and looked down even on a still day on a valley full of Hemlocks, fringing the meadows and creeping up the mountain sides must have seemed to himself to see a glorious green ocean; the variety of branch and top, the broken outlines, all recall the dancing waves of the sea. But let the storm-wind strike it, watch the trees bend, sway, and roll, as the blast pours its fury upon them, and you will feel that the sea has swept up over the solid land. You need not then venture upon the treacherous deep to see the wild magnificence of a storm. As the tempest dies away and quiet returns, and the glad waves of branches dance and toss in the sunlight, you will feel the wonder, and power, and beauty of nature.

I have mentioned the Red Cedar or Savin, as a firstrate tree. It is so. It should be planted oftener in our ornamental grounds. We pass it by with the commendation that it makes good posts and feeds the birds with berries; but few know the tree. It is a singular combination of grace, variety, and picturesqueness, with stiffness and formality. Its power over the eye is the less from its foliage being so minutely subdivided, and it might be said to lack beauty or individuality of foliage; but its masses of foliage are fine; scores of little twigs and branchlets combine to form one branch or mass of green on the tree, and the disposition of the main branches — often weird, always picturesque — gives its foliage a really marked character. The color of the leaf is more varied than that of any other tree; it would be easy any day in winter or spring to make a bouquet of cedar branches, which in sober richness and variety of color would bear comparison with a garden bouquet. During the summer it loads itself with berries, which are to be the food and mainstay of many birds through the winter, and meantime, their rich blue bloom gives the tree the appearance of being in blossom for months together. Its thick foliage makes it a favorite resort for birds in summer; — resting on its spiry, swaying tip, the Red Mavis swings and pours over field and wood his rich, abundant song; — while in winter it is the warm home and house of refuge for shelterless birds. It is excellent, too, as a screen to houses or barns. But it shows us something of its *glories* in the fall. Wild vines incline to cling to and grow up through it; the Sweetbrier will push its flowers and berries up into it; the Woodbine and Ivy twine round the stem, and burst out in masses over the branches; they climb up to the very tip of the slender top, and taking a firm hold they fling long festoons of branches and leaves abroad in the air. There they sway and dance in the wind all summer long; but when autumn comes, and the "wine of the year" is fermenting in their sap vessels, and the leaves have grown ripe for the harvest, there comes over the Ivy a rich yellow, and over the Woodbine a deep crimson glory, that first appears in the edge of a leaf, but which creeps up the midrib, spreads through the sap vessels, and at length some glorious autumn morning fills and illumines every fibre and tissue. The dear old Cedar is ablaze with crimson and gold; his modesty and sober colors can no longer veil and hide him from public esteem; he is crowned with fire; no one can pass without an admiring pause. The russet and browns, the blue berries, all combine to make a wonder and a glory.

But beautiful as the tree is, enthusiastically as we should like to praise it, let us hush, for its real triumph is to come. The added glories of the fall do not develop its peculiar personal charms. But look at it after a snow-storm! The minute subdivisions of leaf and twig offer thousands of footholds to the tired snowflakes; it is full of purity and whiteness; it bends beneath its load, but never tries to lose or shake it off; the long, pliant, irregular branches are now more weird and fantastic than ever; the tree-tops bend in every direction, and the branches are pinned to the ground; they form arches and pillars, towers and minarets, labyrinths of beautiful shapes. The winter king claims the Cedar for his own. Pines and Hemlocks too are most beautiful in winter, but their long fascicles of leaves do not offer the many resting places which the little feet of the snowflakes find in the Savin; they close up as the storm-wind blows, they bend down to avoid the blast, and at the least breeze shake off the load which they have taken up in still weather; — not so the Cedar! it spreads wide its arms as there is more to receive, and folds them about the welcomed strangers, till fiercely shaken by the pursuing winds.

If you would have your country house most beautifully surrounded in winter, build it among Cedars. Pass one winter there, and when the snow has come you will see, what you perhaps never before suspected, that winter in the country is far from cheerless and may well compare with the summer.

In characterizing our trees I have often spoken of their *voice* as a quality too important to be disregarded. In the Pine and Hemlock it is the sweetest and most impressive music, responding to the most delicate touch of the zephyr, obedient to the might of the tempest; whilst there are other trees which have no voice for the light winds and only shriek or roar under the blast. The musical ear may be fed daily, charmed or annoyed by the voices of the trees as they join in the morning or evening hymn around the homestead.

"The wind, when first he rose and went abroad
Through the waste region, felt himself at fault,
Wanting a voice, and suddenly to earth
Descended, with a wafture and a swoop,—
Where, wandering volatile from kind to kind,
He wooed the several trees to give him one.
First, he besought the Ash; the voice she lent
Fitfully, with a free lashing change,
Flung here and there its sad uncertainties.
The Aspen next; a fluttered, frivolous twitter,
Was her sole tribute; from the Willow came,
So long as dainty summer drest her out,
A whispering sweetness; but her winter note
Was hissing, dry, and reedy. Lastly, the Pine
Did he solicit; and from her he drew
A voice so constant, soft and lowly deep,
That there he rested, welcoming in her
A mild memorial of the ocean cave,
Where he was born."

CHAPTER LXXVI.

GREENHOUSE, ETC.

AUGUST brings us to the end of our year. Behind us, is all the work done; before us, much of the expected reward. Many things have been left undone, and many partially or poorly executed; but all has been attempted, and the whole work has been carried forward in the best spirit, and with an earnest desire to do our best. The failures and disappointments which have tried us, or which are still before us, are small compared with the pleasure we have enjoyed and the success which is promised; and we have little to complain of, for who can expect unmingled satisfaction?

The greenhouse in August begins to re-assert its claims, and we begin, slowly and reluctantly, to repair, renew, and refresh, assured by reason of what seems impossible to our external senses, that the present luxuriant vegetation and rich beauty around us can so soon and so easily fall before the destroying touch of coming winter.

Clean all the wood-work, mend pipes and glass, stop leaks, pot and shift cuttings, overhaul the old plants, and give them new earth and new pots; put every thing in the best condition for growth. Give copious waterings of liquid manure from time to time, and lay in a good stock for winter use.

The graperies demand no time or care beyond that given the last month; they all contain fruit in some state of forwardness, and are to be enjoyed rather than worked over.

The long shoots are to be pinched back, to mature wood, and where there are other plants, leaves should be removed to admit light. Be careful that the houses do not get chilled by easterly winds.

The grapes in the cold grapery will be coloring and ripening during the month.

If you have not had as much or as fine fruit as you hoped, let this year's failure help you to insure next year's success.

In the conservatory the work is the same, and there is rather more of it, as more of the plants are stock, and are seldom exchanged for others.

Repot and stimulate Pelargoniums which have been cut down. If the Chrysanthemums, Cinerarias, and Roses seem to crowd their pots, shift. Pot Achimenes, and lay aside such Gloxinias and Fuchsias as are out of bloom. Pinch Ericas and Epacris back a little; it will both strengthen them and increase their bloom. Repot Callas, if not done last month.

In beginning the work for winter, look over all that has been said in the previous months about the treatment, culture, and propagation of plants, that you may be sure to start fairly.

Now is the time to plan and start new cold or conservative pits, or refresh old ones, and, in general, to furbish up all the paraphernalia of winter war.

Those beds in the conservatory in which there are no plants should be enriched, and renewed, and well dug over, while those containing plants should have three or four inches of earth removed from their tops, to be replaced by rich virgin loam.

CHAPTER LXXVII.

FLOWER-GARDEN.

If you would have the full midsummer glory in your flower-garden, be constant and careful in your attendence upon it; the bedding plants are now at their highest point, and will continue to grow and blossom.

Annuals, too, are in their prime, and the place of those just out of bloom should be filled from the reserve-garden. All annuals going to seed should be cut down or pulled up. Many, like Candytuft, may be kept much longer in blossom if prevented from ripening their seeds.

Most of the perennials are gone, but those which remain are so brilliant in color, and large in size, as to allow the loss to be scarcely felt.

Transplant from the seed-beds the seedlings of all perennials or biennials sowed in the spring, to the places where they are to blossom next year, or if no place has been selected, prick them out in rows in the nursery, that they may get well grown before the next year. You may at this time sow the seeds of Sweet Williams, Foxglove, Canterbury Bell, Pansies, and other biennials, from the seed ripened this year. Such seed will germinate much more rapidly than when dried over winter. This, indeed, is true of all seeds; they are in a better state to germinate and develop, if sown as soon as ripe; examples of which are the Acorn, self-sowed from the Oak; Peas and Beans, dropped from the vines while harvesting. Only such seeds as would be winter-killed should be kept till spring.

Biennials hardy enough to stand the winter, gain a year in flowering if planted in August. Pot out of the garden such annuals as you would like for the winter, which were sowed late and are not yet much developed. Take off slips, suckers, and cuttings from perennials.

Remember that the Chinese Hollyhock, Double Scarlet Lychnis, and similar plants, may be propagated by cuttings of the flowering stems and other parts.

Clip Box edgings, that they may make a new growth before winter.

Plant out such bulbs as are injured by too long drying, as Snowdrops, Lilies, etc. Also if there are still any autumnal flowering bulbs not planted, Colchicum, Autumnal Crocus, etc., set them out.

Make layers of Carnations and the other plants already mentioned; cut off such layers as have been before made, and are now well rooted.

Pot cuttings which have struck roots. Pot seedlings that are well advanced, and shift into larger pots those seedlings, cuttings, etc., before potted or sowed in small pots.

Every thing which is to go into the house in the winter, should be arranged and assorted now, and many plants potted. After potting, remove to the shade of a north wall or a shed; keep cool and moderately watered.

Auriculas and choice Polyanthuses, whether seedlings, cuttings, or old plants, should be often worked over and cleaned; keep them growing.

Make ready your bulbs for planting in September and October.

Give the flower-beds occasional waterings with liquid manure; but remember that no *slight* watering should be given to plants in the open border; they should be watered freely, if at all. For they ought to be accustomed to supporting themselves, and if the soil is deep, they will thrust their roots down to the water table, while if watered slightly from time to time, the roots will turn towards the surface, and thus not only the plant gets less hold upon the earth and less food, but it grows weaker, and if the watering is omitted for any length of time, will dry up speedily, when other plants, accustomed to rely on themselves, are thriving.

Once a month, throw a little salt over the walks; it kills weeds, and binds the gravel more firmly together.

During the month, begin to bud Roses. The earliest budded will sometimes start and grow very much before winter; but those budded later are safer. On the next page will be found a description of the flower-garden referred to on a previous page.

FLOWER-GARDEN.

HOW PLANTED WITH BULBS, PERENNIALS, AND SHRUBS.

* against a letter means that the bed is full of the bulbs. ? only partially filled.

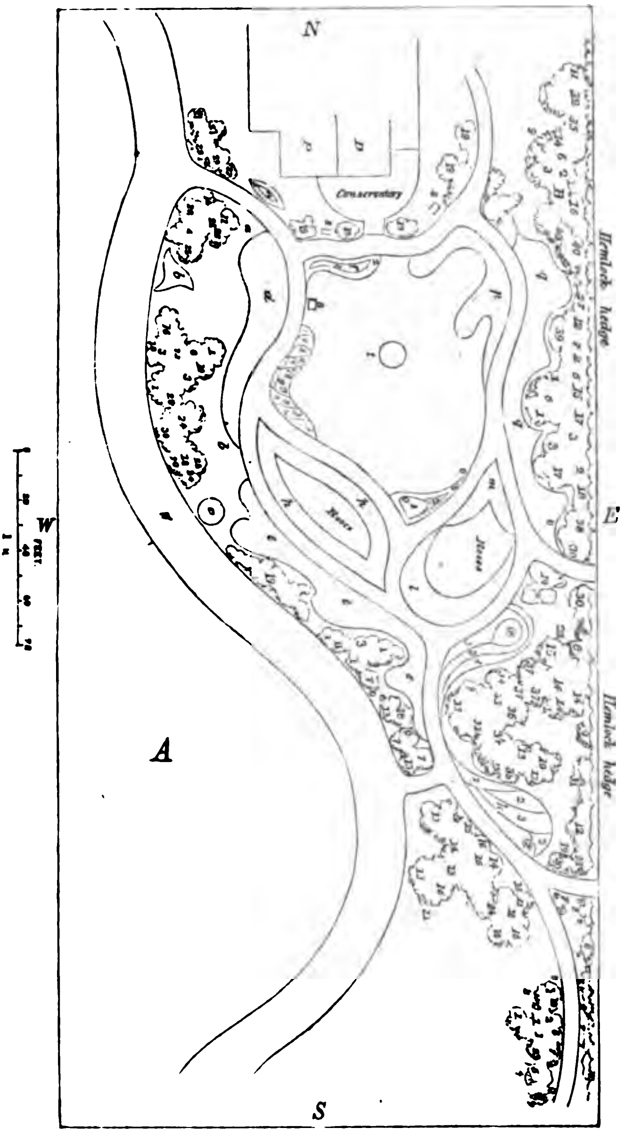
Beds planted as follows: —

*a, Snowdrop, Crocus, Hyacinth.
*b, " " " Narcissus, Tulips.
*c, " "
*d, " " " " " Daffodils, Pansies, Peonies, Day Lily, Tiger Flower, Gladiolus, Fall Crocus, Tuberoses.
?e, Daffodils, Pansies, Polyanthus.
*f, Snowdrop, Hyacinth, Tulips, Pansies.
g, " " " "
k, Perennials.
l, Bedding plants and Annuals.
m, " " "
o, Iris, Jonquills, " Daffodils, "
p, Crocus, " Hyacinth, Gladiolus, Squill, Tulips, Dielytra, Pansies, Dwarf Peony, Polyanthus, Lilies, Amaryllis, Tuberose.
q, Perennials and bedding plants.
r, "
s, Baskets of flowers.
t, Fountain.

LIST OF TREES AND SHRUBS.

1. Norway Spruce.
2. Larch.
3. Hemlock.
4. Copper Beech.
5. Tupelo.
6. Red Maple.
7. Cockspur Thorn.
8. Cydonia.
9. Smoke.
10. Spirea.
11. Wigelea.
12. Barberry.
13. Oaks.
14. White Pine.
15. Red Pine
16. Rhododendrons.
17. Sugar Maple.
18. Fringe-tree.
19. Roses.
20. Magnolia soulangeana.
21. Magnolia glauca.
22. Kalmia.
23. Azalea viscosa.
24. Forsythia viridissima.
25. Austrian Pine.
26. Red "
27. Azalea Pontica.
28. Spirea prunifolia.
29. " hypericifolia.
30. Hawthorn.
31. Snowball.
32. White Lilac.
33. American Elm.
34. English "
35. " Oak.
36. Nettle-tree.
37. American White Ash.
38. Fastigiate Oak.
39. Bladderwort.
40. Black Alder.

Bed *a* is described on pages 30, 31, 544.
" *b* " " 31, 544.
" *c* " " 31, 544.
" *d* " " 468.
" *e* " " 537, 544.
" *f* " " 31, 544.
" *g* " " 537, 544.
" *k* " " 184, 185.
" *l* " " 467.
" *o* " " 544.
" *p* " " 467.
" *r* " " 183.


N
Conservatory
Hemlock hedge
Roses
Roses
W
E
Hemlock hedge
A
S
FEET

I will give full directions for budding, which are applicable not only to Roses, but to all other plants and trees. I have taken the illustrations from Field's new book upon Pears, a very valuable work, and a great assistance to the cultivator.

Make cuttings or layers of the China, Bengal, Tea-scented, and other Roses, for the winter and spring. Those made at this season will blossom next spring and summer. Make cuttings also of Heliotropes, Salvias, Lantanas, Verbenas, etc.

Read over the previous directions for the flower-garden.

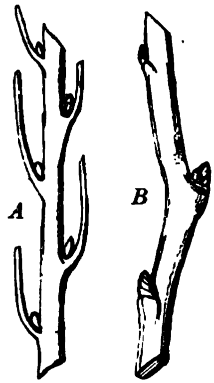
Budding is to be performed when the plant is ready, rather than at any particular season.

Budding is, in fact, the same thing as grafting, but in practice it has some advantages over that method. In the graft there are several buds, but only a small portion of stock and graft can be united, and the junction must be effected between like and like; the albumen and young bark of the graft must grow upon the albumen and young bark of the stock.

In budding, a larger amount of these substances can be brought in contact.

The condition of the stock when to be budded, must be as follows: When a small slit is made lengthwise in the bark, and a smooth, hard, and thin instrument is introduced between the bark and the wood, the bark must leave the wood freely and smoothly, as that of the Willow separates when you make a boy's whistle. The stock must be tested several times to ascertain the condition of the bark. Most trees are in the best state in the spring, and if the bud were equally ready, budding could be done then as well as in the summer.

The usual time to begin budding is late July, August, and September; if done later than this, there is scarcely time enough for the bud to get securely attached to the wood before winter. The condition of the bud should be like that of the stock. The buds must be all well formed and fully ripe. I have said before, that the lower buds on a branch are generally too old and not well developed; the branch grew so rapidly that the lower buds were passed by, while the upper are not well matured and ripened; the middle buds will be ripe and well formed, and may be reasonably expected to thrive best when removed.



A shows a stick of such buds; the upper and lower ends of the shoot having been cut off; those that remain lie close to the stem, are well filled out, and the stick is straight and regular.

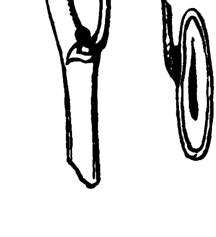
B shows buds which are too high on the stem, and too much elevated above the wood.

The bud must be cut smoothly and applied smoothly to the stock, every part of the bud, and particularly the base of the eye, coming in close contact with the mucous surface of the stock. Should a bud be cut from B, you see at once that it could not be laid smoothly on the wood; there would be a cavity full of air directly under the eye.

I said that buds might be set in the spring, if they were in a fit condition; one leading objection is the absence of leaves, and consequently the loss of the assistance which the footstalk under the bud offers as a handle during the process of setting.

A shows the buds with footstalks. B gives their appearance in the spring.

Having selected the stick of buds, the next thing to be done, is to remove them properly.



Let *a* (Fig. C) be the bud you are to remove; hold the stem in your left hand, and cut the bud out, beginning as far below the bud as you mean to come out above it, as is designated by the shaded lines. The woody side of the bud, when held towards you, will look like the centre lines, being the woody centre of the bud. Of course a bud so cut out will have on it a small shield-shaped piece of the wood of the branch from which it was cut. Many operators insert the bud, wood and all, into the stock, and very often the budding is quite as successful as when it is removed. Still, if this wood comes in contact with the mucous surface of the stock, it prevents the junction from being immediately perfect.

The removal of this wood is a nice but simple process. If the bud is not fully ripe, the operation will destroy the centre and life of the bud, its *eye*, as at *b*, and no growth can possibly occur.

b

c

When properly removed, it is as at *c*, where you see the rough knotted root or bottom of the bud.

To remove the wood, the pointed end of the budding-knife is used, or a blunt-pointed quill pen. The bud is held in the left hand by its footstalk, and the point of the quill introduced under the lower end of the woody shield, when a slight upward motion will throw the wood out.

The operation must be executed with rapidity, and as soon as the bud is ready, before it has been exposed to the air, it should be inserted into the proper place in the stock. The air makes the bud oxydize, and causes decay, and of course endangers the success of the operation. Indeed, so necessary is rapidity in this matter, that it is best to prepare the stock before the bud is cut off.

The budding-knife is essential to the success of the operator. These knives are of various patterns, but all have at one end a piece of ivory, elongated, thin, and rather broad, which, when the bark is cut, may be inserted under it, to raise it from the wood. The ivory may be used separate from the knife, but is less convenient.

Suppose you were about to bud a Rose. Knife in hand, first cut off a large number of the leaves of the stock plant, and rub off all the thorns near the place of operation, which must be carefully fixed upon. It should be as near as possible to a bud, as this bud will draw the sap, and so aid the growth of the new bud. Some cultivators recommend that the bud on the stock should be cut off, and the new bud set directly over its seat; but this is a

clumsy and blundering method. At the appointed place, make a light but smooth cut transversely across the stock, as at *a* (Fig. D); then another, parallel with the course of the stem, and at right angles with the first, as at *b*. *c* represents the bud, all ready for insertion, as it is prepared at this stage of the proceeding. When ready, put it into your mouth to keep it from drying, but do not wet it more than is absolutely necessary.

The stock cut, insert your piece of ivory, wood, or bone, under the two corners of the rectangular cut, and gently raise or slip up the bark. Before putting the bud into the opening, hold the top of it on the thumb nail, and cut it straight across, that this end may be fitted evenly against the transverse cut in the stock. Now insert the pointed end of the bud into the opening of the rolled sides of the cut, and press it into the aperture till the squared end of the bud is just opposite to the transverse cut on the bark; when bring the two lines parallel, and press the edges close together; the appearance will now be like E. When set, take a narrow piece of bass matting or tape, and beginning at the bottom, tie the side of the cut firmly over the inserted bud; fasten the lower end by winding up over it, and the upper in a noose. Wind some distance both above and below the insertion and cuts, to insure that the air is kept out. The cut F shows the completed work.

I said, in first describing buds, that the footstalk has a double value: first as a handle to the bud, in which light we have already considered it; the second value now becomes apparent. In about a fortnight after it is set, the bud will have formed a junction with the stock. As soon as it begins to swell with the sap supplied, the connection between the bud and the old footstalk ceases to be of value to the bud, and as the new development continues, it loses its hold and will drop off if touched. This, then, is a test of a junction between bud and stock, and when it is proved, the bandage should be loosened, but not wholly removed for at least a month.

Plants budded early in the summer will, if cut down to the bud, develop it during the late summer and the fall. If they grow enough to make a well-ripened and hardy wood of even two buds, it is a good thing, as this wood will stand the winter well, and be more forward the next spring; but if the bud breaks without being well ripened, the whole will die in the winter, and the operation will have been in vain. Therefore it is generally safer that the bud should not break till spring, when, after the frosts are over, and before vegetation really begins, the stock should be cut down to the bud, which will grow rapidly. I have seen a Cherry bud which grew 5 feet in one season. Pillar and wall Roses also make very rapid progress.

Roses may be budded in July, August, and September. Those done in July and August will make good growth, if cut down. Cherries, Pears, Peaches, etc., should be begun in August and finished in September.

This is an easy way of adding to our stock of Running Roses, and increasing their beauty; upon the strong canes of the Prairie or Boursault, we may work the Noisette, the Musk, and the Perpetuals, and the same plant will thus, in another year, show a wonderful succession, combination, and contrast of blossoms.

But remember that you cannot produce any results by putting together different species or families; like must grow upon like. The theory some persons have maintained, that a Rose budded on a Barberry will produce yellow Roses, is the wildest kind of nonsense. If the bud would take at all, the yellow Rose would undoubtedly follow, but it will not.

Not only must budding and grafting be confined to the same family, but generally to the same species, if real and permanent success is to be expected.

Our floral year has revolved, and we are now upon the threshold of another; we are looking forward to the preparations for the next year, while yet we are in the midst of the perfection and enjoyment of this.

I think no one can have followed this year through practically, without imbibing a deep and earnest love for flowers and their culture, and forming a determination never to be without some such interest in future.

I hope I have made it plain why I would have every one cultivate something of a garden; and have proved that it is not the size of the garden which gives it its power to bestow pleasure, but the perfection of its arrangements, the flourishing condition of its flowers, and the care devoted to it.

And I need not repeat here what has been so often expressed and implied throughout these pages, that to obtain the purest and best enjoyment from a garden, it must be our own work; the result, more or less successful, of our own planning, and care, and labor, of early and late attention, of personal devotion and love; for *love* it is, after all, that makes the flowers grow, as it does every thing else that is beautiful. And this love, like all other love, grows with exercise, so that to any one who has watched over a flower-garden for a few seasons, such a charge becomes almost indispensable. Try it, and see for yourselves.

CHAPTER LXXVIII.

KITCHEN-GARDEN.

It seems absurd to speak of this month as the *end* of our year in the kitchen-garden, for we are hardly more than beginning to enjoy the results of our labor.

Set out during the month plants of Savoy and Red Cabbage; they will head before winter. Plant White Turnips for winter use. Sow Lettuce to head in October and November; transplant and tie up Endive. Sow seeds of some sort of Radishes, such as black and white Spanish, Salmon and Turnip-rooted, for October and November. Sow seeds of Cabbage and Lettuce for winter frames, and for setting out in the spring.

Some kinds of Peas may be planted now; the earliest varieties may be relied upon for a fair crop in October or November. Sow abundantly of small salads. Spinach sowed the first and second week, will be good for greens before winter; the prickly seeded varieties are to be sown for spring in beds.

Plant beds of Onions for pips, and for leaving out in beds over winter. Make the beds carefully, 5 feet wide; rake the earth fine, sow in rows 1 foot apart and keep clean. Covered with pine branches they will go through the winter well, and begin to grow very early in the spring.

Artichokes must be attended to. The heads will be constantly getting fit to be eaten. If they are cut down for chard, earth up once a fortnight, like Cardoons and Celery, but never do it in wet weather, or when the plants are wet with dew, lest they should rust.

Keep the Asparagus beds clean, and when the seed is perfectly ripe, collect and separate from the pulp, and either sow it now or wait till Spring. Mustard and other small salads should be sowed weekly as before. Plant beds of Winter Cress; the plants will be well grown before winter and be early in growing in the spring.

Melons and Cucumbers are now in fruit; Melons may be hastened in ripening and improved in flavor, if a clean shingle is laid under each, which keeps it warm and prevents its being flavored with the earth. Gather Cucumbers for pickles.

Cut off the ends of the Lima Beans, as the fruit on them will not ripen and removing them will aid the development of the pods already set.

Hoe and clear the weeds from beds and paths.

Gather Okra for soup, and all fruits and vegetables as they come into condition.

Such herbs as are ready should be gathered in season, either for drying or distillation, and all dead flower stems must be cut off, as they are unsightly.

Collect all the materials you can for the compost heap, and do not let weeds grow upon it, as they not only sap its value and strength, but fill it with bad seeds. Manure-heaps of fermenting materials are but little injured by such seeds which are killed by the after fermentation, but never mix them into old and already fermented manure.

Gather the fruit on the espaliers as it ripens; remove all wormy and decayed fruit and leaves. I have already described the treatment of such fruit; it will be abundant through the month.

Read over the "kitchen-garden," of other months, as directions have sometmes referred to the work of August.

Particularly, clean, repair, and renew the hotbeds, and cold frames.

Many persons think this the best month for making Strawberry beds. But it is not. When cultivated on a large scale, the best plan is to treat them as an annual crop. Plant early in the spring, in rows; cultivate between the rows, gather the fruit next year, then plough them in and take a late crop of vegetables from the same land. In this way you will have a new bed each year, and no weeds.

Continue to summer prune fruit trees, and thin the fruit. Look out for insects, particularly for nests of autumn caterpillars; they do little harm but are very unsightly.

CHAPTER LXXIX.

ORCHARD.

The orchard in August makes no demand upon the labor of the farmer, beyond that of gathering the fruit as it ripens.

The earliest Apples and Pears are now ripe, and should be eaten or sold as soon as possible.

The fodder in the orchards is now very forward, and affords constant and ample supply for the cows. The orchard enclosed and sown for the pigs, is verifying what was predicted with regard to good food and rapid fattening. Give the pigs also an abundance of skim, sour, and buttermilk, as nothing makes young pigs thrive better.

It is not, as I have before said, very good for the orchard to be highly cultivated, but it is allowable in the management of a farm to sacrifice one part to another, if we keep the general balance even, and if our fodder crops are profitable as they should be, they will more than compensate for some loss on the trees

One fact will, I think, be admitted by all Apple growers, that those Apples which keep the best, are the fruit of trees in old pastures where, although pruned, they receive little other cultivation. And another fact is equally established; that the more highly an orchard is cultivated the more rapidly the trees grow and the later in the season; consequently their wood is not so well ripened, and is much more liable to sap and frost blight, and to be nipped by early spring frosts. The more tender the bark the more sensitive to all changes of climate.

But do not on this account fail in care and attention to the trees; do not allow them to overgrow or overbear; as soon as they have too much wood, not only is the fruit impaired, both in quality and quantity, but the tree contracts disease.

As you review the directions for the orchard given through the year, you will see clearly that I would have you take great care before planting your trees, to select the most approved kinds, and then to spare no pains in planting and cultivating. If you do this your orchards when in bearing, even of Apples, will give you an average profit of $50 an acre per year.

The Apples which ripen in August are Early Harvest, Red Astrachan, Summer Queen, Williams, Sops of Wine, Early Strawberry.

Pears; Blood-good, Bartlett, Dearbon's Seedling, Jargonelle.

Look out for insects and caterpillars.

CHAPTER LXXX.

THE FARM.

THE farm work for this month is a continuation of that for July, with little change.

On those farms which have meadow lands, either salt or fresh, their Hay is generally to be made now. It is rarely made earlier.

RECLAIMING MEADOWS. — Fresh meadow grasses, if cut when growing, and still young, make quite nutritious and succulent Hay, on which, with some Roots, dry cows and store cattle live and gain; but if left till grown and nearly ripe, it is dry, chippy, and worthless, and is no better for animals than so much brush.

It is to be regretted that farmers take so little pains to inquire into the value of Hay, as differing with times of cutting and methods of making. They are guided by prejudice rather than by the well-established principles founded on experiments, and consequently they annually suffer a loss of from 25 to 75 per cent on the value of their crop.

Salt Hay, also, should be cut young. Some kinds, as Black grass, and others, are as much injured by standing as the best quality of English Hay.

Want of space forbids my discussing the varieties of these grasses in detail, and the methods of improving them. It is enough to know that drainage of both kinds of land is extremely valuable. Salt meadows which, undrained, yield only coarse rushes and bedding, will, when drained, soon give a large burden of Black and Goose grass, and other kinds valuable for food. Fresh meadows, reclaimed, as I have already shown, become most valuable land. And if too wet for thorough reclamation, they may be so far drained and cleared as to permit many improved kinds of natural Grasses to come up and replace the worthless.

Foul-meadow is a grass which makes a hay nearly as good as English, and may be induced to grow luxuriantly in such meadows with a little care.

I think, in most cases, such meadows, with some little expenditure of capital, could be more profitably cultivated in Cranberries than in grass, and they can generally be flowed during frosty weather, and even if they cannot, Cranberries may often be grown with certainty and much profit. Whether for grass or Cranberries, the first treatment is about the same.

First cut down all bushes and trees, and dig out their stumps and roots; next make a drain round the edge of the meadow, which will cut off the water that runs from the adjoining high land. Conduct this drain to some outlet, either natural or artificial; cut a main drain through the middle of the meadow to some outlet, and into this main carry enough side drains to remove the water rapidly. I am supposing the case of a bog, where covered drains could not discharge the water; such cases are few, as although a bog may seem to be like a sponge, laying in a perennial supply of water (only that it cannot like a sponge be taken up and squeezed out), yet in all but the most desperate cases it will be found possible, by lowering the outlet enough, to draw off the water by underdrains. So your sponge will be gradually squeezed, but, unlike its prototype, it will, instead of expanding with its freedom, shrink up.

But drainage alone will not thoroughly reclaim a bog without some mechanical change in its texture, for its matted fibres and vegetable matter will still hold water to an injurious extent. As soon as the drains are made, and bridged, if open, gravel must be carted on to the bog, to the depth of at least two inches. This will cost, probably, about $30 an acre. The gravel can be best carted in when the ground is frozen. Before spring spread it. If you choose not to plough immediately, leave it, and it will gradually work into the bog, its stones and sand opening the vegetable matter, thus draining it still more, and admitting the sweetening air. And, on the other hand, the carbonic acid, which is in excess in the peat, will seize upon the stones, and dissolve out of them lime, potash, etc.

Grass seed may be sown over the gravel. Fowl-meadow, Red Top, and other grasses, which, rooting in the gravel, will soon choke out the wild grass. In a year or two the meadow will be so far drained and settled as to receive the plough. Plough as deep as possible.

If it is soft the horses should have meadow-shoes, called rackets, to keep them from sinking in. These shoes are at first troublesome to the horses, but are indispensable in the culture of all reclaimed meadows, even when well drained.

As you plough give more gravel or sand, if you can, and spread from 50 to 300 bushels of lime to the acre, or 5 to 25 bushels of common salt, or 5 to 50 bushels of ashes. 50 bushels of leached ashes would be a large dose; but of unleached a small one.

When you have well ploughed, sow liberally the best Grasses, or cultivate the hoed crops for a few years, or introduce a regular rotation, the best plan of all. When this is done, give dressings of guano, urine, night soil, or other highly ammoniated manure, and barn-yard manure, if you have it in abundance; but it is the poorest for such soils.

Were you to plant Cranberries upon this land at the time of gravelling, several different methods might be pursued. Sods of Cranberries may be cut and set in rows, more than 3 feet apart each way, and kept hoed and clean for a year or two, till they cover the soil. Or vines may be taken and cut in a hay-cutter, and then be sowed broadcast and harrowed into the ground. Or seed may be sowed.

Whatever crop is grown upon a meadow, it should be frequently rolled, especially grass.

The reclamation of salt meadows is a different matter. By means of dykes and gates they may be reclaimed for general culture, as thoroughly as the fresh, and more easily, but usually nothing more is done than to cut narrow, open drains through the soil, to facilitate the discharge of water as the tide runs out. These drains are cut straight from the shore, or some side drain, to the main, with a common peat or turf knife, and not more than 6 inches wide, and generally only the width of the turf-cutter. Some persons cut two spits or lengths of the cutter deep; the upper as wide as two cuts of the knife; the lower, one. Such drains are rapidly and easily cut.

The peat removed from a salt meadow, and the mud of salt marshes, although not often used in the compost heap, is of very great value, and much more active in compost than the mud of fresh meadows. The mud of salt meadows is almost always rich with shells of shell fish, which give it its value as manure.

August is the month in which farmers generally undertake the reclamation of meadows; and it is best to continue the work through all the unoccupied time that intervenes before winter.

Grain Crops.—In the course of this month the Grain crops will be harvested, and land laid down both to Grass and Grain. We cannot on our place sow Grain before September, as we have Potatoes in No. 3, and the rest of the field is in Roots, which will postpone planting grain till spring.

Dig the Potatoes as soon as ready, and when they are well removed from the field plough with the deep tiller plough as deeply as possible, following with the subsoil plough. The land is smooth and in good order, and should be ploughed in ridges by the poles, as described, and immediately harrowed lightly. Or, better still, follow the plough with the cultivator.

Harrowing of some kind seems to be a necessary evil; we must reduce the surface to considerable smoothness to secure a good spread of seed and braird, or even start and growth of grain. But the action of the harrow is just that which is most undesirable in culture. Those who pack snuff in bladders, have a method of stuffing the bladder fuller, after it seems to be as full as possible; they ram into it a pointed iron, which being withdrawn leaves a hole in the compacted snuff; this hole filled, another is made and filled likewise, and so on until the iron can no longer enter. The harrow acts in just this way upon the soil.

Our soil is a fair gravelly loam and will fall down closely enough under the harrow, and during the winter will become as compact as even Wheat can desire. If it were clayey, it should be rolled with a clod crusher after ploughing to break up the lumps which the plough would leave. If sandy, it should be harrowed several times.

We are now ready to sow the Wheat. The ordinary amount of seed per acre, is 1½ to 2 bushels if sowed broadcast, and 1 bushel if drilled. Less than one in drills, will answer.

It is not necessary to quote the numerous experiments which have been tried with Grains, but the majority prove conclusively that the yield is generally larger with thin than with thick seeding, particularly when the sowing is in August and September, and there is time for it to cover the ground well before winter.

Three pecks of seed per acre has given in many cases more Grain than 2 bushels, and at no greater cost. Any Grain when drilled may be weeded and cultivated if we choose, with a horse-hoe and cultivator, with a return enough larger to pay an ample profit on the labor, and with a saving of from $2 to $3 per acre for seed.

In our Western States the sowing of winter Wheat is rapidly falling into disuse, owing to the ravages of insects in summer. But this pest seems to be travelling westward, and it has been found that in parts of the country for many years valueless for winter Wheat, it may now be sowed without danger.

Careful experiments upon the depth at which seeds will germinate, have shown that it varies with different seeds; the proper depth for winter Wheat is 1¾ or 2 inches.

Observe that sowing in the drill saves the cost of harrowing. Follow the Grain with Grass and flat Turnip seed; sow seed in proportions already given. An English receipt is 9 lbs. Foxtail; 2½ lbs. Cock's foot; 3½ lbs. Meadow Fescue; 4½ lbs. Hard Fescue; 4½ lbs. Italian Rye Grass (this will do with us only when sown in the spring); 3 lbs. Red Clover; 4 lbs. Yellow Clover; 4 lbs. White Clover; 8 lbs. Timothy; 2 lbs. Orchard Grass: 1 lb. Yarrow. (Omit all the Clover till spring). This great variety is recommended as making better and more permanent pasturage, and animals will fatten upon it with more certainty. In laying down land to be kept in grass for several years, I should decidedly recommend the use of a large variety. See "Flint's Grasses" for a good history of American and foreign Grass, and for a good mixture for permanent pasture.

Our farmers give one-half bushel Herd's-Grass or Timothy; one-half bushel Red Top; 12 pounds Clover in spring. I think for Grass in rotation these will be the best, but I recommend one bushel rather than one-half of Red Top, and 16 pounds instead of 12, of Clover in the spring, or three kinds. Also I have no doubt that for the first year a liberal allowance of Italian Rye Grass would prove profitable. Italian Rye Grass is the staple Grass in England, and instances are given of its yielding 10 tons of Hay to the acre; the best varieties are annual, and with irrigation and liquid manure it is an unrivalled fodder crop. It has been but little used in this country, and the experiments made with it have been so badly planned and unsystematically executed that they have by no means decided whether it will do well here or not. Sow with the Grass 4½ pounds of purple topped Turnips. The seed may be evenly and advantageously spread in drills, or broadcast from the seed-sower, or by hand.

If sowed by hand, either Grass or Grain, the seeds must be well mixed. Let the sower tie a good sized apron or small sheet about his neck, and gather up the farther end in his hand. Fill the pouch thus formed with seed; set up the poles, and walk slowly towards them sowing the seed. If Grain, take a handful and sow slowly and evenly by swinging the hand backward and forward. A few experiments will be necessary to a beginner in order to ascertain how much grain to throw at each swing of the hand. To sow Grass seed, it is better to take less and sow with the fingers, with more rapid motion. Grass seed is light and easily blown by the wind, and should be sown on a still day. If sown as early as August, there will be no need of a top-dressing, but if later, sow 100 pounds to the acre of guano with the seed, to give it a quick start and early growth. In the spring with the Clover, sow 150 pounds more. If no manure is spread in the fall, sow in the spring 200 pounds to the acre with the Clover.

The seed sown, harrow it in with a light harrow, and then roll. Rolling is necessary only in order to bury the uncovered seeds out of the way of birds. I have tried both methods, with rolling and without, and could see no difference in the rapidity of starting, or evenness of growth, and I do not recommend a bush harrow; I think it a relic of barbarous farming. The fine branches of the bush gather the earth into ridges, bury some seed too deep, and sweep other places bare. The best method, if labor would admit it, would be to rake the surface with hand rakes and roll; and on light, well-ploughed, clean land, Grass seed might be sown without harrowing.

Numerous experiments have shown that Grass seed does not need to be covered more than one-fourth inch deep, and often seed not covered at all, but rolled, has come up quicker and grown better than any other.

During the autumn weed, if weeds appear. If sowed with the drill without Grass, Grain may be horse-hoed or cultivated with ease. Grain sowed early will tiller over the whole surface. Should it show any inclination to run up to head, feed it down with cows.

The Turnips sowed with Grain or Grass, will need no extra labor and will give 300 to 600 bushels per acre. The manure that they extract will not injure the Grain crop in proportion to their own value. If flat Turnips are to be sowed alone, as on the pasture No. 1, break up the land with the Michigan plough; harrow; sow the seed with sower or in drill, with 150 pounds superphosphate, or guano, 200 pounds ground bone, or the same value in unleached ashes; rows 24 inches apart; single to 8 inches in the row; cultivate till they cover the ground. Top in the fall, and house, either in trenches, or in the cellar. As they keep very well in the ground through the whole winter and often start a new growth in the spring, it would be good farming on such land to fold sheep during the autumn after October, and through the winter and early spring where the ground is not covered with snow, as in England, and let them eat the Turnips off. 1,000 sheep folded on an acre of ground all night is a liberal manuring for the acre, and the unconsumed parts of the Turnips would enrich it still farther. There are good wire and wooden fences for folding.

Manures. — I have already discussed the subject of manures at some length, but have as yet only entered upon it. I cannot close this book without saying more.

I have given a list of manures, among which urine occupies a high place. It is undoubtedly the richest of manures, and were all the urine of a family carefully saved and sowed over the ground, — either soaked by a compost or in a liquid state, — large crops would follow.

One part of the urine of a man is equal to 13 parts of the manure of a horse, or 16 of a cow. The solid and liquid fæces of each person are capable of producing, if applied to the soil and covered, food enough to support the individual a year.

The water-closets and privies of every house should be so arranged that the solid and liquid excrement of the family could be readily and neatly saved and applied to the soil. Many persons who annually pay large sums for manure, think they cannot afford the permanent investment necessary to arrange their buildings for this purpose. They are penny wise, and pound foolish.

The seat to such places needs to be but little raised over the apparent vault, which should have a bottom rapidly sloping to a well-built and capacious drain, which leads to a cesspool at a proper distance from the house. This cesspool may be excavated in the gravel, and made by cementing the gravel, or may be brick or stone, laid in mortar. It may be arranged so as to mix muck, loam, and road scrapings, or to use the liquid alone. The urine, as I have shown, is made more valuable by mixing with it an equal bulk of water. Run into the vault of the water-closet the spout of the sink, and allow all the soapy liquids from the sink to wash out the vault and mix with the fæces in the cesspool.

This will enrich the manure by its own constituents, besides supplying the water for admixture. If you have but scant means for constructing the cesspool, let your drain empty into an oil butt sunk in the ground. Haul near this oil butt a large quantity of mud, loam, sawdust, shavings, leaves, straw, any kind of vegetable matter, and even chopped brush, and forming a compact heap, or a basin, according to the material, with a long-handled dipper; as often as the cesspool or butt is full, dip it out on the heap. When the heap is saturated, mix it up, and haul it away and put more in its place.

A cheap dipper for this purpose is a butter firkin, with a handle carried through it and made fast by pins. The waste of a family of six persons, well saved and managed, will thoroughly manure two acres of land, and as the net value of the most profitable crops on well-manured land is at least $50 per acre, we have $100 as the value of the waste.

I will not pursue this subject farther, as it has been so often discussed that information upon it is abundant.

In discussing manures in April, I went upon the supposition that there must be returned to the soil every year just what is taken away. But in the long run this is not necessary, if land is well farmed, for every manure that we apply has a surplus of something, which is added to the capital in the soil for future use, and may therefore be omitted in the next application. I put the case strongly, *as the aim of the farmer should be to preserve the balance true, and this must never be lost sight of.*

If we add this year a guano rich in phosphates and poor in ammonia, for a special crop, we may next year add ammonia in a similar excess, or lime, or soda, with a deficiency of phosphate. But what I wish to impress upon you is the importance of every cultivator's understanding the soil and its constituents, and the constituents of the crop and the manure, so that he may always act upon principles.

Farming may, in most cases, be compared to a blind man sitting down to an entirely unseasoned dish for dinner. Near him are pepper, salt, and other condiments, and he is to help himself; but as he has no guide, the resulting taste alone can decide whether he helps himself wisely or not. So the farmer, blind to all knowledge of principles, can decide only by experiment upon the application of seasoning to his soil, and he will get first too much pepper, then too much salt, and may think himself fortunate if his mistakes are not irreparable. But the farmer who knows before he acts just what the composition of his soil requires, and just what applications will supply the requirement, works with his eyes open, seasons accurately by his eye, and is in no danger of spoiling his dinner.

I might enter into the details of the application of the various manures, but I cannot even describe that of the principal ones, for want of room; the subject is almost inexhaustible.

Lime, for instance, upon which volumes have been written, is a *sine quâ non* to some lands, but worthless to others, and where it is of value, its application varies from 5 to 300 bushels per acre, according to the length of time since limeing before. If this has been done within 5 or 10 years, 50 bushels is ample; if not for 40 years, 300 will be necessary. I must refer you to other books for the details of experiments and results.

Let me close the subject by saying that the best farmer is he who cultivates his land in such rotation as to enable each crop to take something from the soil that the preceding crop did not want, who grows those crops which will give most milk, wool, flesh, and return the best and largest amount of manure; who so husbands this manure and combines it with all the refuse, animal, mineral, and vegetable, that his place affords, as to make it sufficient for all his land; who, if he cannot do this, *buys* special manures, and does not try to manufacture them; who so drains, subsoils, and irrigates his lands, as to give his manures and crops the best chance; and finally, who so expends his profits as to develop and cultivate his own mind and the minds of his family, that they may draw support and strength, beauty and nourishment, from all around them; from nature and art, from society and books, from science and religion.

PROFITABLE BUT NOT GENERALLY CULTIVATED CROPS. — I have already alluded to these crops, in the kitchen-garden of a previous month, and they may with equal appropriateness be described under the head of Farming.

We are as much behind the times with regard to this culture, as to that of Roots, and to the rotation of crops.

Chicory, or Succory, is the first that I shall mention. Its use as a substitute for coffee, and for other purposes, gives the crop great value, and it may also be used for fodder. The land should be prepared by ample manuring; if fall ploughed, plough again in the spring and drill in the seed at the rate of 4 pounds to the acre, in drills 12 inches apart. Cultivate through the season. In the fall, draw the roots, clean, slice, and kiln-dry.

For a fodder crop, sow 12 to 14 pounds broadcast, and cut as soon as it is well grown; three or four times during the season. All stock are fond of, and thrive well upon, it.

Flax and Hemp may next be mentioned; they are somewhat largely grown in the Western States, and would grow in New England. Ten years ago they were about as much cultivated in Old England as now in New, and at that time an agriculturist spoke of it in the following manner, and his words might all be applied to our American agriculture of to-day. It is to be observed that Hemp may be added to Flax each time that he mentions the latter, as they are alike in all the respects in which he mentions it.

"The cultivation of Flax, although it holds out a prospect of considerable advantage to the farmer, and that neither very doubtful or very distant, is yet, like most things that are new, beset with certain difficulties at the outset. The preparation of the land, and sowing of the seed, are not, however, of the number, for those are simple; but the gathering and managing of the Flax, after it has grown to maturity, the drying, scutching, hackling, and preparing it for market, all require some training and some skill in the persons who carry through these several operations; and the great difficulty lies in obtaining the requisite practical knowledge in these matters at first; once established, the whole will be plain and easy."

"In addition to the profit, which, in a pecuniary sense, would arise from the cultivation of Flax in this country, another very important advantage would be obtained; it would afford a large amount of employment, especially for females, in those rural districts where employment is at present most needed. The various operations connected with the management of Flax require many hands, and much of the work may be performed by females."

"It has been said that Flax is a very exhausting crop, but it certainly is not more so than any of the usual green crops, neither does it require a very rich soil; indeed, a rich or highly manured soil is injurious, causing the plant to grow too strong and luxuriant, and rendering the fibre coarse and less valuable.

"Flax is grown on light land in Belgium and Holland, and I have seen it growing on mere bog in Ireland."

"The general introduction of Flax culture would constitute a new and most valuable element in the rotation, and would enable the farmer to vary and extend his successions, which is in itself a highly important consideration; the water in which Flax has been steeped is highly fertilizing when applied to the land, and the seed, when properly sowed and prepared, constitutes excellent provender for cattle and milch cows; it may be safely asserted, therefore, that a Flax crop, rightly managed, is not only valuable as affording increased means of employment for our agricultural population, and highly profitable for the purposes of the manufacturer, and for the feeding of cattle, but that it, moreover, returns to the soil, in the shape of mauure, as much, if not more, than any of the Grain crops; in addition to this it ought not to be overlooked by the agriculturists that Clover always does well after Flax.

For Flax the land should be ploughed deep and lightly harrowed, enough to reduce it to a fine and uniform condition; the seed may be broadcasted or drilled; if the former, sow 2½ to 3 bushels to the acre; sowed thickly, the fibre is finer and better. But thick or thin are relative terms; each person must settle how much seed he needs, by practice. When cut in blossom, there will be no seed, but double the weight of fibre.

Cut in the seed, 200 pounds of Flax to the acre is a good crop. In either case the Flax is pulled up by hand, and laid in bundles till somewhat dried, and when well dried stored until it is time to rot it.

COST OF A CROP OF FLAX GROWN UPON 1$\frac{54}{100}$ ACRES.

1 1-2	days	ploughing,	$3.00
1-2	"	harrowing and sowing,	1.00
6	"	pulling Flax,	6.00
2	"	threshing and cleaning seed,	2.00
1	"	spreading and raking in,	1.00
1	"	drawing to mill,	2.00
1 1-2 bushels seed, at $1.50,			2.25
Dressing and marketing,			15.95
Interest on land,			10.50
			$43.71

CREDIT CROP BY

233 pounds clean seeds,	$35.50
798 pounds dressed Flax,	79.80
	$115.30
Deduct cost,	43.71
Net value crop,	$71.59
or $46.42 per acre.	

Hemp is grown to some extent at the West; it needs strong land, and is a paying crop. Sward land should be ploughed both fall and spring; plough deep and harrow well; sow broadcast or in drill; if the former, 1½ bushels seed to the acre, from 1st April to 10th May. Cut it when the blossoms are falling off.

In the same book the following cost and profit of Hemp in Missouri, per acre, is given. The estimate was sent to the Patent Office. Cost per acre, $20; gross profit, $40; net, $20. The same crop grown in our country, with our care in cultivating, would give a much larger gross and net profit.

For details of culture I must refer you to special treatises. The estimate is given of the cost and value of an acre of Flax and Hemp, in "Fox's Text-book of Agriculture," to which I am indebted for many valuable facts.

"Liquorice, another valuable and profitable crop, little known, is annually imported in large quantities, though grown to a small extent here. It needs a deep, rich soil, and occupies the land for 3 years; is grown from sets (small side shoots on the main roots), trench the land 3 feet deep, and, if it is not rich, manure with a large dressing of well-rotted dung; throw the land into beds 3½ feet wide. In the middle of these beds, in the last of April, plant the sets 18 inches apart, in dibble-holes 8 inches deep. As soon as they appear above the ground keep them clean. When the leaves and stalks die in the fall, cover the bed with a dressing of well-rotted manure, which is to be carefully and lightly dug in in the succeeding spring. Treat this year as before, and the same the third year; in the fall of the third year, after the stalks are dead, begin at one end and trench the bed over, throwing all the roots on the surface. Small side branches of the roots, with eyes, are to be kept in a place rather cool and dry till spring, for sets; the others are washed, tied in bundles, and sold. Its gross value is not less than $500 per acre."

Lucerne and Sainfoin are two fodder crops not much known among us, but of great value to the milk farmer and the stall feeder. They have been carefully tried in this climate and proved capable of cultivation. Sow the seed in May in clean earth, in drills; cultivate and hoe; cut two or three times in a season. The bulk of fodder which may be cut is enormous. English — and still more, Flemish and French — farmers, consider them to be all-important crops. They last for 3 years, are long, tap-rooted plants, and when the land is afterwards ploughed, their roots contribute a large amount of manure.

From the cultivation of Madder large profits might be made. I do not doubt that any farmer who will cultivate this crop in the best manner for the next 20 years, will make money as fast as any merchant. Madder, like Liquorice, must be grown from sets, as its seed rarely ripens with us. It is a dye-stuff, and great quantities are annually imported from Europe and used. The roots are ground and in that condition sold to the manufacturer who extracts his own coloring matter. The land should be rich and deep without many stones. A stream near by, in which the roots can be washed is a convenience, but if overflowed for a day or two in the *growing season* the crop would be destroyed. Trench thoroughly, and then plant sets either in beds like Liquorice, or in drills 3 feet apart and cultivate with care for 3 years. The entire cost of the crop may be estimated at $100 per acre; a fair yield is 2,000 pounds (ground Madder) to the acre. The difficulty of grinding the root has been one objection to its culture, but now there are persons ready to buy the roots in the ground at a price which will pay the cost of grinding and a profit; at 15 cents per pound for ground madder the net profit would be $200 per acre, making the large allowance of $100 per acre for cost of culture.

Rape is valuable for forage and for its seed. It may be sowed in the spring to be fed off in the autumn by sheep. It grows rapidly, gives a large quantity of food, will grow on much poorer soil than the Turnips, and needs less culture and manure; may be sowed broadcast or in drills. In the latter case 2 pounds of seed per acre are enough. The seed of Rape is worth for its oil, one-half the price of Linseed. It is rather liable to injury in cold winters, and consequently will not be grown extensively for seed here, but the experiment has never been fairly tried. To get seed, sow on a clean stubble ploughed in drills, 24 inches apart, in August. Cultivate in the autumn. In the spring it will cover the ground before the weeds spring up; reap the straw the last of June; dry and thresh; the yield will be from 30 to 50 bushels per acre, and is worth at least $1 a bushel.

Rye Grass I have already commended. Too much cannot be said for it, and where there is a command of water or liquid manure, the produce per acre is almost incredible. It is often cut 5 times and will yield 20 feet in height, if we add the lengths of the several cuttings, and 20 tons per acre of fodder may be, under such circumstances, relied upon.

Silk seems to have been tried and exploded, and whoever recommends it, incurs a suspicion of entertaining some sinister design, and yet without doubt no more valuable crop can be grown in Southern New England, if proper care is taken of the worms and their food, and they are managed carefully and economically, and without the hope of an immediate fortune. The worms should be tended by children and women, and if the culture were begun on a small scale and gradually enlarged as the management proved profitable, the growers of the worms would be amply repaid for the time and capital invested.

Sugar beets. Were I to be asked what culture would best repay an enterprising farmer, who had capital and good loamy and moderately level land, I should say, that rotation which should introduce the Sugar Beet most largely and most frequently. It is another instance of a crop which has been hastily tried and condemned by many persons, and yet which promises to the grower extraordinary profits. The causes of failure are easily seen. In the first place as in the case of other Root crops, the imported seed must be acclimated before the crop can equal the cultivator's expectations, and although great benefits arise from the interchange of seeds between different countries, yet in most cases this benefit does not come in the first sowing.

Then, in the second place, this crop needs constant attention, and the best of culture, a good soil, plenty of manure, deep drainage, good subsoiling, and if possible, liquid manure or irrigation. The important point with this Beet is not enormous size of the roots, but a heavy yield of moderate, uniform-sized roots.

Thirdly, there is in general a deficiency of proper machinery for the extraction of the sugar.

Fourthly, a general want of faith in its value and the large quantity of refuse left after the sugar is expressed.

The difficulties with regard to seed, soil, and culture, are easily remedied. Imperfect machinery has now been perfected, and above all, two large sources of profit have been discovered in the waste; for it proves excellent food for store cattle, and is found to be superior stock for all coarse papers, so much so that the time is approaching when it will be impossible to provide too great a supply for the demand of the paper makers.

It was first cultivated for sugar in France, under Napoleon, war having put a stop to the importation of cane sugar, and at first it needed protection to enable the cultivator to make it. Now the case is reversed, and so simplified has the process become, that it can be produced enough cheaper than cane sugar to undersell it in the market, when the latter is not protected by a discriminating duty. The vast, loamy, fertile plains of the West, and all the alluvial and river soils of New England are well adapted to the culture of this Beet. It has the farther advantage of being equal to any other Root crop, as a food for stock, having by analysis more nutritive qualities.

Teasels are somewhat grown in New England and the West. Their price varies much, so that they are of rather uncertain value. They need deep rich soil, and thorough cultivation. Plough deep a well-manured fallow, and then harrow down; sow the seed in drills 3 feet apart, 6 pounds to the acre; when the plants are fairly distinguishable, thin to 6 inches; hoe and cultivate through the season. In the autumn leave the field clean. They begin to grow the next spring, and come into blossom in July; as the heads become fit to gather (which is known by the ready separation of the seed), cut them; several cuttings are necessary to secure all the heads in the right condition. Dry them on floors made so as to admit air from below; lay them 6 inches deep on the floor. When ready for sale they may be tied in bundles according to the quality, or packed in boxes.

There are several varieties of Teasel; the best are imported from Germany, and the best alone should be cultivated. The wider our woollen manufactories spread, the greater will be the demand for Teasels, as their little elastic hooks do a work which cannot be equalled by any machinery. Machinery has been invented to supercede them, and is often used, but cannot do their work perfectly.

The profit on Teasels ranges from $25 to $150 per acre, according to the yield and the market. Severe and continued cold does not seem to injure them, but rapidly alternating cold and heat, winter thaws and late spring frosts are very destructive.

Tobacco. It is with some hesitation that I say any thing to increase a knowledge of this poisonous plant, but its commercial value is so great, and the profits of the culture so large, that it must not be omitted in this connection. It was formerly supposed that it would grow only in hot countries, and the most delicate varieties seem to need a large amount of heat to draw forth their peculiar properties. I extract the following with regard to its culture from the Text Book of Agriculture: —

"A seed bed is prepared as early in April as possible, for which the richest and best land — moist but not wet — is chosen. It is manured, dug deeply, pulverized and rendered fine and smooth. and the seed sown broadcast at the rate of one table-spoonful to the square rod, before the earth becomes dry.

"After this it is raked, but the seed is not buried, it is rolled or a man treads it in, rendering the surface of the bed as hard as possible; weeds must be carefully extirpated. When the plants have leaves two or three inches long, they are ready for transplanting, about the beginning of June. The field to be planted should be well manured, and ploughed at least twice, harrowed and rolled, and left as smooth as possible; the rows are marked out for 3 feet or 3 feet 4 inches apart, according to the variety grown; and on these rows small hills are formed for the reception of the plants at 2 feet or 2½ feet apart.

"To make *fine* Tobacco it is important to plant early, so that the leaves may be cured when the weather is warm and dry.

"If it rains at setting out, advantage is taken to plant as many as possible; if not, about half a pint of water is poured into each hill and the plants immediately set. The plants should be set with a dibble; make a hole, set in the plant, fill the hole with water, and and then press the earth in compactly about its roots. After this the field is examined several times, and where the plants are dead or injured by the worm, others are set.

"As soon as they stand well, they are either carefully hoed and the vacant places filled with new plants, or the cultivator is merely passed between the rows. After this the plants are kept clean with the cultivator or hoe, being hoed 3 or 4 times without hilling; the plants are frequently and thoroughly examined for the Tobacco worm, which must be destroyed or the crop will be greatly injured. Turkeys are very serviceable for this purpose; if a large flock is turned into the field, they will soon rid it of the worms.

"When in blossom and before the formation of the seed, the plants are topped about 32 inches from the ground, leaving from 16 to 20 leaves on each stalk.

"If there are late plants in consequence of resetting, break them lower down and they will grow and ripen sooner. All suckers must be broken off. When ripe, the leaf is spotted and thick, and will crack when pressed between the thumb and finger. It may be cut any time in the day after the dew is off, left in the row till wilted, then turned, and if there is a hot sun, turned often to prevent burning. After being wilted it is put into heaps of six or eight plants and carted to the sheds for hanging.

"Here it is hung with cotton twine on horizontal supported poles 12 feet long, about 20 plants on a side. It must hang until the stem of the leaf is thoroughly cured to the stalk; from 6 to 10 weeks.

"It is then taken down on a damp day, to prevent the leaves from crumbling, and placed in large piles, by letting the tops of the plants lap each other, leaving the buts of the stalks out. It remains in these heaps from 3 to 10 days before it is stripped, depending on the state of the weather, but it must not be allowed to heat. When stripped, it is made into small bunches, called hands, the small and broken leaves being kept by themselves."

"When fit for market it is pressed in boxes of about 400 pounds each. The crop varies from 1,000 to 2,700 pounds to the acre. In France, 4,000 pounds is got to the acre. An acre of Tobacco in Massachusetts cost $67.50, it sold for $160 — nett, $92.50.

"To save seed, allow a few of the strongest plants to produce their flowers, which will ripen in September as much seed as will stock half a dozen acres. The best soil is a light, sandy loam, or a light soil rich in organic matters, having a portion of sand mixed with it. Clay soils are not adapted to it, and pretty steep hill-sides, if light and rich, are better for the production of Tobacco than level land. The manure for the crop should be highly ammoniated, and abundantly supplied, but both the manure and urine of horses are objectionable, as they seem to give the Tobacco a bad taste."

"Tares or Vetches come here in alphabetical order, as a valuable fodder crop. Hogs may be fattened entirely on them; milch cows give more butter when fed on this than on any other food, and horses are very fond of them. It should be sowed in a regular rotation, and take the place of late fodder, particularly where the late Grass is often deficient. The land must be clean and well cultivated. It will grow on any soil. Sow broadcast 3 to 4 bushels of seed to the acre. If sowed with Oats, — as is very common, — sow 1½ to 2 bushels Tares, and 1 bushel Oats. "The Hopetown or White-flowered Tare, is the best variety."

As fodder, cut after the pods are well grown, but long before they are ripe. If for seed, let them stand till ripe, and then cut with the scythe and treat like Peas.

Willows are a crop but little known in this country, of which several millions of dollars are annually imported, yet they might be cultivated with profit in many classes of soil, and in many places otherwise waste.

There are seven varieties. The best single varieties are Salix purpurea, Salix Forbyana; S. triandra is excellent. Salix viminalis is generally cultivated in England, with several sub-varieties, all of which thrive but poorly in our climate. The Yellow-skin Willow (S. vitellina) and the White Willow (S. alba) are both good and natives.

The farmer about to cultivate the Willow, should make inquiries and satisfy himself as to the best kind for our market. The indispensable requisites in a soil for a good plantation of Willows, are richness, depth, moisture, and ease in cultivation. The many reclaimable and reclaimed meadows of New England, would make the best of land for the purpose. A long continuance of standing water is not desirable, but the land should be so circumstanced that the roots may penetrate through a rather dry surface into a wet subsoil. Having well drained the land, prepare it as for Corn; insert cuttings 2 feet long perpendicularly into the soil, leaving 2 inches above the surface.

"Plant in rows, 4 feet apart, and 1 foot between the plants; keep clean of weeds, by plough, hoe, and cultivator, for two or three years. At the end of the second year, the osier is ready for cutting."

There is a difference of opinion as to the proper time for cutting; some advising fall and winter, after the sap has ceased to circulate, others the spring, when it is first starting. When cut in winter, they are tied in bundles and set upon their buts in water till spring. Cut the osier about 2 inches from the stock. Peel them with this very simple instrument. It is merely a round stick of hard wood, about an inch thick and a foot long, quartered about half the length of the stick, and the two opposite quarters cut off, so that it will leave a sharp edge upon the remaining two. The tool is taken in the right hand, and the Willow inserted in the slit with the left, and pulled through, the bark coming off.

Lay them to dry, and when dry, sell by weight. Some persons who have tried their culture, have got much more profit from the Willow, than from all the rest of the farm. Some varieties sell as high as 8 to 10 cents a pound.

The last crop which I shall refer to is the Grape for the manufacture of wine. The culture of the Grape is on the increase throughout the country, both as a fruit, and for its juice. For the latter use, the method followed is quite different from any hitherto described. The best land for them varies much with the country, the aspect, the kind of Grape; and the best method of making the wine differs in like manner.

Slight changes of soil and climate make so much difference in the Grape and its juice, that no exact directions can be given for it. As I have said once before, its cultivation is a specialty, and I must refer those interested in it to special treatises on the subject.*

* There is a manufacturer of brandy and wine in Boston, on somewhat a large scale, who buys all the native Grapes he can obtain, so that our common wild Grapes, well cared for, and harvested at the right time, may be made a source of considerable profit, without the trouble and expense of manufacturing the wine.

CHAPTER LXXXI.

ORNAMENTAL GROUNDS.

SOME trees not mentioned in July may occasionally be of service and value, but they will be so at rare intervals; and I do not recommend the proprietor of a small place to plant them, even for the purpose of making an Arboretum (collection of all species of trees). The number of varieties is too great to admit of such a collection having a good effect within small limits; but in all large estates, especially in public grounds, a portion could be set aside for this purpose. It seems proper that the love of the beautiful should sometimes be sacrificed to the advancement of knowledge, in large cities and towns (provided deformity be not put in the place of beauty); and it is very important that the people should learn the shapes, appearances, and uses both of our native trees and of those foreigners which will endure our climate. I have already said enough against planting trees in rows, except from necessity; but where rows are deemed necessary, as beside malls or avenues in public grounds, it is better not to confine them to one kind, but to use several varieties; for instance, one family, the Oaks, would furnish species enough to line quite a long avenue, and interspersed with the Walnut and Ash, all somewhat similar in habit, would form avenues, while they gave valuable information. Very few, even of our country folk, know all the varieties of the Oak, and city people seldom know the difference between an Oak and an Ash.

But I no more recommend that all the rows we plant should be devoted to science, than that planting in rows should be general, for no one better loves the grand effect of a fine avenue of a single variety, of Elms or Maples, or of Elms alternating with Pines or Hemlocks. The beauty of an avenue is a separate and important consideration.

The row, however, is not the best form in which to plant an Arboretum. The real habit and character of a variety can not be so well seen in a single specimen, by the side of an avenue, as in a group. Grouped trees are better seen from all points of view, than those unrelieved by any companion. And, besides, the object being to familiarize people not only with the individual, but with the *family*, several specimens are necessary.

I have several times alluded to a doctrine, advanced by Gilpin and others, to the effect that but a few varieties should be introduced in ornamental landscape, and they in great numbers, in order to secure the characteristic effect, whether of Oak, Ash, or Pine. Now by planting in a well-disposed group one of each species of Oak, the best Oak effect can be produced, and as the family is large, quite a wood can be formed, with a pleasant variety of individuals, and yet a certain unity of effect. This may be heightened by contrasting and joining with the Oak wood on one side, or perhaps running into it Hickories, they again blending with Chestnuts, which in their turn combine with Beeches. The Hickory and Beech are more alike than the Hickory and Oak, or the Beech and Chestnut, so that considerable contrast would be secured. At proper points the species — small in number — of Hornbeam and Hop Hornbeam, could be grouped to contrast their light and pliant branches and small leaves, with the sturdy and gnarled Oaks. The Hazel, varying in size from a mere shrub to a low tree, should be planted near the edges of the group, to fringe it, and combine Grass and trees.

Thus, without going out of the deciduous trees, we may produce very beautiful and strongly contrasted effects, and in such a way as to mark decidedly the scientific character of the material used. We have joined the two families of Cupuliferæ and Juglandaceæ, and have made the beginning of a properly arranged Arboretum.

The shrubs and flowers which inhabit woodlands vary with the variety of trees forming the wood. I do not mean that shrubs, flowers, and ferns will not live except in particular woods, but that they have strong preferences, by humoring which we may gain both in beauty and scientific interest. And different species of trees are the home of different and particular species of Lichens, Liverworts, and Mosses, while others of these plants live on all trees alike; another branch of botanic science may thus be illustrated.

To return to the trees; the spiry branches and small leaves of the Hornbeam are very like some kinds of Elm. The resemblance at once suggests the point with which to connect the Elms. These vary much in character. The English Elm is a stately, close tree, more like the Oak, a strong contrast to the American Elm, and these are not the only members of the family which contrast. To a group of them, the English Elm in the middle, tall and sturdy, will give body and vigor; along the edges we shall be attracted by the rough bark of Ulmus suberosa, the cork-bark Elm; at a well-chosen point the grace and beauty of the Ulmus Americana will convince the most complete monomaniac on the subject of caterpillars and canker-worms, that we should rather be more careful in its defence, than inclined to discourage its use. Connecting the Elms and Hornbeams, we might introduce the Nettle-tree (Celtis occidentalis), that queer hybrid which seems to be an Elm-tree bearing blue cherries, whilst Celtis pumila is the shrub pertaining to the family.

No need to multiply examples; enough has already been said to show how science and beauty may both be made prominent in groups of deciduous trees. If we wish for contrast between deciduous and evergreen trees, we can have it by blending Hemlocks or Spruces with the Beeches or Elms, by the introduction of a few Birches and Larches, a gradation pleasant and yet productive of striking contrast; or we may boldly push our White Pines up to the Oaks and Ashes, sure that the fall coloring will justify our practice, even to eyes which can see no justification in the likeness between the stem and branches of the stately and pointed Pines and those of the Ash and Oak. In short, the scientific character and connection of our forest trees may be shown to as much advantage as their beauty, in groups and copses.

I use the word *group* for want of a better. The popular idea of a group or clump of trees is a bunch of trees planted in a circle or square, or some forms as close together as possible originally.

Frequently directions have been given for making such groups;

to plant the trees as closely as the quality of the soil will allow, surrounded by a fence to protect it from the browsing of cattle.

The beauty of the fringe along the edge of plantations is certainly much reduced by the browsing of cattle, and there is no protection like a fence. But fences are expensive, and consequently increase the cost of the plantations; therefore, if the trees are to be protected with a fence, there is an almost irresistible inclination to draw the trees into some close and regular shape which will need but little fencing. It being plain that the resulting group will be stiff, the planter argues that when grown, the trees can be cut out so as to produce an irregular shape. But the argument is very specious. Trees grow so slowly, that it but rarely happens that he who plants, lives to thin them, and how can that unity of design and execution which is so essential to the success of landscape gardening — especially in plantations, its most important feature — be secured, if the work designed and commenced by one person is continued and completed by another? When trees are planted, it should be in accordance with a well-digested plan. In order that they may be perfect when mature, their mature perfection should be distinctly seen in the imagination of the designer. He will then plant each tree where it will stand, so for as the outline of the group is concerned. Its interior may be cut out without greatly altering the effect; not so the outside.

Another reason why the plan of cutting these crowded groups into shapeliness can never be realized, is found in the fact that trees thus planted can never attain the complete beauty of their variety. Every one knows that trees grown in masses, with the exception of those on the edges of the plantation, lose their lower branches; those branches only develop fully which are open to air and light. A great beauty of an irregular plantation is, that its trees feather down to the ground. Let A be a group of such outline as we want 20 years after planting it. What we want can be obtained only by planting it in this shape. Surround it with a fence as in the cut, and lose for Grass, pasture, or tillage, all the unoccupied land within this fence; let it go cheerfully as part of the price, without which you cannot have a fine group.

When it is necessary to form a group by cutting it out of trees already well grown, much may be done to relieve the nakedness sure to follow, by setting tall and quick-growing shrubs along its edges; they will soon protect and fringe the trees.

In such cases, select shrubs that will bear the drip from trees, to stand nearest the group.

To protect new plantations from cattle, without a fence, the English planters fill in among the trees with thorns of various kinds, of a rapid habit of growth. They may afterwards be left, or cut away, as the beauty of the group demands.

A mistaken assumption with those who recommend that trees be planted in close groups, to be afterwards cut into shape, is, that the owner will thin out the trees when they are well grown. By the end of 20 years he will become accustomed to the arrangement, will hardly believe that it can be improved, and will have a decided repugnance to cutting down his trees. Those who plant or own ornamental trees, acquire so blind an affection for them, that they cannot allow any thinning, however much their plantations might gain in beauty by it.

Never plant a group in a circle, or other regular shape, unless from some imperative necessity. You may lay it down as a rule that the same amount of material may be used more pleasantly in some irregular form. You cannot mend a regularly shaped group by planting up to it hereafter; it is as unapproachable as an ice-

B

berg. B is a circular group. After it is well grown, approach it as you may with trees and shrubs, you cannot disguise its originally hard shape. If it stands alone, — as on a lawn, — it is equally bad from all sides; no more play of light and shade, no more variety of outline, than a barrel! If in the corner of a fence, — as in the cut, — it is irreconcilable with the surrounding lines, and cannot be relieved.

The first glance shows that the treatment of C or D is infinitely better. In B, even the beauty of the individuals is lost, whilst in C and D, each tree is improved by its neighbor.

The recommendation frequently given to use the bushy tops of young Evergreens in marking out groups for planting, is good. They may be cut 3 or 4 feet long, and pointed at the but, so as to be easily thrust into the ground, where they are so prominent as to give the character of the group at once. Stakes are rather small and inconspicuous. But be careful not to be guided in marking out your group by some fancied beauty or picturesqueness of outline; it will lead you into errors as bad as a ring fence. The outline is but a secondary consideration in a group; the aim of the planter should be to exhibit the beauties and peculiarities of the trees he uses to the best advantage; and, accordingly, he should so arrange the outline of the group, that each individual may have just its appropriate place.

The outline of a wood may be formed on the same principles as that of a group, but their interiors must be differently managed. The interior of a group should be as closely planted as is consistent with the proper development of the trees; but in a wood, there is a great charm in the frequent recurrence of grassy glades, dells, bits of water, groups of shrubs, openings with a single tree standing in them; and this must be borne in mind when a wood is made. If there are trees enough to give a wood or forest effect, to shut out the world, make these openings within, wherever the surface will allow; they not only contrast pleasantly with the general denseness, but they admit sunshine, and are rich with wild flowers and green grass. In such a wood, the depth of a hollow or a mere dimple may be much increased by planting its edges with trees of rather dark and sombre character, with marked, contrasting horizontal branches; whilst any little knoll may be raised decidedly by planting it with pyramidal and fastigiate trees.

To conclude this branch of my subject, I must refer you once more to Nature's practice. Possess yourself of the spirit with which Nature disposes trees, rocks, hill-sides, valleys, and when the opportunity offers, practise the lesson she is so ready to teach.

SHRUBS. — I have repeatedly dwelt on the beauty and capacities of shrubs. They may be used almost without limit. Were the number of trees planted about our suburban houses reduced two-thirds, and replaced by well-selected shrubs, the general gain would be considerable. Few persons know what size and beauty groups of good shrubs acquire, when standing alone. There may be such a gradation in size as to carry them from the grass almost up to trees, and when varieties are properly combined, they give a succession of blossoms through nearly the whole growing season. Many shrubs, too, like Barberry, Privet, Black Alder, Snowdrop, produce berries quite as beautiful and striking as their blossoms, and which take up the beauty where the flowers leave it, and carry it on to midwinter. Groups of Rhododendrons, Laurels, Hollies, — particularly in favorable spots in the deep wood, — have a beauty of foliage unsurpassed by any tree or plant, while the color of the flowers of the two former, and the berries of the latter, equal the richest garden display. The inhabitants of the deep woods are many and various, and well pay for the trouble of making their acquaintance.

The following list includes many of the best native and foreign shrubs: —

Country.	Name.	Size in feet.	Color of flowers or berries.	Time of flowering.
Native,	Alder,	20,	long tassels — buff,	April,
"	Amorpha fruticosa,			

Country.	Name.	Size in feet	Color of flowers or berries.	Time of flowering.
Native,	Indigo shrub,	3,	purple,	July.
"	Andromeda,	1 to 6, many varieties,	white and red,	Apr. to Sept.
Nat. and for.,	Azalea,	"	many colors,	May to Aug.

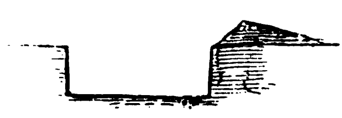
Of wonderful beauty. Azalea Viscosa of our swamps is large, bears the shade of trees well, likes damp places and any kind of culture, and is deliciously fragrant.

Country.	Name.	Size in feet	Color of flowers or berries.	Time of flowering.
Foreign,	Althea,	3 to 12,	many varieties and colors,	Aug. to Oct.
Nat. and for.,	Barberry,	"	sev. varieties—yellow flowers; red berries; red leaves in fall,	May, June, berries thro' rest of season.
"	Bearberry,			
	A trailing vine, adapted to rocky and bleak places.			
Native,	Bayberry,	3,	berries,	
"	Bignonia,	vine,	yellow and orange,	midsummer.
"	Bladderwort,	10 to 20,	white,	midsummer till winter.
"	Button Bush,	6 to 15,	brown ball,	August.
Foreign,	Box,	3 to 6,	evergreen and variegated.	
	Excellent for edgings or single specimens.			
Native,	Cornel, many varieties.	3 to 12,	white, some with berries,	May to winter.
"	Clethra,	6,	white,	August.
"	Cinque Foil, (shrubby,)	5,	yellow,	September.
Nat. and for.,	Clematis,	vine,	white and colored,	July to Sept.
"	Currant,	3 to 6,	red and yellow,	June to Aug.
Imported,	Daphne,	4,	variegated, some red leaved.	one in April, one in Sept.
Native,	Elder,	6,	white, with black berries,	June to Sept.
"	Euonymus,	6,	red berries,	June to winter.
"	Ferns,			Perennial.
	Forsythia, viridissima,	3,	yellow,	May.
"	Ground Nut,	vine,	purple,	August.
Nat. and for.,	Honeysuckle,	vine (extra),	all colors,	June to October.
"	Holly,	already described.		
English,	Hawthorn,	6 to 20 (extra,)	white and red, with berries,	June to winter.
Native,	Hazel,	6 to 10,	tassels and nuts,	April to Oct.
Nat. and Eng.,	Ivy,	vines (Am. poison.)		
	Dwarf Juniper,			Evergreen.
Native,	Kalmia,	6,	rose colored (extra),	June and July.
"	Leatherwood,	3 (wet land),		June,
"	Ledum,	3,	pink,	July.
Foreign,	Lilac,	3 to 15,	several colored,	May and June.
Native,	Osage Orange,	20,	for hedges,	
"	Privet (extra),	3 to 6,	for hedges — white and black berries,	June to winter

Country.	Name.	Size in feet	Color of flowers or berries.	Time of flowering.
Native,	Roses,	already described.		
"	Rhododendron,	" "	like Kalmia.	
"	Rhamnus-Buck-thorn,	10,	hedge — black berries,	
"	Tamarix,	4,	white,	autumn.
"	Spice Bush (fragrant),	2 to 6,	purple,	June.
"	St. John's Wort (shrubby),	5,	yellow,	September.
Nat. and for.,	Spirea,	3 to 6,	many colors,	May to Sep.
"	Sweetbrier,	already described		
"	Smilax (very thorny),	vine,	very thorny.	
"	Snowdrop,	5,	white and red berries,	Aug. to winter.
"	Sumach,	20,	red berries, curious wood,	"
"	Vaccinium,	3 to 6,	white, fragrant berries,	June to Sept.
	Wigelea,	5,	red, white, and yellow,	"
"	Wisteria (beautiful),	vine,	purple,	May.
"	Virginian Creeper,	vine,	called hitherto Woodbine.	

HEDGES are not well understood. They are too often considered a part of the ornamental treatment of a place. Now a hedge is a *fence*, is good or bad as it answers the purpose of a fence, as it is luxuriant and well kept, or thin and neglected. When good, it is certainly much more pleasing than most close fences. Where fencing material is scarce — as at the West — hedges should be much used as fences.

Few shrubs are well adapted to make a close fence. The Osage Orange is the best for farm purposes, where protection is desired, and the climate is not severe. It will flourish in any part of the Middle, Western, or Southern States, and after the first year or two as far North as this book applies. No plant is more easily cultivated. It is best to place your hedge — of whatever plant — on the hither side of a ditch, so that animals may be prevented from charging the hedge at full speed; its thorns will protect it from any mild attack. Dig the ditch to suit yourself, beyond 4 feet wide and 18 inches deep, nothing less is much of an obstacle to cattle. The earth dug out should be placed on the hedge side of the ditch, sloping as in the cut. Sow the seeds, or set young plants of the Osage Orange from 12 to 18 inches apart; the seed may be



put closer, and afterwards thinned; the soil should be rich, and be deeply dug, ploughed or trenched first. If you use young plants, cut them within two eyes of the surface of the ground, and in the following spring cut down as much in proportion; do not try to get the hedge quickly. The second year after planting—say in June—cut the sides of the hedge to the shape you wish.

A B

The conical is best as offering most resistance to the action of snow, (A). B is more common, and poorer. The third year, cut back enough to ensure a good hedge. If it is 6 feet high at the end of 5 years, you do well. And if it reaches 6 feet by slow growth, it will turn a mad bull.

Buckthorn and other hedges are made and managed much in the same way.

In some respects Buckthorn is the best hedge plant. It grows rapidly, is perfectly hardy and uninjured by any insect. Hawthorn, the common English hedge, is not well adapted to our climate, and is also liable to be attacked and destroyed by borers. Other varieties of the Crategus, Cockspur Thorn, Crusgalli, and Cocinnea for instance, are better for our general use. Every portion of our country has thorns admirably adapted for the purpose.

Privet makes a beautiful hedge. It never grows large but is perfectly hardy and almost evergreen. When a few years old it will, if well managed, both blossom and bear berries, and hold its leaves till December.

Hornbeam, Beech, Roses, Cat Briar, and many other plants, are used for the same purpose.

Cat Briar (Smilax rotundifolia), makes a capital hedge for disputed boundaries, edges of ponds, brooks, etc.; grows fast, needs no pruning, and in a few years presents a perfectly impervious fence to men and animals, while it is a favorite haunt for birds. The easiest way is to set bushes, dead or alive along the line, and plant among them either the roots or the seeds of Cat Briar. Plenty of roots may be got from a Cat Briar thicket, and each joint will grow. A few years will turn your bushes to an unequalled hedge. Keep the roots well cut back, as they spread badly.

All these deciduous hedges may be started in three ways. 1st, from plants set in a *single line*, 6 to 48 inches apart, according to the size reached by the full grown plants; 2nd, from plants in a *double line*, the lines 1 foot apart, the plants in them alternating, not opposite each other, 6 to 48 inches apart; 3rd, from *seeds*. Draw a line down the middle of a trench and drop the seeds along it, two or three in a place at the same distance apart as the plants; or a single berry may take the place of the 2 or 3 seeds. Plant in the fall to get the benefit of the frost; cover one-half to one inch deep. They will generally make their appearance during the next summer; keep clear of weeds. Under either method the soil should be well trenched, and the hedges be cut back like the Osage Orange, and carefully pruned in July and August of each year. They then commonly make two growths, the second of which restores roundness and smoothness to the clipped surface.

Evergreens make beautiful hedges, and where a fence would be used as a screen, they are the best plants to take its place, affording as they do shelter both in winter and summer, and being more beautiful than ordinary deciduous hedges. Arbor Vitæ, Hemlock, Red Cedar, Norway Spruce, are the common evergreen hedges. The American Arbor Vitæ makes the quickest growing and stoutest hedge, and is liable to but few accidents. At times a single plant dies from cold or heat, or disease, but as a class they are safe and hardy. In 8 or 10 years they make a hedge 6 to 8 feet high a perfect screen from wind and observation. Set the plants from 18 to 36 inches apart, according to size. Prune once a year into the desired shape. The best time for pruning is just before they make the new growth which will cover all signs of the shears. The Siberian and the Chinese Arbor Vitæ are smaller than the American and rather more beautiful. They make excellent division fences for flower garden and shrubbery, and never attain the height of the American. Treat like the American.

Norway Spruce makes a stout, quick-growing, impenetrable hedge; plant 2 or 3 feet apart, and prune frequently. They may be allowed to grow 10 to 15 feet high and wide in proportion. Probably no better high hedge is known.

The Red Cedar makes a very pretty hedge; plant 2 feet apart.

But when used as a hedge plant it is liable to be winter-killed and to die from other causes and is never stout enough to resist cattle.

The Hemlock makes the most *beautiful* hedge that I am acquainted with; its delicate spray and foliage are always lovely, particularly when making their new growth, when the light green tips seem like thousands of blossoms bespangling the hedge. Of its appearance when gemmed with rain drops I have already spoken. Plant and treat like the Red Cedar.

Many other plants are used for hedges. A beautiful effect may be got with Pyrus Japonica; a hedge composed entirely of it seems like a line of fire when in blossom; combined with Hemlock or Arbor Vitæ it is still finer, the evergreens presenting a beautiful contrast to the flowers.

Roses, Altheas, Barberries, Guelder Rose or Snow Ball are all good for this purpose. The Black Alder is particularly fine with its lively scarlet berries in winter, but not so good for fences or screens as the preceeding, which are hardy and easily managed. Care will make a good hedge of almost any plant, and those best adapted to the purpose depend greatly on the gardener's attention. All hedges need deep rich soil, and regular care in digging, manuring and pruning.

The varieties of hedge are so many, and they are so differently treated in different regions, that it is useless to attempt a minute discription of each. When they grow old and die out badly at the bottom, they may be renewed by cutting them down within a few inches of the ground; the strength of the old roots will enable them to make a strong growth in a single season. Manage them afterwards like a new hedge. When a single bush in the hedge dies, remove it and set a new plant in its place; weave into the space above the new plant plashings of old thorn branches, to fill the gap till the plant grows to the level of the hedge. Or, in such a case, you may introduce the seeds or young plants of Smilax.

The usual mistake in managing hedges is to stint manure and neglect pruning. It is folly to neglect pruning in the hope of getting a large hedge sooner. To be a perfect fence a hedge must be thick at the bottom, and this can only be the case with one which is cut back closely when young, and thus forced to throw out an abundance of low branches. And by after-pruning to the shape I have advised, the hedge may be made to keep itself thick below; but the hedge which is widest above shades and kills out the lower branches.

To allow some of the plants or trees to grow up above the hedge at regular intervals, is bad practice. The stronger growing tree saps the ground, and robs the roots of the hedge near it, beside killing it with its shade. It is robbing Peter to pay Paul.

WOODLAND. — I have tried to block out rudely the rules for planting trees so as to produce good effects, but have not yet considered wood as a crop. No better cultivation can be applied to much of our waste land than to cover it with wood. I have mentioned that waste, sterile land, abandoned to the growth of wood, is fertilized by the annual deposit of leaves, until we may not only cut a large amount of wood, but have left after it land that may be cultivated with profit.

In all parts of our country there are towns like Duxbury, in Plymouth County, Mass., whose soil naturally light and sandy, has been exhausted by long culture, till it has become really barren. A very small outlay would make this land the source of large profit. In midsummer it should be ploughed, or even harrowed, and sown with the seeds of White Birch, Poplar, White and Yellow Pines, American and Scotch Larch, Scotch Pine, some acorns of the White and Red Oaks. This seed should be sown very thickly, as much of it will be eaten by birds and insects. Then harrow again, and roll, if the surface admits of a roller. During the next spring much of this seed will germinate, and for several years afterwards new plants will appear. Growth will be slow at first, but will increase as the young trees shade and fertilize the ground. Rev. Morrill Allen, of Pembroke, Mass., recommends us to cut back the seedlings, especially of Oak, during their first or second year, in order to strengthen the roots. The trees will soon cover the ground, too thickly if the seed germinates freely; thin and prune according to the growth, paying the cost by so doing. After four or five years of little apparent progress, the young plantation will grow rapidly, and in 20 years it will give 20 cords to the acre, worth not less than $2 per cord — $40. And if cut at that time, it will leave the land in good heart.

If left longer, the wood will rapidly increase in value, at the annual rate of six per cent of its value, according to reliable experiments in measuring the relative growth and expansion of many trees. If left for 40 years, this land will not only yield 40 cords of wood to the acre, but will have paid during the time a fair interest in thinnings, fence-poles, etc.

Not an acre of land in this Commonwealth is too poor to be thus improved. Of course every acre cannot be made of the best quality, but every acre can be improved.

The above method of planting costs less at first than any other, but is not the best or surest. The best way would be to plough thoroughly with a Michigan plough, and sow the seed in a drill in rows 3 or 4 feet apart, with 300 pounds guano, super-phosphate, or similar material, to the acre, to hasten the young growth.

The lands we speak of are dry and sandy, and are burned by the summer suns. The trees give some shade, even in their earliest years, and more as they increase, until they materially diminish evaporation. Their leaves enrich the surface; their roots draw up food from the subsoil, and entirely change the character of the soil. A liberal supply of kelp and muck at starting will make the growth more sure and rapid.

It is not absolutely necessary that any attention should be paid to such plantations for 40 years; but in that case the growth will be much slower and the yield less, for the trees crowd each other, and there are too many mouths for the food. Gradually the weaker trees, and the lower branches of the stronger, die. Trees stretch their boughs eagerly to the air, and never grow freely when they are deprived of sunlight. The proper method is to thin and prune annually after the fifth year. The weaker plants and the lower branches of the stronger should be removed; the amount of thinning must depend on the rapidity of growth and other circumstances, only to be met by the judgment of the forester. Cut at first every third or fourth tree, afterwards those which do not thrive or are over-crowded; but remember that all trees have not the same rate of growth. Poplar, Birch, and Larch grow much faster than Oak and Pine; the Pine quicker than the Oak and yet the slow-growing trees will in the end prove most valuable. It should be our aim to remove first the quicker-growing and less valuable trees, and retain the Oaks and Pines as the permanent plantation. The cost of preparing and planting need not be more than $5 to $8 per acre, and the expense of cultivation will be paid by the thinnings. The profit will come in the last years of the operation, and will be 20 to 40 per cent on the whole undertaking. There will be an additional gain in the improved appearance of the neighborhood.

This thinning is an essential part of the proper treatment of all wood-lots. Farmers who cut all the wood from a lot, regardless of size or quality, whether for use or sale, are managing as ill as can be imagined. They might thin in such a way as to get a large yearly profit, and yet get more for the remaining wood than for all which they now cut off at once.

Suppose an acre to be covered with 500 trees of 30 years growth, standing 10 feet apart, both hard and soft, of slow and of quick growth. If all are cut at once the wood will not be first-rate for fuel, as it is mixed. If we cut out 250 trees judiciously, remembering that a soft-wooded, quick-growing tree impoverishes as much soil as the best varieties, we retain 250 trees of the best quality. Next year these will have twice as much light and air as they had before, and almost twice as much earth to feed in; — not quite twice as much, because the stumps of the trees felled will throw up suckers which need some food. The natural increase of unthinned wood is 6 per cent; of wood well thinned 20 per cent, but we will call it 15. Next year we can cut 15 per cent of the remaining trees, (37 trees,) as a clear profit, getting the value of 537 trees for the 500 originally standing on the acre, and in the same ratio in after years. Continue thus till all are cut, when the saplings of the first cuttings will have become quite large trees. In this way a farmer may make his wood lot perennial, both for fuel and beauty, and the eye would not be offended each spring by the sight of thin, bare fields, where were beautiful groves the year before. One of the most forbidding and desolate features about our country towns is the mark of this yearly devastation which is quite unnecessary. By thinning properly you "have your cake and eat it too." By cutting clean, you "eat cow and calf together."

It is strange to see men leaving their country homes to perpetual sterility, and gathering wealth in cities to be lost in bad investments or invested at low rates of interest, when by transforming their native plains and pastures into woods, they might beautify their birthplace, make it the pride of the country, and at the same time invest their capital at the best of rates.

A secondary profit will arise from such a course; every year we see men of wealth leaving the cities in summer to buy houses in the country; however wrapt in money making, they are not insensible to rural beauty. Country towns properly improved will become exceedingly attractive; their lanes and by-ways through woods and along water courses, will make drives of uncommon beauty; the places will draw summer residents whose money will give employment to many persons, and contribute to the permanent enrichment of the little community. The more the number of such persons who visit a town, the more land increases in value.

I have heard the past and present inhabitants of decayed and sterile towns bemoaning the departed glories of their birthplace, and contriving means for restoring that glory. They would foster manufacturies for which the people have no taste, or the place affords no facilities; they would build ships for which there is neither sale nor use; would start banks without depositors, mills without corn whilst they leave untried the readiest means to enrich themselves, the soil, and the town.

The woodland shown on the ground plan of our place is variously planted, and divided into evergreens, deciduous trees, shrubs, arboretum, and general planting, as shown by color and index. It lies mostly about the pond and entrance, and at the foot of the lawn. Our house stands on rising land, with comparatively few trees about it. The treatment proper for the home in the matter of trees and woods, varies with the character of the estate and neighborhood. If it is in the skirts of a town or on a little estate, set it among trees if possible, for the sake of privacy, contrast and shelter. If it is in the country or on a large place, set it out of the woods and group trees about it for better effect, as a relief to the house, and to give shade at those hours of the day when it is most grateful. Here we want contrast with the surrounding country, we want to look out over the landscape and give free entrance to sun and air. There should be woods so near that we can easily walk to them; but we do not care to live in them, and being at a little distance they become an attractive and a pleasant termination to our walks.

In this way they not only add to the general beauty of the estate, but give us a point to walk to, an object of interest for strangers to visit. I repeat that the location of the house is a very nice matter, and in deciding it, the peculiarities of the place, the neighborhood, and the proprietor, must be taken into consideration.

When woods border on water, as ours do, there is a vast increase of beauty. Their shadows and reflections often make us doubt whether the real wood above or the mimic wood below is the most beautiful.

WATER. — Perhaps the most difficult, certainly the most often ill-managed part of the arrangement of ornamental grounds is the ornamental water, whether artificial or natural. No subject connected with landscape gardening has been so often and so lengthily discussed, and none is less understood. Among the contradictory theories and rules, each person is compelled to block out his own course.

The pleasure which the sight of water gives is natural, and the wonder is not that the fondness for it is so general, but that it has not a stronger influence. In its simplest forms water has a marvellous individual beauty. Even the closest, most every day and prosaic familiarity with it, cannot deprive it of its charm as the most lovely and bewitching of fluids, even when it stands in or falls from a single glass vessel. Its *spontaneous* motion, in the fountain, the stream, the rising tide, makes it still more fascinating.

When to its inherent beauty is added the grace and life of motion with all the resulting music, it becomes the principal charm of whatever spot it inhabits.

Its treatment in ornamental grounds depends on the forms in which it appears, and for convenience let us divide these into fountains, still water, and running water.

It may be either a primary or a secondary object. Secondary, when it is used to heighten the general beauty of the place, as when we own, perhaps enclose, a pond, brook, or fountain. Primary, when it determines the treatment of the rest of the place, as when we bound on a river, a lake, the ocean, or have a waterfall on our grounds or in full view. In such cases the grounds are to be used to enhance the beauty of the water, and so far as we may, to bring it into our presence. If it be the ocean that we bound upon, we should open our plantations in one place so as to draw in as much as possible of the ocean view, and thicken them in another, where we approach our neighbor's, that we may shut out all that speaks of narrow boundaries, and is out of keeping with the illimitable. Our improvements must be adapted to the character of the shore. Where that is low sand beach, and our land is level, our plantations must aim to give broad views of the ocean, and shut out all that is disagreeable. Our lawn should slope and undulate gracefully to the shore, so that the repose of lawn and beach may harmonize with the summer peace, or contrast with the winter rage of the sea. So, too, on the edge of lake or river.

Men value most things in proportion to their rarity, and to the amount of their own ownership in them. Distinct from all meanness or selfishness, there is an inexpressible pleasure in owning a beautiful thing. We feel ourselves nobler and better by the beauty we have, and are sure that we are enriching friends and visitors when we show it. Much as I love fine views of the ocean under any circumstances, I would choose that sea-shore residence which, being on a promontory, or on the side of a bay, seems to give a kind of proprietorship in the ocean. Our aim, then, must be to increase the appearance of *embracement*. Good planting will serve to carry our land into the water and bring the water into the land.

As we leave the trees and lawn and come to the shore, the question arises, what shall be done with the water boundary. Let one rule never be forgotten: *preserve or restore the original character of the shore*. If it is a sand beach, no matter how great the in-roads upon your lawn made at times by the swelling surf, never bound yourself by a wall. If a stone boundary is necessary, give a sloping, broken shore of shingle (loose stones of all sizes), never shutting or walling out river, lake, or ocean. Here pre-eminently the true art is to conceal art. Nothing is more repulsive than a fortified shore. I admit that it is not pleasant to have one's lawn washed away, or one's trees undermined; but neither is necessary. Follow your sand shore along and you will come to some place where the sand is replaced by shingle. This shingle has assumed some definite and permanent slope from the water's edge to the land above, or to the top of a ridge, which is not deranged by the action of the waves. Here is your lesson. Begin at your imperrilled boundary and fill out with shingle, large rocks at first, and smaller beyond, at the same slope far enough to protect you. Do not attempt to make a perfect work at first, or to lay a pavement; throw the stones loosely into the general shape you wish them to take, and leave them to the action of a winter's surf. Before spring the waves will pack them into the best possible shape.

If you wish to change the water boundary by digging bays or carrying out a mole or promontory, go and see how nature does it. You can find some place like the proposed improvement.

Perhaps, however, you have to deal with a piece of marshy, sedgy, low land, repulsively muddy. Make no wall or gravel bank, unless they can be so skilfully made and screened that the change between the natural and artificial will be imperceptible; dry your immediate shore by underdrains; plant the outer edge with such trees and shrubs as like brackish waters. The Button Ball, Beach Plum, some kinds of Vaccinium, Cornel, Bearberry, Wild Rose, Ivy, Woodbine, Cat Briar will combine to fringe the marsh. Amongst them, and on the shoreward side, plant the Golden Rod and some of the Asters. Near and among the shrubs set Tupelo, Sassafras, Red Cedar, some of the Oaks, and, as you come farther in, any tree or shrub. This fringe will shut out disagreeable sights, and join your place to the marsh and sea gracefully and naturally, and its roots will soon make a fence able to resist the slowly moving tides of the marshes.

But perhaps your shore is bold and rocky, like those of Nahant, Gloucester, Cohasset, Newport. Then remember that these shores are the most wonderful and awful of Nature's works; they are the solid, impregnable fortress set up by her as the limit of old ocean's power. They are rugged, massive, sublime; in them there is no debatable ground between the beautiful, the picturesque, and the sublime. The view from them may be beautiful; their combined effect may be picturesque; but in themselves they are sublime. The hottest, most enervating summer day never tames them. We may sleep on them, hunt through their crevices for seaweeds and shell-fish, visit them daily, but we never venture on familiarities. They may be as calm to look at as the war-battered cannon in an arsenal; but as it is only necessary with the cannon to look into its throat, or glance at the truck splintered by hostile balls, to feel that it is a terrible thing, which one may indeed walk about and examine, but only with hat in hand, and a mood of awe and reverence; — so with these glorious rocks. Their wonders of science, their beautiful fringes of algæ, their delicate and graceful inhabitants, the rattle of the shingle upon them as the tide rises and falls, their rich deep color, may instruct, delight, and soothe; but the instant rejection and destruction of the tiny waves of summer tell us, by the spray borne to our faces in refreshing showers, of the awful battles which are fought there in winter storms, when the thick gray mists hang low over the leaden sea, when the war-blasts of the gale howl and sweep round them, when the blinding rain, and the terrible, the seemingly irresistible waves are alike reduced to the finest spray the instant they strike the solid shore. We cannot be for a moment on such a shore without feeling that it is the field of a never-ending battle. The water-worn pebbles, the holes indented into the rocks by the blows of monster mallets, the fragments of wrecks strown about, all keep the mind subdued and awed.

Stand on the rocks at Newport, towering above the sea, where is dashed the whole weight of the Atlantic waves, swelling on from Spain to New England, with a roar and rattle that would drown the loudest artillery, and dare to devise plans for their *improvement!* It seems incredible that a man should be found brazen enough to talk about laying out and improving such a spot. 'Tis true we might introduce a tuft of Golden Rod or Aster in some cleft, where, sheltered from storm-winds, the gold or gray would lend color and softness; or we might fill a sheltered hollow with the wild Mountain Bearberry, a plant that springs and thrives amid the battles of earth and sea; if soil and exposure allowed, we might plant Red Cedars to bend under the blasts, and, as along the Jerusalem road at Cohasset, stretch their weird arms inland, as though sheltering the earth from the terrible sea; we might set here and there the low-growing Juniper, or group in proper places such deciduous evergreen trees as the genius of the place tolerates; but to do as has been done on that same Newport shore, terrace the earth banks, cut the rocks into carriage roads and arches, scoop out and plant beds of flowers, the ladies of the garden, in the hollow of rocks, from whose bald heads the salt gales have swept away every vestige of grass, and whose only covering against the elements is their grizzled beard of sea-weed, is too monstrous and sacriligious to be the work of any one who dares even mention the word *taste* in his dreams. It is a sad mockery as a carouse in a graveyard; it is sacrilege in the eyes of every reverential lover of the beautiful. But it has been done even on the glorious Newport shore; one of the most sublime parts of the coast has been converted, by years of labor, and thousands of dollars, into a burlesque on nature.

Whoever is about to arrange grounds bounding on large bodies of water, should give long and careful study to the original character of the surface and the landscape, and should endeavor to appreciate its peculiar spirit. When really beautiful landscape surrounds an estate, it is rare that improvements can be happily made which are of a different style of beauty, as where the general tone is beautiful, we can with difficulty make our own place decidedly picturesque; nor among sublime scenery should we attempt to make a place beautiful. I am aware that my use of these descriptive words is somewhat arbitrary, and it must of necessity be so. Burke, in defining the difference between the sublime and the beautiful, has left no intermediate ground for the picturesque. He calls all objects sublime which are capable, directly or indirectly, of awakening emotions of terror, however slight in degree; other and pleasing objects he calls *beautiful*, or rather other objects capable of arousing emotions of taste. I have no idea of entering the lists against Burke and his school, but will state in what sense I use the terms sublime, beautiful, and picturesque.

The sublime in nature or art is that which can, directly or indirectly, awaken awe. I do not say terror, as that is an active emotion. Niagara, the Alps, volcanoes, glaciers, the ocean, a thunder-storm, a gale at sea, a tornado, are sublime. In them we must recognize a power which has overthrown or can overthrow man and his devices. They are the active manifestations or the evident results of a divine *power*. Every line in them combines to inspire these sentiments.

The beautiful may accompany the sublime, or even be a part of it, as where the quiet lake or valley is found among rugged mountains. The gentle flash of the waves along a sea-beach in summer, the champagne country, all of whose lines are smooth and easy, where hill, water, and wood blend easily and harmoniously, are instances of the beautiful. It has no abrupt contrasts, no startling combinations; "the line of beauty" prevails; curves predominate; in the prominent features no sharp angles appear; the trees are rounded and full, as Oak, Ash, Elm, White Pine.

The picturesque is the *result* of the sublime. The lightning is sublime, as it cleaves its way earthward through the black bosom of the thunder-cloud, and strikes and blasts some noble tree in a moment. The blasted tree remains a picturesque monument of the tempest. The noble ship, borne helpless with her precious freight of life, adds a fearful interest to the sublimity of the gale which sweeps her on to the rock-bound coast, but becomes *picturesque* when weeks or months afterwards she lies on the shore, with tattered sails and loose ropes flapping in the breeze, and broken ribs and planks, forcing the image of the skeleton of a sea monster on our imagination. Time smooths into picturesqueness the fearful traces of the avalanche; as it gives the beautiful the courage to creep up to and twine about the feet of the sublime, the place of meeting receives something from each, and the result is the picturesque. The curves of the beautiful are there mingled with the straight lines and sharp angles of the sublime. Harmonious con-

VIEW FROM THE GROUNDS OF H. W SARGENT, ESQ., FISHKILL, N. Y.

trast is the leading feature of this scenery. Through the light, sweet music of the beautiful we hear the deep bass of the sublime, ever true to the harmony.

Among trees the Norway Spruce, Hemlock, Larch, Tupelo, are picturesque.

After this explanation, the reader cannot fail to understand though he may not approve, my use of the terms in question.

To resume; the landscape gardener must appreciate the kind of beauty which surrounds any place, on which he is to exercise his art, and must work in harmony with it. Though contrast is the life of rural improvements, it can only be pursued with success within certain limits, a knowledge of which is essential to the artist. For instance: in an estate some miles in extent, situated in a decidedly *beautiful* country, picturesqueness may be gained by introducing so many trees and other objects of a picturesque character and by so altering the surface and water as to afford a marked contrast to the general landscape; but no conceivable amount of art can make any portion of the estate *sublime*.

In comparison with the sublime, the picturesque and the beautiful are as quarried stones to the everlasting hills. We may do what we will with the stones, may construct what we please; our edifice and masonry may strain the limits of human skill; but in comparison with Nature's works they are mere trifles. We may create the beautiful, may carry it toward the sublime till it becomes picturesque; but then our limit is reached. Unless it be thought that the magnificent is a step farther, when a skilful addition of objects stately but more artificial, as fountains, architecture, broad and brilliant masses of color, gives our estate the character in question.

Of the way in which a home situated at the foot of a mountain, on the sea-shore, at the head-waters of a river, or in the gorges cut by it — in short among sublime scenery — may be made picturesque by the tasteful use of the beautiful, I know no better instance than the place of Mr. H. W. Sargent, on the Hudson river, opposite Newburg. The river has just come out of the Highlands, and with the forest-clad mountains makes a scene truly sublime. On the home-side of the estate, the landscape gardener has most skilfully introduced the beautiful. On the opposite page is a view taken from these grounds. So well is that which was under control adapted to that which was beyond it; so well is the landscape drawn into the place, that the whole seems at times purely beautiful.

Another instance of proper adaptation of improvements to the prevailing tone of surrounding country is given in the view of the Fisher Place near Philadelphia. All the scenery of the neighborhood is beautiful, and with this the grounds are so in harmony as to greatly enhance both their own effect and that of the surroundings.

The house and grounds of Washington Irving, give another instance of judicious and pleasant contrast. This quaint old Dutch house with fantastic gables and wild draping of most luxuriant vines is very picturesque from the home-side. Taken in connection with the wild country lane that leads to it, the rude entrance, the banks covered with shrubs and wild vines, it is as picturesque as any specimen of landscape gardening to be seen in this country. Yet things outside the place, the Hudson with low banks and broad bosom, the far-off mountains, are beautiful rather than sublime.

There are several other views in different parts of the book, which illustrate the opinions thus briefly stated, and which tell their own story.

Ponds and Brooks. — Let us now turn to the consideration of bodies of water, which are wholly or partially under the control of the proprietor of the estate. The water may be artificial or natural, in the form of brook, pond, or fountain. In the two former cases it may be on so large a scale as to be worthy the name of river or lake; the latter like the gigantic fountains at Versailles, or the jet on Boston Common, may throw so large an amount of water that the cause is lost in the effect; but whether large or small the same principles apply to them.

When water is artificial, one of two things should be decidedly done; either the art should be carefully concealed and converted into a semblance of nature, or it should be made so prominent as to draw attention both to the beauty of the material and the skill of the workman. For skill is a thing by no means to be lost sight of in a beautiful work. Though it be the highest art to conceal art, the second place should be assigned to that which teaches impressively that man is the greatest of God's works, and that to him it is granted in many cases to increase the beauty of the minor things which are put under his control by their Maker. Evidently these two degrees of art have entirely different spheres for their exercise.

The pond, or stream which skirts a lawn, gleams in a wood, leaps down a hill; the water which gushes from a ledge of rocks by man's contrivance, can hardly be satisfactory unless they seem in place, unless they combine naturally with all about them, earth, grass or trees. Naturalness is a primary and essential element in their excellence; but in fountains, fish ponds, aquariums, which stand in flower-gardens or on esplanades and terraces, naturalness is quite a secondary matter. We know instinctively that the presence of water under such circumstances is due to art alone; and accordingly the art should be made prominent; it lends to the effect rather than detracts from it. We may build the pedestal of our fountain of mossy rocks, in imitation of sylvan grottoes or mountain springs, and may, perhaps, thus increase its beauty, — not because we believe that the arrangement is the work of nature, but because we admire the art which could present so charming a thing as water in such a way as to add the agreeable association of woods and mountains, mosses and ferns.

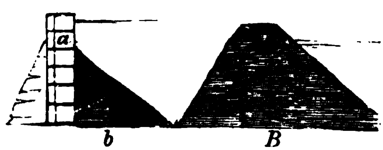
Or take an instance on a larger scale. Occasionally we meet with a natural and perennial stream of moderate size, winding through a hilly country. It may be wise to execute an idea suggested by the precipitous hill-sides, or by our preference for the grand effects of a mountain, lake, or tarn, over the attractions of any ordinary mountain brook (where the soil is of too poor quality to deter us on economical grounds); and to dam the stream and flood its waters back till they form such a pond as we like. The first step is to ascertain at what point the hills approach each other enough to allow a dam to be built with most economy and the best effect. Do not imagine me to mean *least cost* by *economy;* I mean *to the best advantage*, and may as well say here that cheap water works are a plague to an estate and its owner; if you attempt to deal with the subtle and insinuating element, remember that half-way work is ruinous, and that the cheapest work is that which is most thorough from its first general conception to the last detail of execution. To return; by following the valley along, we may find a point where the approaching hills will permit a dam to be made easily, and this is the point at which to pause and decide whether to give the dam a natural or an artificial appearance. In both cases the work must be equally well done.

First examine the valley and the views of it, as seen by the imagination, filled with water, which may be got from different points. Consider these views carefully. Though it be sometimes well to make ponds for boating, bathing, fish culture, and yet more for the beauty they reveal to us when on their shore or their surface, the wonderful variety of light and shade, the shadows sleeping in their depths, still in most cases these considerations are not the main inducement to make the dam. The views of the water which may be got from the windows of the house and from different points on the ground, the general beauty at a distance, are of equal importance with the nearer attractions. Consider the proposed water from all these points. If you examine faithfully, you will perhaps see that by cutting down or raising a small hill, by breaking a ravine through a ridge, eradicating or creating a wood, you may give your pond much greater charms. Pause now and inquire whether you are able not only to make the pond, but to reconstruct the landscape. There no art must appear. In dealing with the water and earth works it may be allowed to show itself; in the other changes, never. Study the soil; make the acquaintance not only of the trees and shrubs, but of the wild flowers, of the grasses even, which grow there, and must be reproduced if you remove them.

Having assured yourself that you can do this, take levels from the bed of the brook up the sides of the valley, along the hills, into the meadows; try the different heights. If your dam is 15 feet high, the pond will stretch along here and there; 5 feet more would give a beautiful bay or inlet, winding river-like behind the hill or wood, or through yonder valley, or would bring the sheet up to the view from this or that distant point. Another rise would connect it with another pond or stream. Try all these things. Then return to the dam. To make the pond with a dam of 10 feet, will cost a certain sum. The earth-work must be of sufficient strength and slope to bear the pressure of 620 pounds to the square foot at the base. 5 feet more in height involves an additional pressure of 310 pounds to the square foot, and consequently much more solid embankments, at a corresponding increase of cost. These facts should be carefully ascertained and estimated by a competent engineer, and what matter if his bill swells the expense by one or two hundred dollars, if thereby the value of the improvements is increased many fold, or the cost being thoroughly ascertained, the decision can be understandingly made whether the work shall be undertaken or abandoned?

You have now settled the question of where, how high, and how solid the dam is to be.

The resistance of water is overcome by giving the dam a slope on the inside and out. A dam with a perpendicular wall of masonry *a*, necessitates either an increase in the size of the earth-work *b*, or that the masonry should be very heavy and costly. A much more secure and less costly method, is to make the whole dam of earth, as in the cut B.



But before you can settle the question of the material to be used in the dam, you must decide what kind of fall or outlet the water is to have. The waste-way or fall may be made to suit the fancy and the supply of water. Under the lowest part of the dam there must be a flume to discharge, by which the pond can be drained at any time. This question of the waste-way or fall, brings us back to the consideration of the size of the pond.

Evaporation is nearly constant from every sheet of water. A stream which winds through a bog and along a cold shaded bed through the whole year, screened from evaporation under sun or wind, and maintaining a steady though small stream, may, if converted into a pond, be unable to do more in summer than supply evaporation. Thus we are compelled to take into consideration the amount of evaporation which our pond can support without shrinking into insignificance or uncomeliness.

The rule is sometimes laid down that an artificial pond, which does not at least remain permanently full, is worthless.

I do not agree. It is by no means necessary that it should stagnate when low, a misfortune not inseparable from a want of outflow, as appears in Jamaica Pond, a little lake of some three miles circuit, near Boston, which has no visible inlet and outlet, and what is true of a large pond, holds, under similar circumstances, for small ponds. It is urged that the water line left on the stems of trees and shrubs along the shore of a pond low in summer droughts, the rugged banks, the growth of sedge, etc., are unsightly and intolerable, and more than neutralize its beauty during the rest of the year. To argue the point would be to waste breath. What can be said to him who will not admit that half a loaf is better than no bread? It is true that the beauty of a full pond in summer is very greatly increased by the coolness it imparts to the air, and by the pleasures of bathing and boating. But lovers of nature know that the three hot months when ill-fed ponds shrink, are but one-quarter of the beautiful year. They know that such a pond in the early spring, when it reflects the tassels of the Alder, Hazel, and Birch, is decked with the floating flowers of Red Maple, and the keys of Maple and Ash, has a wonderful attraction. They know, too, that never is it more beautiful than when it catches and returns intensified the purple and gold of Maple and Ash, or is ablaze with the October fire of the Oaks and Walnuts. They know that in winter its outlet will be a mystery of icy stalactites, that the sides of the waterfall will be fluted with frozen organ pipes, whence the music of the brook below seems to flow. They know that in stinging mornings the warm breath of the brook will rise through the bitter air, and be caught and held in lacework by every twig and branch, till the silver wood rivals the summer glories.

They, like me, think half a loaf better than no bread, and we agree to make a pond, though it be full only half the year. When it is low, its edges, or even its bare bed, may in a few weeks exhibit a new beauty. As the water shrinks, sow the moist margin with the seed of Canary Grass; it will immediately germinate and keep the shore green all summer, and as it is not aquatic, will disappear soon after the water returns. But do not suppose that this is the only compensation with which the owner of a shrunken pond can console himself. To me the green covering is no more needed than are clothes on the naked limbs of the Greek slave.

Having made the dam, raise the water to mark the water line, and then draw it off. The same line may be marked by grade stakes, and the trouble of letting on and drawing off the water saved; but in that case you fill the pond with imaginary water, and the impression left on the memory is not so vivid, and certainly not so reliable, as by the real pond. Before you draw off the water, row over it in a boat, study every point and inlet. If you are not familiar with the shores of any beautiful pond, find one, and study it. You will then discover how little you know of the minute effects that the mossy rock, upturned stump, gnarled knuckles of the roots whose reflected beauty you so often admire are not absolutely and independently beautiful, but depend for their effect upon that which surrounds them, and what you admire is not the individual, but the *tout ensemble*; they are a part of the whole construction of the place, and adorn it, and are as relative to it as the ribbons and laces are to a lady's dress.

Let the pond be drawn off a few inches while still in your boat, and again study the shore from the water side. First there are large stones, some bare, some covered with minute infusoria and larger algæ. Among them spring Pontederia and Potamogeton, Sagittaria, Sedge and Bulrushes, then Grass and tufts of bushes, Viburnum and Cornel, the Button Bush, Alder, Elder, Clethra, and Andromeda. Or the stones and pebbles retreat under an overhanging bank, bound together by the roots of trees and shrubs. The gentle fingers of the wavelets have picked out the earth from between them, and the fibrous roots hang like a veil over the little cave within. Or the retreating water exposes the solid rock, which, as it heats in the sun, will be alive with basking frogs and turtles. Or the roots of a gnarled old Oak project abruptly. In another place the bank towers up overhead, covered with ferns and low shrubs, rich with Violets, Hepaticas, Anemones, or gay from bottom to top with Cardinal Flower and Golden-rod; and farther along, a strip of sand beach is left sloping slowly to the shore, to be lost in grass, or to open into a cattle track or roadway. Hither the cows will saunter lazily in the summer noon, and wading knee deep, will stand through the hot hours, beating the flies from their sluggish sides with their wet tails. The irregular flapping, the measured chewing of the cud, the patient waiting, all so in keeping with the surroundings, have attracted the artists of successive generations, and moved them to hand down to posterity the sweet rural scene in pictures, which they hoped posterity would never cease to love.

Does not the study of this shore prove that the retreating waters may add rather than remove something, and that for variety an occasional subsidence is desirable.

I cannot give minute directions for making your pond's edge; it is a matter of feeling rather than of rule. Each pond has its own character and should be treated accordingly. When you are at a loss what to do, I can only give you my former advice: hunt out a similar natural pond and catch its spirit. The country is full of beautiful ponds, of dells with pools in the bottom, where lessons unteachable in books may be learned.

So, too, if you want islands. You know Nature makes them from a kind of necessity; peninsulas are cut quite into islands; on accumulations over snags aquatics start, shrubs take root; and the resulting islets are among the greatest charms of the water. They may be the same in artificial water, may close or lengthen vistas, fill up openings that are too large, make bays; they become the resort of water fowl, and increase the number and variety of reflections. If you make your ponds as directed by damming a brook, you will probably produce islands unawares; some parts of the valley being higher than the rest will be cut off from the main land as the water flows back.

By making the outline of the pond in this way you will get a variety and fitness beyond the reach of the most artistic designer, however elaborately he measures and levels, and thus made it will have double the beauty it could have, if made in the same place by line and rule.

Where the shore of either pond or island is exposed to the wearing of a current, it may be fortified by stones, as directed for the sea-shore ; but never surround your water with a stone wall, unless necessity requires it. The basin in a flower-garden may be stoned because it is a basin ; and for the reason that the pond in a lawn or woodland is no basin it should never be converted into a washbowl by a stone margin ; the outrage is almost as bad as terracing the seashore.

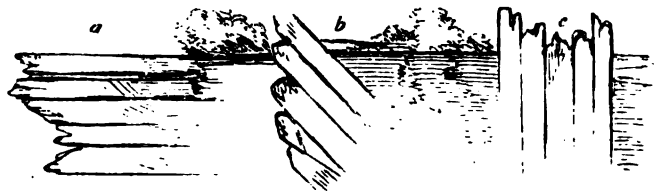
THE FALLS OF BEAVER BROOK, AT BELMONT, MASS.

But to the dam again; to the outlet, now that the extent of the pond is determined. Whatever our original prejudice for or against a regular or a broken fall, we must first consider the amount of water which will run over it during the months when it is full.

No words are needed to set forth the grandeur and beauty of a single, unbroken sheet of water, when upon the scale of Niagara, and even at the dam of a mill-pond there is no small charm in its regularity and glitter. But I confess that where the supply is not very large, there is to me no comparison betwen a well-broken fall and a regular sheet. The very mention of the two suggests the difference in the character of the dams. For the sheet there must be an uninterrupted descent from the top to the bottom, which can be obtained only by a confessed wall of masonry, or by an abrupt ledge, real or artificial. If the ledge is available, and the sides of the valley narrow to the very fall, and is planted with appropriate trees and shrubs and ferns, the single sheet may be made very effective; and when the stream is small and little or no water wastes, the solitude of the glen, the luxuriant vegetation, the ferns, lichens, and mosses, which will spring out of the crannies and crevices of the ledge, make an exquisite and impressive combination. There is a pleasure in studying the water-worn face of the ledge, and we can better realize how grand the fall is after a thorough inspection of its parts. A fall of this kind seen through a veil of trees with its concentration of water toward the outlet, its noiseless glide over the brink, the hesitating of the little drops left on the outside by the greater weight within, the dashing, foaming plunge below, has a solemn beauty, which may well rouse the feeling that there is nothing more to desire in the way of a fall, — unless a well-managed *broken* fall can be seen near by.

But if you decide to have a sheet, try so to combine the stones in the masonry of the dam that they may resemble the ledges near by, particularly if these crop out in the hillsides which descend toward the pond. A little study of the peculiarities of such outcropping ledges will teach you not only the intrinsic difference between different rocks, but how their characteristics can be imitated, and how artificial rock-work can be pushed toward, or even up to them.

Limestone, Slate, — indeed all the secondary rocks, — are decidedly laminated; they lie in strata and according to the *dip* of the strata is the appearance of the outcrop. In the three varieties *a*



b c, of such ledges we see how the treatment of a dam should vary, as it is in the neighborhood of one or the other; *a* is easily imitated, as its stones lie in the position which masonry most commonly takes, and if the pieces of rock are well selected and the sides of the ravine well managed, the dam in a few years after it is made will seem to *inhabit* the place. But in general these ledges are of varying softness, so that they break irregularly. The formation at Trenton Falls is of this character. In the interspaces there may be some long mosses and lichens, but rarely ferns or flowers, as the crannies offer no hold for the roots. For the same reason that *a* is good, *b* is bad for the single sheet; and yet when exposed to the eye for a considerable portion of the year *b* and *c*, are the most agreeable forms of stratification, because their crevices offer abundant foothold to ferns, wild flowers and shrubs, and the glen which is faced by them will soon be wild, verdurous, and a haunt for birds and lovers of nature. The perpendicular stratification *c*, breaks off on its outer laminations into irregular heights, (see cut), and can be easily adorned.

Another class of rocks, the primaries and volcanics, of which our New England is largely composed (granites, sienites, porphyries, conglomerates), lie in heavy solid masses dipping into the earth at various angles, but the strata being very thick, their outcrop seldom shows much stratification, is more often a bold smooth, water-worn surface, covered with some kind of lichenose vegetation, but rarely giving much foothold for plants. Among such formations the dam for the single sheet must be made as solid as possible and of stones native to the place, showing as little mortar as may be, trusting to the growth of trees and bushes near by, and the water lichens etc., to cover their face.

To whichever of these formations the dam is to be assimilated, if the native ledges do not come near it, set large masses of rocks into the neigboring banks, in imitation of the peculiar natural ledge, in order to blend earth and dam more kindly.

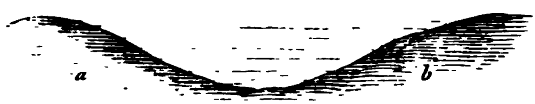
Your dam must be made after the habit of the natural formation, be your preference what it may; no other arrangement will harmonize well with the landscape. It is among horizontal or obliquely inclined strata of secondary rocks that the abrupt fall obtains; the water constantly wears upon and cuts them back. Not so with the hard rocks of the volcanic and primary formations; they offer a resistance too solid to be much affected by the wear of an ordinary stream. The streams which find their way through these rocks is so obstinately met and turned back, that they work hither and thither, and take advantage of every slope and inequality of the surface, finding it necessary to be guided by the original form of the stone instead of cutting their way through it; and to me such falls are always the finest, because they are always active and interesting. In them a very small stream is turned, twisted, and tormented before it can escape; at one point its impetuous rush is stopped by a projection of the rock; its waters roar and foam as they are crowded back, they eddy and boil till they find an escape at a lower point, or until they gather volume enough to swell over, when away they go! all foam and roar, to be again tortured and fretted. All is hurried beauty. Cries of pain at being dashed against hard rocks, and torn by sharp points, combine with the glad laugh of triumph as the water at last escapes and blends in the deep undertone of the current below, which has all the while been hastening on to its final leap. It is rich in variety; bushes fringe and dip into it, and sway with wind and current; trees root at the edge of eddies, where their seeds have been caught and whirled till they found a resting-place. In the winter each point is seized by the frost as a fortress, whence it throws out bastions and breast-works of ice to stop the stream. The constant dashing sends up unexpectedly large volumes of spray to clothe the trees. And when in summer the channel is nearly or quite dry, its "potholes," where stones have churned deep into the rock, its jagged points and polished surfaces, the little bushes and flowers which have clung tenaciously to the cracks, the flicker of light and shade make the bed of the fall almost as attractive as when full of water.

A broken fall like this gives the largest amount of beauty possible from a small supply of water, and will not generally be so expensive to build as the other. The bulk of the dam can be of gravel and clay, much less expensive than masonry, and only so much stone used as is necessary to receive and turn the water.

The fall several times referred to, and of which a sketch is given on page 789, is a notable illustration of the points just insisted on. It is on Beaver Brook, Belmont, Mass. In a distance of 200 feet it falls about 50 feet. The outlet of the pond is over a common mill-dam, 10 feet high, where it is caught in the jaws of a rocky ravine; the ravine narrows rapidly, and the compressed water foams and boils, but soon escapes; running some 50 feet, among rocks and trees, it meets a perpendicular barrier of rock, fringed with Ivy, and shaded by Elms, where it turns at a right angle, falling quite rapidly through a course of about 20 feet; then turns again at a right angle in another ravine, glides over some 15 feet of rapids and rocks, and makes its final leap of about 20 feet. This cold description can give no clear idea of even the mechanical formation of these falls, much less of their beauty at all times. In all parts but the outlet of the pond it is natural, and I mention it to show how nature makes falls among the primary rocks. By these turns of the channel a little water is made at all seasons to assume the character, give the foam and spray and music of a large fall, whilst in a freshet it rises from beauty to grandeur. It comes down, a torrent, with a body and violence that seems to threaten the solid rock, and sweeps along large fragments of rock like pebbles. In the ravine about the fall the high sides, outcropping ledges, sturdy trees, and views over the distance, give the scene a mountainous character; and almost within sound of the bells of Boston is a bit of wild beauty and real grandeur not often surpassed in the mountains and forests of Vermont and New Hampshire.

I have said that the dam of the broken fall may be made of clay and gravel mainly. A close, hard gravel, puddled or intermingled with clay, is the best material to resist water. It packs together under the pressure of water, and unless there are too many large stones in it, prevents its escape. In gravel dams great pains should be taken to entirely surround all large stones with fine material. Water is very insidious; it will work along a stone, clinging to its surface, dissolving all soluble particles, and will gradually creep on to the next, so that if many lie near together, or in a somewhat direct line through the dam, it will not be long in making its appearance on the other side.

There is hardly a pond which is not at times very much fuller than usual. During freshets, the water is far above its usual level. To make a pond capable of holding this excess would not only necessitate a much higher and more costly dam, but leave a large empty space after the freshet was over. The emergency may be as well met by the waste-way before mentioned, which should be quite narrow at bottom, with a wide flare as its sides rise. Let *a*



b be the waste-way. At all ordinary times the water will not rise much above *a*, but in a freshet there may be a great and sudden rise; but water seeks its level, and a foot's rise in the pond is a foot's rise in the waste-way, and the flare of its sides allows a much greater amount of water to escape as it rises, so that the rapid and increased flow will counteract the tendency of the pond to fill, the escape being in the ratio of the rise, and experience shows how difficult it is for a pond with such a dam to rise inconveniently.

The great drawback to the gravel banked dam is the danger of being mined by muskrats, in their desire to get into the pond during winter, or to descend thence into the bank for a home. This may be met by vigilance and good traps.

I do not propose to give minute directions for building dams any more than greenhouses; one is the province of engineering the other of carpentry.

I have said that the undisguised appearance of art in masonry, is sometimes agreeable in water-works. This depends on locality and circumstance. If a large stream is to be used to flood a valley, it is nearly impossible to check it unless with expensive works of engineering, to disguise which into a semblance of nature would be enormously expensive. A case might occur where such disguise would be in good taste and worth the cost, but it would be the exception. Masonry may be made beautiful to look at, and is certainly beautiful in its suggestive power, — as the work of man. When a dam is obviously artificial, a road or path may cross it, the waste way being spanned by a bridge, rustic or elaborate according to the character of the shores. Thus we seem to invite inspection and to appeal to the perfection of the work for our justification.

In laying out and improving grounds, the avowed object is to create beauty, and we may therefore put up on the shores of our ponds and islands rustic houses for boats and aquatic birds, bathing houses, rustic seats. Islands should be connected with the main land, waste ways, inlets and brooks spanned with rustic bridges, both for their convenience and the beauty of their reflections. The line between good and bad taste in such structures is very fine, and beautiful natural scenes are often terribly disfigured by carpentry. Rustic bridges and seats are perhaps no more beautiful in themselves than elaborate carpentry. We often see archways over gates in a flat, sandy country, devoid of all similar objects; arbors in town gardens, and the like, evidently considered beautiful by their owners. They are just as bad and incongruous in such places as the carpenter-work in the woods and by the water. There is a *fitness* which we all recognize as an important element of beauty. The rough bark, and irregular, contorted roots and branches woven into rustic seats, bridges, and arbors, assimilate in color, form, character to the surroundings; they harmonize well with shrubs trees, and vines. Vines seem to have a liking for them, will climb along the bark, garland the rough knots, festoon the hand-rails as though they loved them; the irregularity of wild vines, shrubs, and flowers seem to need irregularity in all wood or stone work to feel at home; and however nicely, beautifully, luxuriantly, ivy or flowering vines may cover the wall of a stone house in town, the gardener's hand is evident; they give no idea of the free growth of these climbers in the forest or waste, where they trail over bushes to look at themselves in the still waters, or dip in the running stream.

But even into wild scenes rustic ornaments are not to be introduced at random. It by no means follows that because some tree stretches its arms widely that we ought to set a rustic seat under it, or because there is a point reaching out into a pond that it should not terminate in a boat house, or because a path crosses a brook that it should have a bridge. Many objects of this kind tire, and remove the feeling of fitness.

As for bridges they should be introduced only where depth of water necessitates. Shallow spots are much more agreeably crossed by stepping-stones, round which the waters may purl and babble in a thousand little bubbles to catch the sunlight as they sail down the stream, and where in a June morning we may sit and paddle barefooted.

It is impossible within these limits to do more than hint at the various beauties of water. One quality it has in common with green meadows: horizontality. It is sometimes said that the beauty of level meadows is attributable to their resemblance to a sheet of water, but the truth is that the beauty is due to the horizontality common to both, a quality always attractive, and also to their contrast with the irregular forms that surround them. The truth of this statement may be demonstrated in winter. Visit the most beautiful sheet of water you know, when frozen and covered with snow, and you will find that the charm you have been accustomed to connect with water solely is not peculiar to it. Now that the charm of sparkle and reflection are gone, you will surely derive a greater pleasure from the horizontal surface than when water was in the place of snow and ice. In the summer there is a perplexing superfluity of wealth, which prevents any fair analysis or recognition of the attraction of the quality under consideration.

Ponds may sometimes take the place of grass meadows. I am an advocate of ponds great or small, wherever they will heighten effect, and can be economically made, and kept reasonably full. One can often drain a bog into a pond dug out in its centre, or can carry all the underdrains from the grounds into some dell or hollow, where a little pond may nestle; a pond thus supplied will be perennial. In most ponds thus made in bog-soil, there is a tendency to noisome vegetation. Make your pond on the principle of an aquarium. First dig out enough of the original soil to give the proper depth; upon the bottom lay several inches of clean stones, (shingle from the sea-beach is best), over this lay several inches of clean sand from river or beach; put in snails and little fish, but never aquatic birds, unless you can have a perpetual stream running through the pond; they will eat the snails and little fish, and leave the confervæ and algæ, which in time will fill the pond. In some cases it will be cheaper to pave the bottom, leaving openings where springs exist for their water to come up through. Clear away the autumnal leaves; if left they will sink to the bottom, causing considerable impurity. In very small ponds it may be well to surround the edge with stones to prevent the bank's caving, etc., and if the stones are old and mossy they may be a great ornament; but as surely as a pond larger than a basin in a flower-garden is bordered with hewn stones, unless avowedly used for a horse, duck, or fish-pond, good taste is inexcusably outraged.

In connection with fish-ponds, a word on the subject of ponds for breeding fish. They should be stocked with such fish as are native to similar soil, water, and surroundings. At small expense they will, in a year or two, give the fisherman both sport and profit. Those who wish to know more must consult special treatises.

By referring to the plan of our place you will see in the large pond in the lawn many dotted lines connecting the shores at different points. These in connection with the true shore lines, show the shape of the pond when we took it. By the other water lines you see that if the water were raised a little at the dam, it would be sent into many little dells and would cut off some promontories. It was by raising the dam 3 feet that we got the present pond. This increase of size makes a second bridge upon the avenue necessary, but it is evident that the bridge and its reflection will be a pleasant object. By the enlargement we get three pretty islands and many bays, and add to the extent of the water even more in appearance than in reality. You see by the direction of the little arrows, how from various points there are large water views, no two alike. These extensive but different views from points so far separated give the pond all the merits of a large lake to one who strolls along its shore.

The dam is supposed to be 10 feet high and with a broken fall situated just where the land narrows abruptly, and planted principally with evergreens. In fact it is an evergreen wood. No path has been carried to it, for the pleasure of a stroll in the woods is often heightened by the absence of paths and a sense of untrammelled freedom.

There should be as many paths on a place as possible without showing to one who walks along them, more than the portion of the one he is upon which is just before and behind him. Where many are visible at once the place seems cut up and pathy. Yet a plan may look pathy without being so, for upon it every wood or path is seen at a glance, while on the ground they wind in and out among hills and valleys and are screened by trees or even by slight inequalities of surface. You should never pronounce on a plan in this respect, till you know the surface which it represents well enough to be a competent judge of the degree of concealment it affords, or unless the topography is so well shown on the plan as to tell its own story.

Brooks. From the dam you descend to the brook. The most difficult matter in the management of ornamental water is to make a natural brook, one which shall be neither canal nor ditch. The course of brooks is naturally devious, bending hither and thither to avoid roots, stones, hard pan, and this gives them much of their beauty; they are still more indebted to the bushes and flowers that fringe them, and not a little to the music they make as they run over stones.

To attempt to give directions for making brooks in the abstract would be like painting the portrait of a person one had never seen.

The general principles laid down for the treatment of water apply to the brook. Make its banks like the shores of a pond, after the style of other brooks. Its bed must vary with the soil it traverses; its bends and curves may suit your fancy; only remember that here, as elsewhere, no one line is always right. Sometimes the straight line is best, sometimes the abrupt, sometimes the gentle curve. As before, learn of Nature; visit many brooks, become familiar with them; fill your mind, too, with the theories and principles advanced about other kinds of water. Then carefully try to make your brook. If it prove successful, you are more than fortunate; if unsuccessful you could hardly expect more; and at worst, it will be better than a ditch or canal, if you made any effort for variety.

The course of a brook through a rapidly changing and steep surface may occasionally be varied by a little dam to spread it in some hollow or make a little fall whose deep tones shall give body to the song of the lighter ripples. All the devices of taste and skill may be exhausted and the result be only a very poor brook. Beware of the *serpentine!* the tendency is toward it; brooks are capricious, and rarely move in regular curves, often in abrupt twists and bends.

Following our brook through the farm you come to the cattle pond near the barn, where the brook was dammed to give water to all the animals, and a swimming-place for water-fowl. Where the pond bounds the farmyard its edge is carefully made and sloped with shingle to give a gradual and safe descent. The opposite side is protected by a wire fence, to prevent the animals crossing at will into the pasture beyond.

There now remains only the consideration of water in

FOUNTAINS. Where it varies according to the supply and to the fancy of the maker. In their proper place all kinds are beautiful, from the jet single or combined, that leaps a hundred feet into the air, to the weeping or oozing fountain whose supply is hardly enough to sustain a constant overplus and keep the water plants at its base in a healthy state. Every form into which they can be put has its charms and has its due of praise, till we come down to the squirt;—here we must stop. Nothing is more pitiful than to see in front of some expensive mansion, in the centre of a broad lawn, or of a glowing flower garden, a little intermittent jet, flickering and wavering in the air a few feet above its basin, without sufficient vitality to withstand a mild zephyr, and so slender that we must bring it into relief against some dark object to assure ourselves of its existence. This kind of pretension is truly painful and reprehensible. The same weakness in a different form, leads men of small means to ape the vices and extravagances which disgrace men of fortune. Such abortions are the more to be regretted, as the same amount of water could make a very pretty weeping fountain. To get the squirt, the pipe of discharge and supply must be narrowed to the smallest possible opening. Were the opening slightly increased, the stream would instantly topple over like a ricketty child, and disappear.

The weeping fountain is generally a large basin of fantastic form, raised on a pedestal, which in its turn is surrounded by a lower basin filled with water, and perhaps containing gold-fish or shining pebbles. The force with which the water bubbles up is in proportion to the supply, and it then escapes over the sides into the lower basin. If the upper one is well designed, the lower may be built with rough, mossy blocks of stone, and in their crevices may be planted tufts of Fern, Lobelia, Mysotis, etc., which will be nourished by the water from above. A wide field for ingenuity is opened, and with a very small amount of waste water a great deal of beauty may be produced, which is impossible with the squirt. It is not my purpose to describe larger fountains, as they are familiar to every reader, in one form or another, and where there is a free supply of water they may be fashioned after the most beautiful devices.

The base, or the part, by whatever name it be called, used as the means of discharge, is too often the expensive part of a fountain; people are very apt to think that the water should be secondary to the shell of the fountain. This is a pity! the most beautiful fountains are the simplest; the single or complicated jet rising from the middle of a pond pleases everybody more than the most elaborate device. The weeping fountain, with a boiling, irregular jet in the middle, is much prettier than a larger jet, which lacks the picturesqueness of base, which should always accompany the weeping fountain. The latter may be introduced into conservatories and flower-gardens with the happiest result. Be careful to know well what will be the supply and head of water before you begin the fountain; upon these two things its importance depends. If you can do what you please with the water, the flower-garden should be subordinate to the fountain; but if the supply is too small for any thing but a vase, the fountain must be subordinate to the flowers. On a slope the same water may be used several times, if it can be brought out upon the top of the slope to advantage. At first it may appear as a jet, next as a weeping fountain at some turn in the path, shaded by dark pines, or under a bank; again as a rill bursting from the top of a ledge, or from under a projecting rock; at another turn it may seem to be a cool spring, surrounded by moss and wild-flowers; and it may often happen that by careful designs this variety may be produced with little trouble and no appearance of straining. A Hydraulic Ram is very useful in all these cases. By means of it a small brook may be made to force itself to a very high point, whence the water may be again distributed over the whole place, to return finally to the brook which gave it birth. The improved Hydraulic Ram will raise water 10 feet for each foot of fall; it is mentioned in the Annual of Scientific Discovery for 1851, that one with a fall of 6 feet lifted 60,000 gallons per day 60 feet.

Another means of raising water is by a wind-mill, which may be made quite a picturesque ornament to any place.

All machines of this kind, however, are liable to get out of order, and will try the proprietor's patience.

By whatever means a good supply of water is secured, it is a great acquisition to any place.

ARBORS, ETC., IN GARDENS. — My reason for objecting to *carpenter* architecture for little structures in the rural parts of an estate; viz., that it is not in harmony with surroundings, may be supposed to imply an approval of it in the more enriched and artificial grounds near the house; and it is true that arbors, seats, etc., in and about a flower-garden should be more elaborate; but let them be used sparingly. It is common to see a little garden, with starveling flower-beds and a few shrubs, bestridden by an elaborate, expensive edifice, miscalled a summer-house, miscalled an arbor, properly called a nuisance. If a place is wanted for shade, rest, as an out-of-door sitting-room, in a small garden, it should be at one side, and of humble, unpretending character. A seat under the shade of a tree, or overrun with roses or other vines, is appropriate and often convenient. No one cares to sit about in a flower-garden, unless after the sun is low, or before he rises high; when the shadows are long, no especial structure for shade is needed; and in 99 cases out of 100 no arbor or garden structure should be built in a suburban garden. When a simple building can be partly hidden by a group of trees, relieved by rising ground near by, or otherwise fitly placed, it is well enough to have it. It becomes a support for vines, and perhaps a favorite place for children to play in.

Another popular delusion is the idea that empty urns and vases, painted china sets, ugly statues of mythological deities are appropriate to square plots of grass and patches of flowers. Suburban gardens are often spotted with these things, which are seldom either ornamental or useful. A rich urn or vase filled with flowers is a beautiful sight, and may sometimes be used with excellent effect, but when and where must remain an open question. Some persons contend that the antique vases, copies of which are commonly used for this purpose, were not originally intended to hold flowers, and that it is a perversion to put them to this use in our gardens. Grant that such use is a *diversion* from their original purpose; it may not be a *perversion*. The real question is, Why introduce them at all? if to *show* them as in a gallery of sculpture, then treat the surroundings accordingly; but if the vase is used as a flower-garden ornament, the flower-holding property is its attraction, and constitutes its fitness. If it is not appropriate for this, and cannot receive from graceful vines and brilliant flowers as much beauty as it gives to them, it is badly chosen, and should be changed for a better.

Earnest appeals have been made to the love of art in man not to desecrate the sacredness of art and antiquity in this way. The alarm is unfounded. A vase in the middle of an open space, gigantic, surrounded by impressive architecture, may fitly concentre on itself all the beauty and solemnity of the place. A reduced and imperfect copy in plaster or iron, which can be carried in a wheelbarrow and set where we please, is quite another thing, is to be judged from another stand-point, and is by no means desecrated when used to show plants and flowers to the best advantage.

Having thus passed in review the principal features of the country place, having considered how economy and beauty, business and pleasure, may be combined, it is with great regret that I leave the subject, since the fact is now thrust upon me, which I indeed foresaw, but could not realize, from the beginning; viz., that however minutely I have followed the subject, I have only touched upon it, and that what is said is but as the cropping out of the ledge in comparison to the vast stratum beneath the surface which has not even been uncovered.

It must, however, be apparent that none but a man of expanded views and noble aims can be the best farmer and gardener; that these occupations have an interest not surpassed by any other;

and that the arrangement of a country place is a very difficult and elaborate, though a charming work.

You see that no book can convey the minutiæ and details which give finish and fitness to ornamental grounds. Bring to the work of arranging such grounds the best agriculture, horticulture, engineering, architecture, and there yet remains a subtle sense of natural beauty, of harmony and fitness in details, which are to the whole place what the "atmosphere" is to a picture, or the cuticle which covers the nerves is to the organism; without it there will be harshness, and an indefinable want; with it, rich, harmonious perfection. This spirit of landscape gardening cannot be committed to paper; the artist who possesses it seldom has an opportunity to give it full scope, he is cramped and fettered by the economy of his employer, who thinks it quite enough to pay for time he sees expended in producing obvious and large results, and cannot be persuaded that time spent in giving his place those last touches, which would be to it what glazing and varnish are to the painted landscape, is worth any farther outlay of money.

SUPPLEMENT.

CHAPTER I.

THE GREENHOUSE AND CONSERVATORY.

SINCE "Country Life" was first published, very many new green and hothouses have been constructed, and we ought to expect a corresponding improvement in heating, ventilating, and the use of materials; and, although great improvements have been made over the common practice of former times, a careful examination of the plans and theories herein presented will show that "Country Life" is still in advance of the times. We gladly welcome every new house, whether erected for purely commercial purposes or for private gratification; for, besides the pleasure their fruit and flowers give their owners, they exert a liberalizing and humanizing influence on every one who comes into contact with them. The most earnest lover of nature and flowers, who will readily walk miles in the fields and forests for the pleasure of association with nature, or to procure some favorite flower, who knows the delight with which one finds a rich bed of Epigæa in blossom, a bank of Violets, a tuft of Pogonia, a hedge of wild Roses, or the fringed Gentian, feels a still keener pleasure when he enters in winter a planthouse full of blossoms.

We seem then to especially realize the value and beauty of flowers; and but few persons are so stolid or careless as not to wish, when they visit a greenhouse, that they too might have plants in blossom during the winter. The contrast between the cold silence of nature out-of-doors, and the rich glow and fragrance within, compels us to recognise the real beauty and significance of the flowers, which we are too apt to neglect in the profusion of summer.

Keeping pace with the increasing number of planthouses, many families of plants have been greatly increased, and have sprung from the minority to the majority in point of numbers. This change is most conspicuous in the plants with variegated leaves, which have become sufficiently numerous to demand special accommodation; these plants have an advantage over others in the contrasts of color in their foliage, which make them interesting when not in blossom; some indeed are more valuable for their leaves than their flowers. The following list of the most desirable variegated plants, for a private collection, was made for me by Jonathan French, Esq., of Roxbury, Mass., who has been a very successful cultivator of these plants: —

BEGONIA, — rex, reichenhernia, grandis, argentea, Queen Victoria, Madame Roy, Madame Crouse, velvetiana, Madame R. L. Stewart, verschaffeltii.

CALADIUM, — argyrites, bellemeyii, barraquinii, chantinii, bicolor picturata, Newmanii, pictum, pœcile, hastatum, Wightii, bicolor.

FERNS, — plais, argyræa, tricolor, cretica alba lineata.

CROTON, — picta, variegata, noblesse.

MARANTA, — zebrina, regalis, alba lineata, fasciata, eximea.

ANŒCTOCHILUS, — argenteus, Eldorado.

POTHOS, — argyræa

ANANASSA, — sativa variegata.

PANDANUS, — javanicus argenteus.

DIFFENBACHIA, — seguina picta.

ASPIDISTRA, — lucida variegata.

APHELANDRÆ, — leopoldii

DRACŒNA, — terminalis, picta.

HOYA, — variegata.

ERANTHEMUM leuconeryum.

BILLBERGIA, — zebrina, gesnera splendididissima.

DIOSCOREA, — discolor, zebrina.

AGAVE AMERICANA variegata.

LEDUM, — carneum, variegatum.

HYDRANGEA, — variegata.

CHAPTER II.

FLOWER-GARDEN.

THE flower-garden has been sensibly affected by the increased interest in horticulture: the number of genera of flowers has not been increased, but the number of species has expanded immensely.

Whole exhibitions of our horticultural societies have been given to special plants, such as the Gladiolus, the Cape Bulb, the Japan Lilies, Verbenas, or Petunias, which a few years ago were content to occupy a very small space. For many years it was supposed that new varieties of plants could be produced only by a kind of legerdemain; for instance, Tulips, we were told, would change their color if we drew different colored silken or worsted threads through the bulb, that the color of thread might pass into the circulation and change the petal; there were also minute directions for special composts and watering solutions, which, applied around the growing plants, would change color and form.

None but special gardeners cared to try to bring new varieties for seed; Tulips and Gladiolus bore seed, but it was supposed they could not be expected to blossom from the seed under five or seven years. All this has changed, and we have every year increasing numbers of seedlings, some better, others not so good as their parents; the seedlings, generally, seem less reliable and permanent than the old varieties, and many of them are never heard of after a year or two.

Tulips can be produced from seed in three years, instead of seven, as formerly believed.

Gladiolus seeds, planted the year they ripen in peaty soil, and carried through the winter in a greenhouse or pit, will blossom in two, or, at most, three years; and, starting from the pretty but not especially interesting G. Byzantinus, the beautiful but weakly

G. Cardinalis, the G. Psittacinus, the brilliant G. Gandavensis, several hundred new and magnificent varieties of Gladiolus have been produced, which are so varied in color and form that one might well be excused if he devoted himself to their culture to the exclusion of all other flowers; grown singly, tied up to stakes, nursed in beds, retarded to give a succession of bloom, there is really no bulbous plant which repays so bountifully the care expended upon it.

The Gladiolus requires no special culture. A rich, light, well-drained garden soil will produce splendid flowers; its worst enemy is the mealy bug; if any bulbs are found to be troubled with them, burn the bulbs at once.

The bulbs should be taken up as soon as the leaves turn yellow, be dried rapidly, and kept in a cool place until spring; never plant it in wet land, or clayey loam, on a clayey subsoil; if your soil is wet, drain and surround the bulb with sand; wet produces rust, which soon burns the foilage and plants; when in favorable soil, the bulbs often produce two or three spikes of blossoms, giving a great quantity of blossoms for several weeks.

When the bulbs are lifted and dried, remove the bulblets which will be found at the base; put these bulblets in dry paper bags, and lay them aside for at least a year; then plant in pots in the fall, or in the earth the succeeding spring, and you will get plants which will, at maturity, give the same variety as the parent; by the bulbs, therefore, we may produce like, and by seeds unlike varieties.

The list of beautiful species is numerous; and, as they are constantly changing by new seedlings, no list can be of permanent value. I shall therefore only give names of twelve. Their colors will enable the amateur to select according to the effect he may wish to produce. Planted in the beds of city areas (see pp. 880–9), as succession to spring bulbs, I think they would be equal to any bedding plants.

1. Ceres, pure white and purple.
2. Napoleon III., bright scarlet, striped.
3. Brenchlyensis, vermilion-scarlet.
4. Solfaterre, pure yellow.

5. El Dorado, pure yellow.
6. Ophis, yellow, spotted with purple.
7. Pluton, deep scarlet, spotted with white.
8. Hebe, carnation, striped with carmine.
9. Madame Vilmorine, rose, white centre, striped with carmine.
10. Purity, pure white, lower petals marked with rosy-violet.
11. McMahon, cherry-orange (very bright).
12. Azlaie, salmon-rose, shaded.

Gladiolus Byzantinus, Communis and Roseus are sufficiently hardy to be planted in the autumn, and, well covered, will come up and blossom in the spring.

Hyacinths have always been favorites as spring bulbs, both in the garden and the house. New varieties are yearly introduced to replace those which have deteriorated; for even when the bulbs are carefully taken up each spring, after flowering, and replanted in the autumn, they seem to lose vigor, making it necessary for those who would keep up with the times to purchase new bulbs or propagate for themselves.

The precautions are to have rich, loamy, well-drained soil, and, as with the Gladiolus, to surround the bulb with sand if the land is inclined to much moisture. Where Hyacinths are left in the ground unremoved for several years, they will continue to blossom, but less perfectly each year, as the tendency of the bulb to make offsets increases, and at last the offsets consume the parent; these offsets, taken and treated like the full, grown bulb, will in time produce perfect flowers of the same species.

To all these bulbs the same rule may be applied: if you desire to surpass in the quality of your flowers, you may make a soil just suited to them, — and all require about the same, — an equal mixture of loam and cow manure and one-quarter common sand. These bulbs are grown in the house in the winter, in rather deep and narrow pots about four inches in diameter, with good drainage, made of broken charcoal, soil like that just described. Set bulb in sand, and cover top one half-inch deep; as they grow, move in to the light. Occasionally the bulbs may be watered with nitrogenous guano-water or any other form of ammonia; when in bloom give plenty of water.

When Hyacinths are grown in glasses, be sure to use dark colored glass, and change the water sufficiently often to keep it pure; if the roots get slimy, the slime should be removed and the water changed; pieces of charcoal in the water help keep it pure, and you may add very little guano or ammonia to the water to stimulate the plants. Set the bottom of the bulb one-quarter of an inch above the water; keep them in the dark until the roots get a couple inches long, then remove to the light. After Hyacinths have blossomed, either in pots or glasses, you must be very careful to dry them thoroughly, and then lay them aside to be planted in the ground next autumn; but they seldom blossom as well a second time, though after a year in the garden the bulbs recover much of their size and firmness.

The same objection applies to lists of Hyacinths as to Gladiolus. The subjoined list of twelve varieties is made by R. McCleary Copeland, who has been for many years a very successful exhibitor of Hyacinths before the Massachusetts Horticultural Society.

Lord Palmerston, grayish blue, shaded with purple.
Robert Fortune, reddish pucy-mauve.
Thorwaldson, bright azurean blue.
Josephine, rich crimson.
Von Schiller, deep red, striped.
Macaulay, deep rose-pink, full centre.
Ida, clear yellow.
Heroine, yellow.
Crœsus, deep yellow.
Sultan Achmet, white.
Mont Blanc, white.
General Cavaignac, white.

I could easily fill pages with detailed descriptions of different bulbs, the treatment varies but little, all wanting attention, rich, dry, light soil and good drainage, and earnest amateurs will soon find what particular care each variety requires to bring it to perfection. I can safely say that there is no variety of plants which will not compensate the cultivator who brings them to their perfect condition.

Many of the tender Cape bulbs would become acclimated if sufficient care should be taken with them. Mr. Sargent, in his very thorough appendix to Downing's Landscape Gardening, describes the careful experiments he has tried in acclimating tender and half-hardy evergreen and deciduous trees and shrubs; planting them, in the first place, in sheltered situations, the first winter he would surround them with boxes and straw, the second with straw and canvas, the third with canvas, and at last leave them unprotected. In some such manner he has brought several specimens to endure a temperature which would have been fatal at first.

Such experiments teach a lesson of value: we cannot make any given bulb more hardy by planting it year after year, but we may produce seedlings which in a few years would become hardy. The beautiful Cape bulbs, now only fit for the greenhouse, or the heated and protected border, to be started in pots under glass and removed to shelter before winter comes, would be very much more valuable if we could treat them like Hyacinths or Tulips; as there is sure to be trouble and vexation in every horticultural operation, and every effort should be made to reduce the sources from which trouble and vexation are liable to arise.

Cyclamens are very charming little plants, the most patient and enduring bulbs we can have in the greenhouse. There are many species which are very tender and fit only for the greenhouse, whilst there are others which in England are as hardy as the Crocus, such as C. Coum, C. Europæum, C. Ibericum, C. Lalifolium, C. Linearifolium, C. Littorale, C. Neapolitanus, C. Verum; being hardy there, it only needs patience to acclimate them or their seedlings here.

These plants offer as good a field for the amateur florist as the Gladiolus did a few years since; and to show what are the elements necessary to commence their culture, I will give a brief account of the English method. "It would be folly to deal with hardy Cyclamens as we deal with most other hardy spring flowers, because, if exposed to all the rigors of the early season at which they bloom, nothing but disappointment is to be expected." Those who grow Ixias, Sparaxis, and other of the newly hardy Cape bulbs out-of-doors are in just a proper position to do justice to hardy Cyclamens. A border facing south, sheltered with a back wall or greenhouse, or enjoying some of the surplus warmth from a stove or furnace, and consisting chiefly of peat and leaf mould, in a warm and well-drained subsoil, is the place for Cyclamens, Tritonias, Ixias, the hardy Amaryllises, Alstrimerias, and myriads of the choicest flowering-plants known, which need not so much the help of artificial heat, as moderate protection against the scathing blasts and perishing sleets of our spring. We can promise our readers who will make up a border for plants of the kind first named, an amount of enjoyment far surpassing all that they have ever derived from the pursuit of gardening according to the established plan of making a grand summer display, and devoting every possible energy to the development of the bedding system.

If the position is well drained, all that hardy Cyclamens require is a mixture of turfy peat, leaf mould, and yellow loam, equal parts: this must be eighteen inches deep; and, when the bulbs are planted, cover them with two inches well-rotted dung. Plant in October, and take up and replant every succeeding October; plant in a little sand, and set C. Coum an inch below the surface; the others press in slightly like onions; cover the bed in "winter with four inches of tan."

The varieties of greenhouse Cyclamens must be refused water as soon as out of bloom until the leaves turn yellow; then keep the plants moderately dry until you wish to start them anew.

The Cyclamen will ripen seed freely, which easily germinates when sowed in rich earth; they will blossom in three years from seed. In our hot summers the bulbs might dry too much, which can be prevented by setting them in a box of loam or trench, where they could be occasionally moistened; this would keep the bulbs full and plump until wanted.

This English advice is not directly applicable to this country, but it teaches the direction in which our efforts should be made. The same reasoning applies to the other Cape bulbs, and I believe that in the small and protected gardens of city areas, warm borders under hedges, and indeed whenever there is sufficient interest to provide good quarters, we may hope to propagate seedlings of these plants which will become in time perfectly hardy.

The Tuberose is another illustration of the rewards bulbs will give the patient cultivator. It is a most beautiful flower, and deliciously fragrant. Their qualities have induced many persons to try to grow them in the open ground, but with little success; when they received the best skill of nurserymen, only about half the bulbs could be made to blossom, throwing up stalks with fifteen to twenty blossoms on them.

Mr. E. W. Buswell, an enthusiatic admirer of flowers, living near Boston, tried tuberoses year after year, and found that the purchased bulbs would rarely throw up flower stems, although they made many small bulbs as offsets. This awakened his curiosity, and induced the belief, that if he should remove all the offsets, and every appearance of them, by gouging out the eyes which could be seen on the bulb, that he could drive the vigor of the bulb into the flower stem. He according purchased some new bulbs, carefully selecting those which were hard at the top, showing that they had not blossomed the preceding year, and which showed neither scars of old offsets, nor many indications of new ones. Knowing that roots must precede the leaves, and that the more roots at first, the more vigorously the flower stems would push when they should start, he prepared a compost, as directed on p. 809; he selected medium-sized pots, and filled them one quarter full of broken, very dry cow manure, picked up in the pastures; over this he placed the loam, and planted his bulbs; to promote growth at the roots, he set the pots in an active hotbed, watered them moderately, and covered them from the light. As soon as the point of the new growth began to appear through the soil, and he found that the roots had got to the manure, he gave water freely, admitted light, and kept the plants covered with glass; in this warm and moist air, they pushed rapidly, and soon required to be set in deeper frames to give the ascending stalks more room; he continued to water freely, and when the weather got warm enough, transferred them to an old hotbed frame in the open air, where the plants blossomed abundantly, eighty per cent blossoming, giving thirty blossoms on a stalk. During the entire growth, he watched for offsets, and, on their first appearance, pushed his knife down, and cut them off so that the bulb had nothing to do but blossom.

This success shows what can be done. Doubtless, the tuberose, started in pots in the house, in April, would, with attention, be ready to go into the open ground by June. Set them over some fermenting horse manure to give a little bottom heat, and water if the weather should be dry, a very fine bloom may be expected, not so large a percentage as Mr. Buswell got with his hotbeds, but sufficient to repay all the care and trouble.

The following list of perennials, bedding plants, and annuals was prepared by Mr. John C. Hovey, of Cambridge, and member of the Flower Committee of the Massachusetts Horticultural Society. The plants and flowers here mentioned can be relied upon as being really the best for a small collection: —

TWENTY-FIVE BEST PERENNIALS.

Aconitum Japonicum.
Adonis vernalis, yellow.
Caltha palustris, fl. pleno, yellow.
Campanula carpatica, blue.
Campanula persicæfolia, alba plena (white).
Clematis erecta, white.
Delphinium formosum, deep blue.
Dielytra spectabilis, rose and white.
Epimedium macranthum, white.
Genista Siberica, fl. pleno, yellow.
Gypsophila paniculata, white.
Helleborus Niger, white.
Iberis saxitile, white.
Iris superba, light blue.
Lathyrus latifolius, dark rose.
Lychnis, viscaria, fl. pleno, red.
Orobus verna.
Papaver Orientalis.
Ranunculus aconitefolius, fl. pleno.
Salvia azurea, blue.
Sedum denticulatum, red.
Spirea filipendula fl. pleno, white.
Spirea japonica, white.
Trillium grandiflorum, white.
Yucca filimentosa, white.

BEST TWELVE NEW PERENNIALS.

Arabis lucida, variegata.
Clematis erecta, fl. pleno, white.
Dielytra spectabilis alba, white.
Doronicum caucasicum, yellow.
Gaillardia grandiflora.
Iberis tenoreana, purple.
Orobus, verna rubra, red.
Pentstemon grandiflora, lilac.
Phlomis abasicus.
Platycodon grandiflorum, blue.
Tradescantia pilosa.
Verbena montana

TEN BEST PHLOXES.

Augustin Lierval, white, with crimson eye.
Julie Roussel, white, carmine eye.
La Volupte, dark crimson.
Madame Marseau, white, purple eye.
Madame Suer, white, crimson eye.
Triomph de Twickel, white, and crimson stripe.
Madame Vilmorin, crimson, dark eye.
Madame Lierval, violet and crimson.
Madame Rougiere, white, rose eye.
Madame Henricq, rose.

BEST TEN HERBACEOUS PÆONIES.

Festiva maxima.
Rosea lutea.
Victor Leman.
Madame Vilmorin.
Comtesse de Morny.
Camille Caillot.
La Negres.
Lutisciana.
Officinalis pleno.
Tenuifolia pleno.

BEST TEN TREE PÆONIES.

Banksia.
Athlete.
Alba plena.
Carnea plena.
Fragrans.
Maxima plena.
Ottorius.
Rosea odorata.
Splendissima.
Triomphe de malines.

BEST EIGHTEEN CHOICE CARNATIONS.

Apollo.
Lively Ann.
Admiral Curzon.
Christopher Sly.
Royal Scarlet.
William IV.
James the Second.
Merrimack.
Lord Gooderich.
Lady Peel.
Mayor of Nottingham.
Splendor.
Tenby Rival.
James Kirtland.
Sir Joseph Paxton.
Fanny Garden.
General Simpson.
Queen Boadicea.

BEST EIGHTEEN VARIETIES PICOTEES.

Rosetta.
Princess Helene.
Jemima.
Mrs. Holbeck.
Finis.
Prince Albert.
Ada Mary.
Cedo Nullii.
Ophelia.
Mrs. Norman.
William Summers.
Sultana.
Countess.
Prince of Wales.
Mrs. Dodwell.
Mrs. Lochner.
Mrs. Hovey.
Passee Bride.

BEST EIGHTEEN HOLLYHOCKS.

Acme.
Warrior.
George Young.
Princess.
Minerva.
Decision.
Rev. J. A. Dix.
Invincible.
Carus.
Macrantha.
Princess.
Prince of Wales.
Lucifier.
Chrysolite.
Hesperus.
Cynthia.
Lady Dacres.
Queen Victoria.

The following list of roses is recommended by Mr. Francis Parkman, of Jamacia Plain, near Boston, as having been grown by him, and are adapted to our climate. The most of them will be found in the list of roses, on pp. 611 to 622, "Country Life," with their colors and habit described : —

Moss, Reine blanche, pure white, large and full.

SIX CLIMBERS.

BOURSAULT, — amadis, crimosa.

AYRSHIRE, — ruga, splendens (needs protection in exposed situations in winter and spring).

EVERGREEN, — félicité perpetué, (cover).

PRAIRIE QUEEN.

BALTIMORE BELLE.

HYBRID PERPETUALS.

Auguste Mie, fl. pleno.
Baronne Prevost, fl. pleno.
Caroline de Sansel, fl. pleno.
General Washington.
General Jacqueminot, fl. pleno.
Gloire de Santenay.
Jules Margottin.
La Reine, fl. pleno.
Lord Raglan, pleno.
Maurice Bernardin, fl. pleno.
Sensteur Vaisse, fl. pleno.
Souvenir de Reine d'Angleterre.
Triomphe de l'Exposition.

BOURBON ROSES, — NOT ABSOLUTELY HARDY.

Blanche Lafitte.
Dr. Berthet.
Dupetit Thouers.
George Peabody, fl. pleno.
La Quintrine.
Monsieur Jard.
Prince Albert.
Reveil.
Sir J. Paxton.
Souchet.
Souvenir de Malmaison, fl. pleno.
Louise Odier (these are especially autumn roses).

CHINESE ROSES.

Archduke Charles.
Cels Multiflore.
Cramoisie Superieure, fl. pleno.
Eugene Beauharnais.
Fabvier.
Madame Breon.
Madame Bureau.
Mad. Bosanquet, fl. pleno.
Carmine Superb.
Napoleon.
President d'Olbecque.
Prince Charles.

These roses are most valuable for planting in masses or in beds, where succession is wanted.

List of perennials especially recommended by Mr. Parkman.

Achillea, ptarmica, double white.
Aconitum versicolor, variegated blue and white.
Aquilegia Alpina, blue and white.
Aquilegia formosa plena, blue and maroon.
Betonica grandiflora, rich purple.
Cerastium tomentosum, pure white.
Delphinium formosum celestinum, white and sky-blue.
Dianthus florii, deep rose.
Dielytra spectabilis, red and white.
Funkia Sieboldii variegata, blue variegated leaf.
Gloxinia flowered Digitalis, white, with black and purple spots.
Iberis caridifolia, pure white.
Lychnis Haageana, scarlet and red.
Lychnis viscaria splendens, deep vivid red, double.
Platycodon grandiflora, blue, very large, drooping bells.
Platycodon Wahlenbergia, white, very full.
Pyrethrum Carneum, flesh-color, yellow centre.

CHAPTER III.

KITCHEN-GARDEN.

The most important improvement connected with the kitchen garden, is the publication of "The Field and Garden Vegetables of America," by Fearing Burr, of Hingham, Mass. This is the most valuable contribution to horticultural literature for many years. Mr. Burr has not only collected into one volume a careful description of all the vegetables which can be cultivated in this climate, but has grown most of them himself; so that we know that his judgment upon any particular variety is formed upon actual experience.

We have long needed such a book, because the diversity of climates and soils in this country permits the cultivation of a great variety of fruits and vegetables; and yet but few persons can hope to know all the plants they might profitably cultivate. In this book of six hundred and forty pages, the reader will find all the genera of vegetables, and most of the species, with their character, value, and methods of culture, carefully described.

Mr. Burr disagrees with the direction given in p. 625, "Country Life," where the cultivator is directed not to tie up his tomato-plants, but to leave them on the ground until they are well grown, and then to work some meadow hay under them to protect the fruit. This practice is certainly the best in field culture, as obviously to make trellises or supports for an acre or two of tomatoes would be more troublesome and costly than the profit of the crop would warrant. In his article on the tomato, he advocates confining the vines to trellises, as a means of hastening the maturity of the crop.

This seems very reasonable; and as it is of the utmost importance to get tomatoes early, where early fruits may be expected, I will quote his directions for forcing the crop on p. 640: "The ripening of the fruit may be hastened by setting the plants against a south wall or close fence: as the plants increase in size, they must be nailed or otherwise attached to the wall or fence; and, if the weather be dry, liberally watered. When the first two trusses of bloom have expanded over each shoot, the shoot should be stopped by pinching off the portion which is beyond the leaf above the second truss, and no more lateral shoots should be suffered to grow; but the leaves must be carefully preserved, especially those near the trusses of bloom. The number of trusses on each plant will vary with the strength and vigor of the particular plant; but three or four will be quite enough, leaving about half a dozen trusses of fruit."

"As the fruit ripens, it must be well exposed to the sun. There will be nothing gained by allowing a great many fruit to ripen: the number above given will be sufficient, and the tomatoes will be much earlier and larger than if they were more numerous."

By growing them on trellises or within loops, supported by stakes, the vines can be more easily controlled, and the fruit more readily gathered.

The best varieties are, for general field culture, the large red tomato: this is the most productive variety, but not so early by a fortnight as White's Extra Early. "The plants are moderately vigorous and readily distinguished by their peculiar, curled, and apparently withering foliage. In order to retain this or any other early variety in its purity, seed for planting should be saved from the smoothest, best-formed, and earliest-ripened fruit."

In strawberry culture, there has been no material change. The practice recommended on p. 735, "Country Life," of growing it as an annual crop, is increasing, and is universally advocated by market-gardeners near Boston. Nor is there very much change in the varieties about Boston for market: Hovey's Seedling continues on the whole the favorite. Wilson's Albany, though more prolific, is too sour to be desirable, and the Jenny Lind lacks firmness of berry to stand transportation.

Mr. W. H. Locke, a well-known market-gardener of Belmont, Mass., the headquarters of successful strawberry culture in New England, gives the following list of the strawberries cultivated in Belmont: —

Jenny Lind; Early Virginia; Cutter's Seedling, a good bearer, hardy, but fruit too soft for market; Brighton Pine, a fine berry, but difficult to cultivate; Wilson's Albany; Hovey's Seedling; Jenney's Seedling; Austin's Seedling; Triomphe de Gand; La Constante.

The two latter are generally conceded to be the best of the imported varieties. Mr. Locke recommends for three varieties, Jenny Lind, Hovey's Seedling, and La Constante, ripening in the order in which I have named them; La Constante exceeding the others in sweetness and flavor.

A new berry, widely disseminated and highly praised, The Agriculturist, has not yet been sufficiently tried to enable one to speak definitely of its qualities; it is claimed to be the best new strawberry: as there are many beds of them which will fruit this year, its merits will soon be known.

Currants have been improved by two seedlings of Mr. Dana, of Roxbury; but, for general use, the old Dutch currants continue to be favorites. There has been little change in the other small fruits: each year gives new varieties; but there is no need to discuss them here.

The profit attending the culture of the small fruits is strongly brought out in a report of the New-Jersey Fruit-growers' Association, published in 1864.

This report gives the number of acres under strawberries in three towns, Burlington, Chester, Cinnaminson, as three hundred and fifty-four; yielding 12,596 bushels strawberries, which were sold at the average price of three dollars and sixty cents per bushel.

"Two hundred bushels have been raised to the acre under favorable circumstances; the common error is, not adapting the variety to the soil. Early Scarlet, May Queen, Iowa, Denner's Prolific, succeed well in light sandy soil; Triomphe de Gand, Scarlet Magnate, Lady's Finger, require rich and heavy soil. Set the vines, eighty thousand to an acre, beds three and a half feet wide, plants twelve inches apart, in rows five inches apart, eighteen inches between beds."

They give the yield of raspberries on forty acres as an average of thirty-three bushels to the acre, sold at four dollars and sixty-four cents per bushel. The varieties grown were Old Purple Cane, two kinds Allen, Kirtland, and Black.

There were ninety-nine acres of blackberries, yielding an average of fifty-three bushels to the acre, sold at three dollars and thirty cents per bushel; varieties grown were New Rochelle and Dorchester.

An interesting fact elicited in connection with market-gardening is, that of all engaged in that occupation, twenty-five per cent get rich; twenty-five per cent make a living; twenty-five per cent just get along, and the remainder fail. There is no other occupation, not even general farming, which gives so favorable a return to those who follow it.

CHAPTER IV.

ORCHARD.

There is little to say about the orchard, although there is no branch of my subject which possesses a wider interest. Near Boston, cultivators, having met with so many discouragements in peaches, gave up their general culture; but a few who have observed the theories and directions given in "Country Life," pp. 296–299, have found the peach steadily improve under their hands: and, during the past year, the peaches shown at the Boston Horticultural Society were as fine as in the good old days, when every garden could boast of its abundant and perfect fruit. Throughout the West, the peach-crop failed. Occasional failure of peaches from late frosts, and from early warm weather in the spring, must ever be expected; but where cultivators are careful to get healthy trees, and take good care of them, the peach will be found, one year with another, a very profitable crop.

In Eastern New England, the apple-tree has been so infested with canker-worms for several years, that it seems almost impossible to secure a reasonable yield of fruit; and farmers are in many cases cutting down their trees to cultivate pears, grapes, and vegetables: but through the rest of the country, the apple continues to pay the grower perhaps better than any other kind of fruit. The lists already given of apples are as well suited to general culture as any. A meeting of eminent fruit-growers, in New York, to decide to what varieties of fruit the Greeley prizes should be awarded, gave the first premium, of a hundred dollars, to the Baldwin Apple. As the best six apples after the Baldwin for general culture, —

For *Summer* — Red Astrachan, Primate.
Autumn — Gravenstein, Porter.
Winter — Northern Spy, Hubbardston.

The same committee awarded the first prize for pears to the Bartlett. Best six —

For *Summer* — Manning's Elizabeth, Rest.
Autumn — Shelden, Seckel,
Winter — Lawrence, Hovey.

This committee of eight gentlemen, from different parts of the country, in making these selections were obliged to leave out many first-rate varieties of fruit. They first agreed upon the points of excellence which a fruit should have to make it perfect; and then classified the fruits in the order in which each variety covered the greatest number of these points. The result of their vote showed, that, in the judgment of the committee, no collection can be complete which does not comprise at least twenty-four varieties of pears.

In conclusion, I will give two receipts for grafting wax, which have been found very valuable by many persons.

Dr. Ward's receipt. — One part of tallow, two of wax, four of rosin; if too stiff, add tallow; too soft, rosin; keep bottled, and apply with a brush.

Watson's receipt. — Two parts of rosin, two of black pitch, one of white turpentine, one of tallow, one of beeswax; apply when melted with a brush; keep warm when using, in a bottle or jar of hot water.

Liquid grafting wax. — One pound rosin, five ounces ninety-five per cent alcohol, one ounce beef tallow, one tablespoon spirits turpentine; melt the rosin over a slow fire; then take from the fire, and stir in the beef tallow with a perfectly dry stick or wire; when cooled, add spirits turpentine, and last, the alcohol, in small quantities, stirring constantly; if the alcohol cools too much, so that a lump forms, reheat until it melts. Keep it in a corked bottle, and lay it on with a brush.

CHAPTER V.

GRAPERY. — GRAPES, AND HOW TO GROW THEM.

I DO not intend to devote any space to the culture of grapes under glass, as the directions previously given are sufficient; but the interest in the culture of out-of-door grapes has greatly increased: in every village there are many who now grow them for their own use or the market, and very many vineyards have been planted in different parts of the country in order to make wine.

In California, grape culture and wine making seem as certain as any other kind of cultivation, whether owing to peculiarities of atmosphere or rarity of rains; but east of the Rocky Mountains, the vine has suffered from a variety of enemies, which have proved in some cases too powerful to be overcome, until many vineyards have been pulled up, and the soil devoted to other purposes.

Immense efforts have been made, and are now making, to find or produce some grape which will be hardy in all sections of the country, not liable to mildew and rot, and which shall be sufficiently spirited for the table and sweet for wine. Several grapes have been propagated which it was hoped would prove all that could be desired, and have been very extensively sold; but none has yet proved equally valuable in all parts of the country. If such a grape can be found, it will be an incalculable benefit to the country; but I think our cultivators ask too much, and have set too great a stint for themselves.

No one grape has ever been the favorite in Europe, where there are a great variety of wines of entirely different qualities, and made from very dissimilar grapes. Some of the best wine-grapes prove very inferior for the table.

Our country affords very dissimilar soils and climates for the vine; and if man, with his infinite capability of self adaptation, finds it so difficult to move from the east to the west, and continue in the same health and vigor, do we not make an unreasonable demand on the vine.

The grape which would be perfectly satisfactory in the cool, changeable climate of New England, where we rarely have a hot moist interval in summer, so very common in Cincinnati, would find itself unable to contend with the Ohio climate; whilst, on the other hand, a grape which would find in the long, hot summer of the West the time to develop and perfect its sugar, and to ripen its wood, would be crude and unripe here: it might make a fine wine on the Ohio, and a poor vinegar in the environs of Boston.

Grapes have two distinct uses, — to be eaten, and to make wine; and their value as a crop in any locality depends on the manner in which they are to be consumed. Near cities and large towns, they are most valuable for the table. At five cents per pound net, grapes will sell in any city, if well grown and ripened, faster than they can be brought into the market. It is the rarest thing that we can buy a nicely flavored and well-ripened grape in our markets: there are plenty of sour, ill-ripened grapes, which are sold at five, ten, fifteen cents per pound, whilst the perfect article can rarely be purchased at any price.

Supposing that a gardener should establish a vineyard solely to grow table-grapes; grown to stakes or espaliers by any good method the fruit will average, when he gets a crop, ten to twenty-five pounds per vine, which at five cents per pound, and this generation will not see well-ripened, good quality of grapes at a less price, would give at least eighty-four cents net per vine.

Setting the vines one to every forty-eight square feet would give nine hundred vines to the acre, or a net profit, under favorable circumstances, in grapes of seven hundred and fifty-six dollars per acre. Such calculations and realizations as these are very tempting, and certainly enough to stimulate an immense culture. And it is to the fact that men have made money in grape-culture that we owe the increased interest in new varieties of the grape.

With these figures before their eyes, men have established vineyards with the reasonable belief that a great deal of money could be made; and, when the heavy first-cost of starting the vineyard has been incurred, it is a great sorrow as well as loss to have the crops cut off by some insidious disease.

Every new vine is asserted to have all the required virtues, and to be exempt from disease; but in time it is found but little better than its predecessor. When the first edition of "Country Life" was prepared, the interest in grapes was commencing, and the "Concord" was the great favorite; every thing was predicted for it: but so many fine grapes have been since produced, that it is difficult to decide which is really the best.

In order, if possible, to ascertain what grape or grapes are really best for general culture in the Northern and Western States, and to enable me to succinctly state the most important facts about the vine and its culture, before commencing to write this article, I wrote to many of the leading cultivators of the grape in all parts of the country, asking them the same questions, as to best varieties, frequency and cause and cure of mildew and rot, best soil and method of pruning, and other similar questions. I have received a large number of replies embodying the most important information from Mr. Huseman, Hermann, Mo.; Mr. Huidekoper, Meadville, Penn.; Mr. Meehan, Philadelphia, Penn.; R. A. Grider, Bethlehem, Penn.; J. A. Deliot, Sing Sing, N. Y.; R. Buchanan, Cincinnati, O; Dr. Grant, Iona Island, N. Y.; Professor Silliman, New Haven, Conn.; J. Fiske Allen, Salem, Mass.; W. C. Strong, Brighton, Mass.; and E. A Brackett, Winchester; and the views which I shall give in the following pages are those in which all these gentlemen, or a majority of them, coincide. I do not propose to write a minute treatise on the vine, its propagation, profits, diseases, &c. I have no space in which to do so, nor does the able treatise of Mr. Andrew S. Fuller of New York leave much room for a new comer; for the same reason, I cannot enter into any extensive discussion of varieties and various methods of treatment. I shall confine myself to the general plan of this book, and give a simple statement of what I esteem to be the best method of cultivating the vine, a summary of the facts about its diseases, &c., and the most valuable varieties in which, as I have said before, these distinguished cultivators coincide.

Many varieties of grape have been discovered which blossom late enough, and ripen early enough, to escape frost; so that the chief enemies to grape-culture are black rot and mildew. The rot is more injurious at the West than the East; but, wherever it exists, it is attributed to excessive moisture, either at the root, or in the atmosphere, and to sudden changes of temperature. It is nearly sure to come with a hot, moist condition of the air; and when these periods occur at the West, in the infancy of the berry, the crop is sure to be lost. There seems to be no cure for the disease, other than planting vines on high and dry land, and selecting those varieties of grapes whose constitution will not be affected by it. Different grapes in the same vineyard will be affected differently, some varieties escaping entirely, when all the rest are ruined; and singularly enough the grape ruined this year may escape next. The natural precaution is to plant in each vineyard several varieties of grape, selecting those which common experience has most often shown to have escaped the destroyer. In the East we are but little troubled by black rot. Professor Silliman finds the Catawba and Isabella rot in New Haven; Mr. W. C. Strong, the Catawba and Concord, in Brighton, Mass.; and J. Fiske Allen, the Diana, in Salem, Mass.; but these agree with other cultivators, that, at the East, the rot is not as yet a dangerous enemy. In Missouri, Mr. Huseman complains of the Catawba, Isabella, Garuguès, and To Kalon, as most subject to rot and mildew; Mr. Buchanan, of the Catawba, Delaware, Norton, and Ives; Mr. Grider, Bethlehem, Penn., finds Concord, Maxataway, and Clinton very great sufferers, whilst the Franklin escapes from disease. On the Hudson at Sing Sing, Mr. Deliot finds Catawba, Anna, and Concord most injured.

The West has suffered more because vineyards have been more extensively planted in that region, but every cultivator at the East has lost his crop at some time by blighting diseases. Mr. Grider states that vineyards frequently escape both mildew and rot for several years; but at last their time comes nearly irrespective of locality and varieties of grape. Mildew seems to act very capriciously, attacking some plants standing near to each other in a vineyard, and leaving others of the same variety, equally near each other, untouched; sweeping off all the fruit from some variety, and leaving all of another uninjured; whilst the next year it will affect the vines left uninjured this year, its former victims escaping.

What all the causes of mildew are is not yet ascertained, though some and the worst are well known. All agree that sudden changes of temperature, unequal currents of cold or warm air, radiation from the leaves of the plants at night when the temperature becomes unusually cold, standing water about the roots of the plants, badly drained land, are sure to cause mildew; or at least plants exposed to these conditions always suffer from mildew.

It is possible, in the cold or warm grapery, when the vines are growing rapidly and the temperature is high, to produce mildew in a few hours by leaving the sashes open so as to bring rapid currents of cold air over the surface of the leaves, but mildew under glass may be checked and removed by the free use of sulphur dusted over the leaves, and exposed on the flues. Brushing the vine over before it commences to grow with a mixture of sulphur and lime-water is found to be very beneficial. Under glass, none but careless persons need suffer from mildew; but sulphur applied out of doors is of doubtful benefit, for in the open ground we cannot control the currents of air.

Professor Silliman, reasoning from the effects of cold currents of air in graperies, and from the fact that vines growing on fences or house walls rarely mildew where there is a projecting roof over them which moderates nocturnal radiation, believes that this disease can be controlled by planting vines against such supports as will enable us to throw out a light roof or shelter over the top of the vine, thus checking or retarding upward currents of air, and reducing the radiation. This would be beneficial, but it does not cover another class of causes. Mr. Allen of Salem has frequently found grapes out of doors ruined by mildew after being enveloped for twenty-four hours in a dense fog, against which no projecting roof would be any defence.

Others of the gentlemen I have referred to have found that those vines are sure to be the victims of mildew which are of weakly habit of growth, whether produced by over-pruning, over-bearing, moisture, sterility of soil, or currents of air; and here I think lies the root of the matter, — mildew is a consequence of enfeebled vitality; the seeds or spores of this fungus are always floating in the air, ready to take root and develop whenever a suitable soil is ready for them: we all know that any vegetable matter laid in a damp and ill-ventilated place will become mouldy very quickly. Vegetation suffers from fungitic growth, whenever any cause renders it sickly, weakens its vitality, suddenly checks its vital processes, whether currents of air, nocturnal radiation, or excessive moisture. As soon as the vine ceases to progress or maintain its integrity, it commences to decay; for growth and decay are simultaneous processes in all living matter, the animal absorbing oxygen and giving out carbon at the same time, and the plant doing just the opposite. When therefore from any cause you check the advancing processes of vegetation, you uncover the decaying processes to the seeds of the fungus, which is mildew or mould. If the vine's progress is but momentarily arrested, it may start on again, and suffer but little, its leaves perhaps become spotted; but, if the adverse condition is continued long enough, the leaves and fruit are both blighted.

We therefore see that there are two methods for us to pursue with the hope of ultimate success: first, so to arrange the vineyard that its aspect, shelter, soil, moisture, shall afford to the vine a perfect condition of health; second, as we can rarely insure all these conditions, we must try to produce vines of such varieties as shall have particularly hardy constitutions, and be in themselves able to resist adverse influences.

It is a mistake in growing new varieties, which we may hope will be able to resist mildew, &c., to suppose that the wild grape of any portion of the country is the best stock to commence with, because sometimes wild grapes suffer from these diseases, quite as much as cultivated; during the last year, for instance, wild grapes in many parts of the country were entirely cut off by mildew. We must follow the same plan which cultivators of other plants have proved to be the best, propagate from the best cultivated varieties you can get, for cultivation brings with it new diseases and conditions, and the best cultivated varieties will have overcome many dangers, which will threaten new comers from the field and forest.

These considerations enforce the importance of seeking new varieties of grape adapted to particular localities; the climate of the East may be expected to attack vines from the West, and *vice* *versa;* and, whilst we may reasonably expect to produce a vine perfectly adapted to one district where the conditions are always relatively the same, it is almost impossible to believe that one can be found whose constitution can equally resist the unfavorable influences of climates and atmospheres of widely separated localities.

I will now give a list of the grapes which the gentlemen I have referred to believe to be the best for the part of the country in which they reside. The following are the six grapes on which the greatest number of persons have united; perhaps if a still larger number of persons were consulted the verdict might be different; but these gentlemen are well-known authorities in horticulture, and their opinion is as likely to be fair as that of any other set of men.

1. DELAWARE — Grant, New York; Silliman, Connecticut; Strong, Allen, Brackett, Massachusetts; Huidekoper, Pennsylvania; Huseman, Missouri; a qualified commendation, Meehan, Deliot, in rich soils, Buchanan (10).
2. CONCORD — Silliman, Huidekoper (thinks it vigorous, prolific, but crude), Huseman, Meehan, Deliot (in poor soil), Grider, Buchanan (7).
3. IONA — Grant, Silliman, Strong, Allen, Brackett, Deliot (all Eastern men), (6).
4. DIANA — Grant, Strong, Allen, Huidekoper, Meehan (5).
5. ALLEN'S HYBRID — Silliman, Strong, Allen (Eastern) (3).
6. CREVELLING — Strong, Brackett, Meehan (3).

CLINTON — Meehan, Deliot (poor soil), Grider (Middle States).
HARTFORD PROLIFIC — Silliman, Huseman, Grider.

This tabular view shows us that the Delaware is a favorite in all parts of the country, to which may be added the opinion of Mr. Fuller, who in his "Treatise on the Grape" says, "It (the Delaware) is a purely native variety, and probably a seedling of the Catawba, or one of that group." "If I could have but one variety for my own use it certainly would be the Delaware, as it is the highest flavored native grape known." "All that it requires is a good rich soil, with fair culture, to produce the best results."

"Bunch and berries of a medium size, skin thin of a beautiful dark red color when ripe, flesh tender and juicy and scarcely any pulp, exceedingly sweet, but still brisk and vinous, never cloying to the taste, vine very hardy, moderately vigorous and productive, ripens the first of September."

Mr. Huseman of Missouri, whose first favorite is the Concord, says, "The first season the Delaware attracted great attention by its fruitfulness, seemingly healthy habit, and excellent quality of its fruit; but the two following seasons it has been badly affected by leaf blight, and seems too feeble and delicate in its habit to become a paying fruit here compared with others."

The Concord, which is second in number of advocates, is a hardy, vigorous, and productive grape, though found to be more liable to rot and mildew than some of the other grapes. Its fine color, a rich deep purple, and largish berries make it a very attractive market fruit, for which it will be a favorite until purchasers shall learn to discriminate in buying between looks and flavor, as its juicy, pulpy, sometimes acid and foxy, though thin-skinned berry is decidedly inferior in table qualities to several other varieties; it ripens from 10th to 20th September. Mr. Huseman finds it the best grape in Missouri for table and market, and third for wine purposes.

Third, the Iona, which is also a seedling of the Catawba, which Mr. Fuller "considers the most promising of all the new varieties; the vine is strong, vigorous, short-jointed, and hardy; berries large, round, semi-transparent when they begin to ripen, growing opaque as the color deepens; skin thin, pale red, with deep small red veins at first, changing to dark red when fully ripe; flesh tender with very little pulp; sweet brisk flavor; ripens 10th to 20th September.

Fourth, Diana. This grape has been twenty-six years before the public, and has been always praised; but owing to its being more tender than some varieties, and more liable to rot and mildew, it does not rank as high as formerly; medium-sized branches; medium-sized, though often uneven berry, pale red with thick skin; flesh tender though more pulpy than the two former; keeps well after being gathered; ripens from 15th to 30th September.

Fifth, Allen's Hybrid is considered to be a cross between our native and the foreign grape. Bunches medium to large; berries round, good sized; skin thin, amber-colored; flesh tender, pulpless;

very fine vinous flavor; ripens 1st of September; rather tender, needing some covering to thrive in the Northern half of the Northern States, therefore not so good for the vineyard unless in well-protected situations.

Sixth, Crevelling. This is a Pennsylvania variety of grape which is very highly praised by those who have cultivated it, but has not been generally cultivated. Berries round, black, rather large; flesh juicy, sweet, and rich flavored; good bearer, vine hardy and vigorous; ripens from 5th to 20th September.

For the eastern half of the Northern States this list is undoubtedly all that one can wish who only proposes to plant half a dozen varieties; there are many others very popular and doubtless very valuable. First, the Adirondac, a seedling of the Isabella, which Mr. Brackett of Winchester, Mass., places second in his list of grapes. Bunches large; berries large; skin thin, nearly black, with a delicate bloom; flesh tender, little pulp, sweet flavored; ripens 1st to 20th September. Strong and vigorous grower. Second, Israella, seedling of Isabella, much like the Adirondac, ripens 1st to 10th September. Third, Rogers No. 15, which some cultivators think the best of the new seedlings; bunch rather large; berries loose, large, round, amber-colored, tender, juicy, pulpless, rich flavor, earlier than the Concord; vine vigorous and but little affected by mildew. This grape is constantly increasing in favor; but the great number, more than forty seedlings, grown by Rogers tends to create confusion, and some of the inferior varieties have been taken for No. 15, which has injured its reputation.

As we get farther West there is less unanimity of sentiment as to the six best grapes, because of the greater number of varieties which thrive in the different localities, and the smaller interest felt by cultivators in comparing and testing their individual experiences.

Mr. Huseman, of Missouri, recommended in an essay published by him in 1863,—for wine, Norton's Virginia, Herbement, Concord; for table and market, Concord, Herbement, Hartford Prolific, Blood's Black, Union Village, North-Carolina seedling, or Mary Ann.

I should consider any cultivator unwise who should stock a vineyard of whatever size with one or two varieties: he should have at least half a dozen, in order to take advantage of all circumstances; but where one can grow only a single vine on some fence, house-wall, or post, then let him select of the foregoing six varieties the one he prefers, sure that it will be as good as any grape yet discovered.

Leaving the varieties, we will now come to methods of cultivation. The first condition of success is thorough drainage; and whether the vine is to be in a city area or a country vineyard, no one can have reasonable hope of success who does not thoroughly secure good drainage.

Where otherwise there is no appearance of surplus moisture, a close, clayey subsoil almost prohibits success, as it is, like the copper bottom of a basin, almost impervious to moisture; and a sudden summer rain which does not appear on the surface may be collected in the subsoil like a pond, and give the vine, by its cold evaporations, a sudden check and mildew.

Second, Soil. Many specific soils have been recommended for grapes; in the grapery under glass, whether the border be within the house or outside, the soil and border must be rich, as the roots are compelled to draw their support from a limited surface. In garden or field culture, the best soil is a light rich loam, which must be thoroughly worked by trenching or subsoiling. If it is rich, it is an advantage to have a tendency to sand, and that a rich soil is rather stony is in its favor.

If the soil is poor, it must be enriched by well-rotted barnyard manure or special manures, of which the two best are ground bone, ashes and gypsum.

Third, Situation. First let it be sheltered, to reduce as far as may be the injurious sweep of cold winds. The garden or the vineyard, protected on the north, west, and east by high evergreen woods and hedges, is most likely to be healthy. When a side-hill well sheltered, and with the other conditions secured, can be obtained, it is the best, as the atmospheric conditions are more uniform, there is less tendency to stagnation of air, cold currents, and low temperature than on level land.

When a vineyard is to be made on a side-hill, select the side facing east or south if possible, the west last, and north not at all, as it does not receive sufficient sun early and late in the day or in the year to give the vine its necessary stimulus.

If vines are to be grown in city areas, where the soil is on the shady side of the yard, procure a vine with a long cane, plant on the shady side, and lay the cane down under the bricks or flags of the yard, and bring it up on the sunny side; or plant your vine, and let grow the first season as long a cane as will ripen its wood; then stop it, and lay it down as before. You will also gain in this way more active root-surface, as the vine under the bricks or walk will root freely, and will obtain a much larger feeding ground: if the soil is rich and well drained, the roots will thrive under the pavement about as well as in the open ground; they will be protected from the direct evaporation, and, if they get less direct rain, will lose less by evaporation.

Fourth, How to plant. Prepare the ground thoroughly, not merely where you are to set the vine, but the entire surface to be used for the culture, by deep spading or trenching (see pp. 88, 89, C. L.), adding at that time such manure as you desire, carefully incorporating it with the soil. The soil ready, dig your holes eight feet apart, three feet in diameter, in rows six feet apart, deepest on the edges, say one foot on the circumference, shoaling to six inches in the centre, which enables one to spread the roots evenly, and give their ends a suitable downward tendency. When you plant in the open ground, set the stake in the centre of the hole first, lest it should injure the roots by being thrust in afterwards. Select good red cedar, locust, chestnut stakes, about three inches square or diameter; char the lower three and one-half feet; then drive them in three feet deep, leaving seven feet projecting above the surface; then set the vine, first softening the surface around the stake on the surface of the hole with a hand fork, as directed on pp. 157 to 160, "Country Life."

Select in preference two or three year old plants, and, before setting them, prune their roots carefully, and cut the cane back to four or six buds; after planting, leave the surface of the ground fine and smooth; if you plant in the fall, cover the ground with well-rotted top-dressing of manure, drawing the mulch or some earth about the stem to protect buds; during the first season, the vines which grow feebly should be stimulated with liquid manure or guano, in order that all may be equally ready for pruning and training the second year.

If the vines are to be grown on espaliers, you may make the whole espalier when you set the vines, or only set the posts, leaving the completion of the espalier for the time when it is needed. Where the vines are to be trained on walls or fences, there will be no need of any long stakes. Light stakes one inch square may be set as a support for the vine for the first year or two.

When the buds break after planting, select the strongest, and rub off the other buds that all the strength may go into it, and, when it has made a few inches' growth, cut off the naked stem of the remaining old cane an inch or two above the new shoot: this shoot may be left to trail over the ground, or be tied up to the stake. About the first of August, pinch off the end of the cane to check its growth and ripen the wood. One or two new eyes may break below; if so, when they have grown a few joints, pinch them; the vine may now be left until time for pruning. The best season for pruning is from the fall of the leaf to the middle of winter.

It is best for all young vines to be lightly covered with some kind of litter during the first winter; and therefore convenience will induce one to prune before the cold sets in. Cut away the long cane, leaving two buds at any rate, and, to avoid accidents, it will be well to leave three or four. In the spring, before the vines have started, you can rub off the weaker buds. Save the canes you cut off to propagate new vines.

If your ground is not rich enough to maintain a permanent vineyard, top-dressing of manure may be dug in between the rows; best do this in the fall, and use well-rotted manure, as green manure, or too much of it, is likely to over-stimulate the growth when applied in the spring, driving the vine too much to wood, producing larger but not so well-flavored fruit.

We are now ready to start on the second year of the vine, and must commence by deciding in what way our vine is to be pruned. Experience has shown that vines left to themselves will grow every year longer, and farther from the ground, with a long interval of naked stem of no possible good, at the top of which is the new growth and the fruit; and where the vine is left to run unpruned, the fruit will be large and fine at the top of the vine, and nearly worthless below. Pruning, therefore, is simply a process by which man brings the fruit-bearing portion near the ground, saving labor, and, as it proves, increasing the crop, by compelling the sap to feed all the fruit-bearing buds alike, producing fruit equally good in all portions of the vine. This is the principle; the application has varied with different cultivators, but the variations are easily reducible to two: the long-cane system, in which the vine throws up a cane this year which bears fruit next, and at the same time produces a second cane; next year the fruit-bearing cane of this year is cut out, and the succeeding or third year the cane of the second year bears fruit, and makes a new cane to replace the fruit-bearing cane of the same year. I will dispose of this method at once, by saying that although it has some advantages it is wasteful, more troublesome and inferior to the second system or spur-pruning. On pp. 116, 117, 118, you have the cuts of the method of spur-pruning applied to the grape-vine as it is carried along the rafters of the grapery: the principle is the same when enforced out-of-doors, though the management is different; but even though I may repeat myself I shall go through the treatment of the vine for the first four years.

Having decided upon spur-pruning, we must next decide whether the vines are to be grown on posts or espaliers, and we should remember that the wall of a house or a fence are the same as espaliers. It has been found best, in order to secure the greatest amount of fruit with the least expenditure of vital force, and to insure the even breaking of all the buds and a uniform supply of fruit, to bend the vine considerably out of the perpendicular, as thereby we retard the sap, and are enabled to produce uniformity in the length of the new wood, which insures an equal distribution of sap to all parts of the vine, and therefore a uniform development and quality of fruit.

When vines are to be grown upon espaliers, the first step is to produce for the second year canes which can be bent at a considerable angle, if not a right angle, and carried along the espalier; the posts of the espalier being set eight feet apart, the vines may be set opposite them or half way between: in either case it will have eight feet in length by one-half the height to cover with fruit-bearing wood, and the simple problem is how this may be most perfectly done.

By referring to the plan annexed, you will see the method of pruning and training for several years; after the fourth year the method of pruning is the same, unless spurs become too old or chance to lose their buds, in which case they must be cut back to the arm. In time the arms themselves get too old to produce as vigorous fruit as when younger; in that event cut one out at the fork, when a new one can be developed from many latent or concealed buds which are always present at the base of buds formerly developed and removed, and which will grow whenever there is a chance; after one arm is renewed treat the other in the same manner.

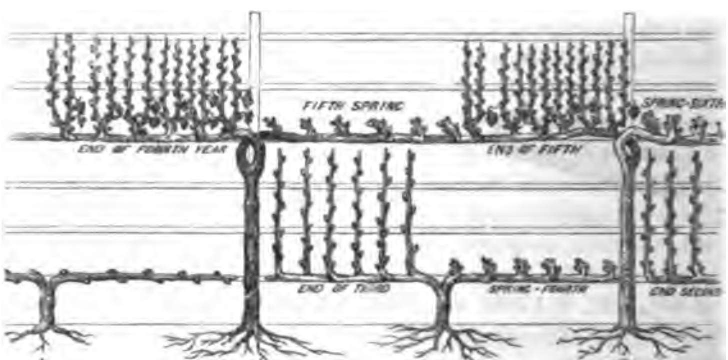


Fig. 1.

To return to our vine with four buds left at the commencement of the second year, let the two most vigorous buds grow, and rub off the others; as they grow, bend them down to the ground, or tie them to stakes, keeping them always very carefully bent.

Pinch the vines when they have made five feet growth ; prune them back to four feet in the autumn, and lay them down and cover them up as the first year. At the commencement of the third year tie them to the espaliers at A and C ; the buds will break at each eye ; rub off all but those you wish to preserve, and tie them up to the espalier as they grow ; when they have made three to four feet growth pinch them ; they will then be in the condition shown by the left side of C. Prune them to two buds ; besides these two buds, B and C, shown in fig. 3, there will be several base buds, D, E, F ; leave them all until spring.

In pruning the vine this and succeeding years be careful to cut the right hand-spurs so that they will incline to grow to the left, and the left *vice versa*, to ensure the espaliers shall be covered evenly, — this is best effected by leaving that bud as terminal for growth which has the right inclination.

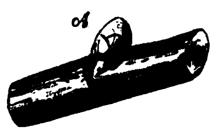


Fig. 2.

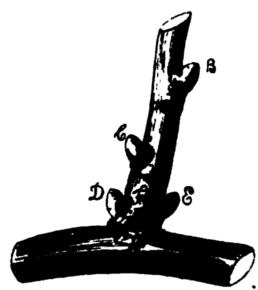


Fig. 3.

Plate No. 2 shows the condition of the buds on the arms at the end of the second year. Plate No. 3 at the end of the third year.

The fourth year there will be two shoots, one starting from B or E, plate No. 13, for fruit ; and one for growth of new cane from C, D, or F, according to which of these buds is the strongest and has the best inclination ; all other buds but the two will be rubbed off. B, in plate No. 1, shows on its left side the condition of the vine at the end of the fourth year, and on its right, when pruned at the commencement of the fifth.

Fig. 4.

Plate No. 4 shows the condition of the spurs at the end of the fourth year, the right hand cane B developed from bud E, in fig. 3, and produced fruit; and cane D was developed from bud D in same plate, which was the strongest of the base buds; after the cane B had grown two buds beyond the fruit, it was pinched, and D was pinched at three feet; in the autumn, all the fruit-bearing spurs were cut off at H, in fig. 4, and the other shortened back to two buds of base.

Remember that the object of this method is to keep the spurs short as possible, by constantly bringing up the new canes from as near the arm as the buds will permit. When the vine is pruned in the autumn, it is safe to leave one more bud than we mean to retain to enable us to cut it off later in the year, when the frost of winter may have chilled the upper bud; as I have said in another part of this book, the pruning should always be made midway of an internode to leave a bit of cane above the bud as its protector.

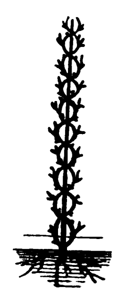
Plate No. 1, at D, shows the vine at the end of the fifth, and pruned for the commencement of the sixth year: there is a difference between A and B, C and D, in that B and D are trained on the upper half of the trellis; to get the vine up the extra height, generally requires another year. When at the beginning of the second year the two buds grow into two shoots, and are bent down, in order to produce B and D, we remove one shoot and carry it up to the place where it is wanted, stop it a little beyond, and, when ripened, prune the wood back to the point at which you wish to have it commence growing the third year, rubbing off all the buds below; from that time the treatment is the same as A and C.

This method enables one to carry a vine on the side of a house or as high as he desires, and spread it where he wants it, either to get it into the sun or out of the way of thieves: this method of pruning once fairly understood, the cultivator can do what he pleases, carry his vine where he pleases; if he wants to lay a tender vine down and cover it each year, he can carry one cane the second year diagonal to the espalier, and the third year carry out his spur from one arm instead of two; then, when the fall comes, he can untie the vine and cover it as he thinks best. When vines are grown on walls or houses singly, they may be allowed to make longer arms and spurs than when in vineyards, as the vine has more room for its roots to feed.

Fig. 5.

Plate number five shows a spur which has grown too old and clumsy to give vigorous canes and the best of fruit: remove it at the line *A*, *B*, but not smooth with the wood, as the latent buds are more readily developed from the base of the spur, a little above the arm, than from the surface of the arm itself.

Espaliers for the support of the vine are but rarely used in the vineyard, where it is usual to tie the vines to stakes. The vines are allowed to grow about six feet high, and are then stopped, and pruned according to the short-spur system. This is cheaper, and very often a more convenient method; but, unless the vine is twisted, in order to retard the flow of sap, the upper buds will be over stimulated, and produce the best fruit. There are many ways for doing this, but by far the best is that practised by Mr. E. A. Brackett, of Winchester, who, taking the two eyes and canes of the second year, winds them in opposite directions in a spiral around his stake, keeping the two canes about four inches apart, and stops the growth by pinching when the vine has reached the top of the stake. The spiral vine is in much the same condition as the horizontal, and is pruned by the short spur method. A secondary advantage of this method is, that as the vines acquire age, they become rigid, and ultimately can dispense with a stake.



How long vines can continue to be pruned in this manner and yield profitable crops has never been ascertained. But there are some in Europe more than one hundred years old, still bearing vigorously every year. As vines acquire age and stretch their roots indefinitely, they could be allowed to carry out their arms much farther, and in such cases the alternate vines should be removed to give room on the espaliers to the remainder. As the cost of vines in the new vineyard is large, the proprietor should, as far as possible, propagate his own vines; and I should not do justice to this subject, were I to leave it without briefly setting before the reader the best methods for their propagation.

If our object is to get new varieties, plant the seed selected from well-grown and perfectly ripe grapes of the variety to be cultivated. The seed must be kept from drying, or their vitality will be injured, which may be prevented by drying the grape into a raisin, which will keep the seeds moist until spring, or by planting them in the fall, in open seed-beds, or boxes of loam, or sand, which are to remain under cover: as grape seeds very often do not germinate until they have been in the ground two years, the cultivator must leave the bed in which he plants them undisturbed for two years, unless as many vines come up the first year as he wishes. The seed should be sowed in drills one foot apart, seed three inches apart, and half an inch deep: plant in a light, rich, loamy soil; when the seedlings come up, shade the young foliage in its infancy from the scorching rays of the sun; the plants will soon grow strong enough to need no protection; they may be allowed to grow together in a mass until fall. When they have made a few leaves, tie the little plants up to small sticks, and pinch them after they have made six or eight good buds; in the fall take them up, cut back the wood to four eyes, leave the tap-root of a moderate length, and either plant them at once in rows four feet apart, plants four feet apart in the row, or cover them up, tops and all, in a trench until spring; if they are planted out, they should be covered with a protection of light litter until spring. In the spring tie them up, and let them run from four to six feet, then stop them, and cut them back in the autumn to four eyes, when they will be ready to be set out in a permanent position. The fruit continues to improve for several years, so that it is not possible, until the vine is mature, to decide upon the success of the experiment.

But if you want to increase the number of plants of the kinds you now have, it must be done by cuttings, either of a single eye or of several eyès, or by layers. In layering the vine, you do not need to tongue it as is directed on p. 289. When it is laid down under the soil, it will root at every bud, and if the buds are near the surface, each eye will break and throw up a cane; when well rooted, cut the layer off the main stem, and treat like a new vine.

Single eyes will give the greatest number of plants in the shortest time. Cut buds off with a piece of the internode on each side as in plate 12, taking them from wood of the last year's growth: you may set the bud in that condition in the soil, covering the bud about a quarter of an inch; or you may slice off the lower part of the wood under the eye, nearly or quite to the pith; or you may cut the bud away from the internode at the upper end, and taper the lower end, leaving it an inch or two long. In the first two cases the bud is laid horizontally on the earth, in the top of the pot, and then covered over; in the other the pointed end is pressed down into the earth in an oblique direction, until the bud is covered as deeply as before. On p. 292 of "Country Life," you will find its after-treatment indicated. It is quite necessary in order to succeed with single eye cuttings to have bottom heat until the plants have got well established, when they may be potted off into small pots, or be at once set in an open frame or bed in the ground, to be treated like seedlings. You can get bottom heat by the hotbed where there is no greenhouse.

Cuttings of two or more eyes may be set at first in the open ground: when the vines are pruned in the fall, cut the prunings into two, four, or six buds, according to the number of plants you need; two will answer. Pack them in sand or loam, and keep them during the winter where they will be moist, or bury them in the garden; prepare the cuttings by removing the wood smoothly at the base of the lower bud, and two inches above the top of the upper bud. In the spring make a trench of good soil, with a sloping side deep enough to take the cuttings; set them in four to six inches apart, and cover all but the top eye with soil; return all the earth back, and press it compactly about the cuttings. If the weather should be very dry, occasionally watering to keep the ground moist might be necessary; they will very soon commence growing, and frequently make three to six feet the first year. Tie them to stakes as they grow, and pinch the ends of the vine as in other cases; in the autumn take them up, prune back to four buds; you will find roots have started out from each bud which was below the ground; cut off the root-stem below the strongest roots, and then cover the vines till spring, or set them in their proper places.

Another method of increasing vines is to graft old or worthless stocks with new varieties; the method in "Country Life," on p. 562, is not the best; it has been proved that grafting the root or lower part of the stem by the cleft method is more successful, cutting the vine off just below the surface of the ground, or as near it as is convenient, using but one scion of one year's wood, shaping it as you would an apple-scion: insert it so as to bring the edge of the inner back of the scion and root together; cover the head with grafting clay, or merely return the earth close about it. Mr. Fuller recommends, when this is done in the autumn, setting an inverted pot over the top of the scion to protect it when we remove the covering in the spring, and then to cover the whole with earth and litter.

Cuttings may be made of the immature wood, but they are more troublesome, and some think can never make healthy vines, though there is no reason why they should not, after they once become established; the cutting is made and treated as is described on p. 284 to 286; cut a piece of the vine with two eyes upon it; cut away the cane smoothly below the lower eye, and a short distance above the upper, leaving the leaf that is opposite the upper eye; the cane should be taken off smoothly below in order to offer as large and smooth a surface of the cambium layer as possible, out of which the new roots will be emitted; set these cuttings in pots like that shown on p. 284, and treat as is there described; when they are well rooted, transplant to open beds, frame, or small pots, and treat them as heretofore described.

With these directions I must leave the subject, believing that I have simply and succinctly stated the leading facts, and given the important directions about the vine which will enable any earnest person to cultivate grapes successfully. There will be, of course, many questionings occurring to every one which I have not answered; many cases to which my directions do not seem to apply; but I have given the principles, which, like the foot rule, may be applied by intelligence to all cases.

Different localities will require different treatments, and will be exposed to very dissimilar obstacles; men who live near great sheets of water, as on the islands in Lake Erie, will be able to grow grapes with a perfection unknown to the main land, the great body of water producing a more equable condition of atmosphere. The vineyard on a side-hill or upland will escape some of the trials which annoy those in valleys; but each grape-grower will learn how best to contend with his own enemies, and at length sufficient knowledge will be gained to enable us to overcome the principal obstacles to grape-culture. Before many years, we may reasonably hope to see grapes adapted to every locality, which will funish an abundance of fruit and wine.

CHAPTER VI.

THE FARM.

During the past six years, there have been many improvements in farming tools and stock; by the aid of improved tools, the old men, women, and children of the Northern United States have cultivated and harvested full crops, with as much ease as the entire male population before the war, and with greater profit.

I shall not recount the changes in tools, for they are still progressing, and the tools which are seemingly perfect this year may be surpassed next: in "Country Life," I described and gave an illustration of a very excellent mowing and reaping machine, which is antiquated now; and the same would be true in a few years of the best mower or reaper of the present day. Great as the advances have been, there is an immense field still open in the application of steam-power to cultivation: many steam-ploughs, field and road engines, have been invented, but none which can do the work with sufficient economy. The time is near when all the work of the farm will be done by steam: the farmer will make a fire under his engine, get up steam, ride to his field, plough, harrow, hoe his crop, cut and harvest his hay and grain, gather it into wagons, and move it away by steam; nor would such power reduce the value of cattle and horses, or the rates of labor. Nothing in human economy is more remarkable than that every simplification of process, every invention of labor-saving machinery, has increased the demand for labor, and the rate of wages. The Spanish Proverb says, "It takes a mine to work a mine;" and it certainly takes a machine to repair and utilize each new machine, and men to supervize, control, and use them.

The improvement in stock-breeding has been in sheep, rather than cattle. The greatly increased demand for wool for the past six years has made sheep more valuable than formerly, and of course as fast as sheep become important, men try to develop them into their most valuable form and condition.

Wise sheep-breeders have been at work for twenty years, laying the foundation of the new and improved varieties of sheep, and were ready to meet the inquiry for them, when they were wanted; and, stimulated anew by the rapid and profitable sales they made of their improved animals, they have continued breeding with care until we now have an American merino sheep, which is better than any other variety of sheep for wool, and although carefully bred from Spanish imported stock, have so far outstripped their progenitors that our sheep are carried from America back to Europe to give the flocks there fresh start and better blood.

What variety of sheep is best for this whole country cannot be settled in a word. There are many considerations latterly overlooked by sheep-breeders, which will yet qualify the estimation in which the merino is held, and which will raise other varieties, if not to its level, to at least a very high point in the general estimation.

Sheep are valuable for mutton and wool; and the greatest profit seems certainly to lie in a sheep which will make the best and most mutton, and the best and most wool, at the same time. With the usual enthusiasm of Americans, who believe that what is good for one part of the country must be for the whole, some breeders have assumed, that, with sufficient care and time, such a sheep may be produced.

But there are certain indisputable facts which contradict this theory: all sheep do not produce the same kind of wool; there is as much difference between the wool of a merino and Leicester or Cotswold as between the feathers of a turkey and eider-down. The merino wool, whether long or short, is very fine, and each separate fibre is crimped or curled; whilst the wool of the Cotswold is coarse and straight, with few, if any, curls and crimps. These distinct characters never vary, and are of great importance, as from the fine wool broad-cloths and fine cloths are made; whilst blankets, shirts, alpacas, and similar goods, are made from the coarse; and neither kind of wool can be made into both kinds of cloth.

This fact leads to another. In England there are several breeds of sheep, which have been in that island so long that they are called native. These sheep are all long-wooled, though some, like the South-downs, are shorter and finer wooled than the others; and, though bred for years side by side, the fine and coarse-wooled sheep have maintained their differences. They have also differed in size, the coarse-wooled being the largest. Many breeders have tried to combine these two kinds, and various cross breeds have been made, some lasting for a time; but all the valuable improvements have been made in the direct line of the same variety as coarse or fine wool, or rather, as they call it, long and short wool. Besides the difference in the wool, there is a marked difference in the quality of the mutton; the short-wooled or South-down sheep having always had the highest reputation for the quality of their mutton. Certain English breeders have improved the quality of the coarse or long-wooled sheep. They have increased the tendency to fatten, reducing the coarseness of structure, replacing bones by fat, and substituting a rounded outline, and skeleton capable of taking on flesh, for the gaunt, leggy, bony animals which yielded but little mutton or wool.

The old Leicesters are described as large, heavy, coarse-grained animals, the meat having little flavor, and no delicacy; the carcass was long, thin, flat-sided, with large bones and thick legs; the fleece was heavy, long, and of coarse quality. The sheep were slow feeders; and when sent to market, at two and three years old, weighed about one hundred to one hundred and twenty pounds each. Mr. Bakewell by care produced from these sheep the new Leicester, a sheep without horns, with white faces and legs, head small and clean, eye bright, neck and shoulder square and deep, back straight, deep carcass, hind quarters tapering towards the tail, and somewhat deficient in this respect when compared with the Cotswold sheep; legs clean, with fine bone; the flesh is juicy, but of moderate quality, and is remarkable for the proportion of outside fat it carries. They are not considered so hardy as the other large breeds, and require shelter and good keep. Early maturity and an aptitude for fattening are the principal characteristics of the breed; wethers at twelve to fifteen months old weighing from eighty to one hundred pounds, and at two years they average one hundred and twenty to one hundred and fifty pounds each; fleeces averaging seven pounds each. I have quoted the Leicesters, not because I should propose them to our farmers as the sheep for us, but to show what has been done.

The merino sheep, with all its wool, and all its good qualities, is inferior in flavor and quality of mutton to the best coarse-wooled sheep; and no amount of breeding has ever changed it materially in this particular: it is just as inferior to the improved English long-wools as they are to the short-wools. Were fine the only or the best wool for manufacturing purposes, it might be best to content ourselves with poor mutton, and make up in the wool. But this is not the case; the long-wools are equally important, and some of them, for special purposes, sell higher than the fine wool. The obvious conclusion is, that long wool and good mutton are to be set against fine wool and poor mutton. Nor is the weight of fleece of clean wool in favor of the merino in all cases. Owing to the large amount of yolk in the merino wool, their fleeces average much heavier than the long-wooled sheep; but from fifty to seventy per cent of the weight will scour out when it is cleansed against thirty to forty per cent of the weight of the long wool; and therefore, in many cases, carefully bred long-wooled flocks will beat fine wools in weight.

Generally, however, the flocks of full blood or grade merinos yield a greater average weight of wool than any other sheep. Therefore where sheep are raised for wool, as they must be where distant from market, the merino is preferable; but where the market is convenient, the long-wooled and fine-muttoned sheep may be made more valuable to the breeders. I do not mean what are now called mutton-sheep in New England and Canada, any more than when I say merino I mean the merino sheep of 1850, whose average fleeces would weigh three pounds against five pounds to-day, but the mutton sheep which will be bred by some competent person who will improve it, as Hammond and others have improved the merino.

The merino has certain qualities for New England, and much of the Northern United States, which are invaluable: they are good workers, not being willing to feed in the same pasture, however fertile, unless it has considerable range; they will walk over the surface, cropping the bits they like, until they get back to the hills and sterile places, seeming to find in the stunted herbage food exactly adapted to them; and, as we know, they improve the poor land by feeding upon it. They thrive on lands that would be only a burying-ground for the improved Leicester or Cotswold. The merino also are very quiet; and though inclined to ramble for their food, they are not unruly, and are restrained from jumping by very moderate fences, whilst the old-fashioned mutton sheep could be controlled only by six or seven high bars. Careful breeding has changed these sheep in shape, wool, and mutton; has reduced the wild flocks of former times to the quiet and contented animals which follow their master whenever he appears.

The number of sheep in Vermont, the headquarters of the merino, has not increased in the last ten years in proportion to their quality; but the yield of wool to the head has doubled. The credit for this change is due to a few men who, though, at first prejudiced against the Spanish merino, soon saw their good qualities, and purchased full-blooded animals from the importers, and have carefully bred them since; never mixing any impure blood with their flocks. The Vermont merinos originated from two families of Spanish sheep, called, in Spain, Paular and Infantado; names belonging for many generations to large families of sheep which were carefully bred, and kept from any intermixture with other families. These sheep were driven every year from one part of Spain to another, seeking pasture; making a march of eight hundred miles a year, for so many generations, that the sheep became great travellers, and, according to the Darwinian theory of development, acquired a constitutional capacity for enduring labor, and a disposition to work for their living, of great value to us. Imported into America at different times, most of the merinos were mixed with the common sheep; but some of the Infantado family passed into the hands of a Mr. Atwood, in

Connecticut, who kept them pure, and from whose sheep the improved Infantado or Atwood merino is derived.

The Paulars were brought to the United States by Mr. Jarvis at about the same time with the Infantados. Some were kept pure; others mixed and disappeared amongst other sheep. A few full-blooded Paulars went into Vermont, and are still bred there, but have failed to find as many admirers as the Infantado or Atwood sheep, which, as improved by Mr. Hammond, of Middlebury, who has done for the merino what Mr. Bakewell did for the Leicesters, are certainly the beau-ideal of fine-wooled sheep.

I cannot give the details of their breeding, or enter into minute descriptions of these sheep. They have been described in the Patent-Office Reports, in Randall's "Practical Shepherd," and elsewhere; and it is enough for my present purpose to say, that, as merinos, they stand first, and have been sold for fabulous prices. Mr. W. R. Sanford, of Orwell, sold twenty-three two-year-old ewes, in 1863, for $15,000, and they were soon sold a second time for an advance. Mr. N. T. Sprague, of Brandon, Vt., a celebrated breeder of these sheep, has a buck which he values at $20,000. Bucks have been sold within the past two years for $5,000 to $7,000 each; and offers of $10,000 have been refused; and ewes for $1,000 to $8,000. These prices seem fabulous and purely speculative; but it is not speculation alone, rather the real merit of the animal, which sells them. One of these extra bucks taken West, and crossed on any flock of coarse-wooled sheep, would, in two or three years, double and perhaps treble the yield of wool, without increasing the cost of producing it, and at the same time perhaps give rise to a lamb as good or better than himself.

Nor is the improvement imaginary: it is conceded by those who have grown sheep, and who for years kept only the common varieties, that the present merino is better than the old sheep in all particulars. Their wool is finer, more uniform in all parts of the body, equal in quality, is stronger, makes stronger and more durable cloth; the sheep are less liable to disease, are better shaped, more compact; every part of the body is covered with wool, the head and face, all but the top of the nose, and the legs down to the dew-claws, just above the hoof. More wool can be cut from the parts of these sheep which used to be naked, than came from the whole body of the old common sheep.

The wool is worth from ten to twenty per cent more in quality, besides its increased quantity; the average of most flocks now being from five to seven pounds per head, and many going as high as twelve pounds per head. Mr. Sprague cut from ten yearling ewes, eight of whom had born lambs, which always reduces the wool, one hundred and seventy-two pounds, thirteen ounces,— one shearing nineteen and three-fourths pounds, unwashed wool.

Mr. Darwin E. Griswold, of Orwell, who has been several years breeding these sheep, estimates the improvement in the average yield of Vermont wool to be two and a half pounds per head. The coarse sheep have been improved by Spanish merino blood, making their wool finer and heavier; whilst the Saxony sheep, a smaller variety, which yield very fine wool, have gained in size of body and fleece, losing some of the fineness of the fibre by the same cross.

This improvement has resulted from the constant care of the breeders, who have never sold their best sheep, but preserving the best to make their flocks better, and selling only the poorer sheep; and we may reasonably believe, that, if they adhere to this practice, these sheep will be still further improved, until the culls of the flock will be as good as the best are now.

To bring the merino to their present condition, it has been necessary to keep them from storms in cold weather, and feed and water them generously. Formerly, sheep were left to shift for themselves all winter, the farmer tossing some hay or straw to them every day, or letting them eat at a stack, without shelter or care. I have seen large flocks, which have remained out through sleety storms in winter, perfectly cased with ice.

The barns provided for their flocks by good sheep-farmers of the present day are models of convenience and comfort; the sheep are sheltered from all severe storms between the first of October and May. In the winter they are fed with the best hay, have free access to pure water, and are kept warm in good cellars or barns; their lambs now come in March, when they can be easily watched and provided for by the shepherd, instead of being scattered far and wide in bleak pastures, to be hunted up, or left to die if exposed to a severe storm. The sheep are sheared in May, and sheltered from bad weather until their new wool grows enough to protect them, and then turned into well-fenced pastures, which are not overstocked. During the summer they are carefully watched, salted, their noses kept tarred, to drive away the fly, and then, as autumn's storms come on, are carefully protected.

It hardly seems as if all this increased cost could pay; but it does. Mr. Daniel B. Buell, a careful breeder in Orwell, Addison County, Vermont, who has been brought up with sheep, and has kept them in all ways, considers that the present price of wool, fifty to fifty-five cents currency, pays for all the extra trouble. He considers that the better the sheep are fed, the more profitable they become. He turns his sheep into his best fall feed, to bring them into the barn in good condition, and then keeps them well during the winter, giving a peck of oats and corn to fifty sheep per day, with abundance of best hay, and pure running water. Too much care cannot be taken to provide water in abundance. Sheep do not drink much, but often. They do not need grain all winter: it is best to give it them at first, when changing from grass to hay; and when they become used to hay, and are thriving on it, the grain may he withdrawn, until towards spring.

The breeding ewes should have grain, oats and shorts being best, six weeks before lambing, and turnips or some roots, in order to increase their milk. A variety of food is of great importance to them; many careful experiments have been tried, in England and America, with different varieties and mixtures of food; and the result has been always in favor of mixed food in which there was a large proportion of roots.

Strangers to the merino are frequently surprised at their wrinkled appearance, and do not understand how the many folds of skin sheep-fanciers desire to produce, can be of any value. The original merino was a nearly smooth-skinned sheep, with a tendency to folds of loose skin about his neck; these folds were, of course, extra skin, and caused just so much more wool-surface. As the sheep were improved, the tendency to wrinkle increased, and it was soon considered a proof of improved blood; this induced some breeders to try to increase the wrinkles on their stock, until sheep are produced that have twice as much skin as their carcase would warrant. Wrinkles are by no means a proof of good blood, nor are they especially desirable; the wool of very wrinkly sheep is generally shorter and less valuable, though it is equally true that some of the best sheep are very much wrinkled. Wrinkles belong to no one famlly; and Mr. Sprague, who has kept them sixteen years, thinks they are rather a proof of mongrels, or mixed families of merino.

The merinos are less subject to disease than common kinds of sheep, which seems contrary to analogy; as we should expect that increased care and protection would make them more tender. Sore lips, sore eyes, a kind of colic called stretches, and foot-rot, are the principal diseases. Grub in the head is very troublesome sometimes, but may generally be prevented by tarring the nose in the summer, to drive away the fly which seeks to lay its eggs in the sheep's nose. If the eggs are laid, the grub, after it is hatched, creeps up the nostril, and attaches itself to the upper part of the mucous membrane, causing the sheep great uneasiness, and sometimes, when their numbers are excessive, death.

Sore mouth and lips generally come from eating some pernicious weed in the grass or hay; lambs are frequently very much distressed by sore lips after the winter sets in, when hay is their principal food. Whether due to hay or other causes, this sore mouth generally yields to a few applications of healing ointment of any kind, even common mutton-tallow. Sore eyes, ophthalmia, and the like, will generally pass away without any permanent injury, after bathing the eyes a few times with luke-warm water. Some shepherds recommend many kinds of violent treatment, but they are useless, and often injurious; Nature will effect a eure with the most simple treatment.

Foot-rot, the scourge of thousands of flocks in Europe, is well known in America, but has not yet become a great evil here. It is an inflammation of the foot, which first shows itself in the skin between the cleft of the toes at the top of the hoof; this skin is commonly as fine, "sound, smooth, and dry as the skin between a man's fingers; the first symptom of hoof-rot, is a disappearance of this smooth, dry, colorless condition of the naked skin at the top of the cleft over the heels, and of its coolness;" the skin becomes chafed, a little corrugated and moist, and, as the disease increases, hot. The part first attacked becomes sore, discharges a very foul-smelling water, and soon ulcerates; the ulcer extends between the horn on the inside of the cleft and the inner sole or core of the foot, and increases very rapidly; if not cured soon, the inside of the foot will become entirely rotten, and at last the hoof drop off.

As soon as a sheep is seen to be lame, it should be caught, and examined; if there is any appearance of rot, dissolve some green-vitriol in hot-water, making a strong solution; then lay the sheep on its back, holding it partly between your knees; pare the inner-sole, or side-horn, as thin as you can, and not bring blood; cut the diseased horn entirely away if possible. Return the sheep to its feet, but set the diseased feet into the hot solution of vitriol, taking care that it shall not be scalding hot; let the sheep stand on its feet, resting its weight as much as possible on the feet in the solution; so that the pressure may open out the hoof, giving the vitriol a chance to get into every part. Let the sheep stand three to five minutes, and then take it out, and turn it into a dry place, where it should be kept for a day out of the wet. Very bad cases will be cured by one immersion, if it is thoroughly done; many specifics are advertised to cure foot-rot, but none will be found more simple or effective than this.

Foot-rot is attributed to many causes; changing from a light and dry to a low and wet pasture; too much rank, green food in the autumn, producing general derangement and inflammation of the system; contagion, filthy yards, wet straw. Whatever its origin, it should be watched with care; a lame sheep should be examined as soon as seen, and isolated from the rest of the flock, as it is certainly contagious; and common sense should teach every one to keep their sheep in clean and dry quarters. It has so often appeared in flocks which have been removed from high and dry summer-pastures to low and damp meadows in the fall, that I suppose we must believe it is often originated in that way; but it appears in flocks not subjected to such changes, whilst flocks in wet meadows often entirely escape. I believe, that, although often due to locality, it is also hereditary, like the gout; and that descendants of flocks in which the hoof-rot has been will always be subject to it.

Where a flock of sheep, or an individual, shows the hoof-rot, it is very desirable to change their food, and clean their yards and stables at once, as so violent a disease cannot fail to affect the general system, and no local treatment will dispense with a proper attention to food and cleanliness. No good sheep-farmer will ever allow his yards and folds to get filthy, but will clean them as carefully as the horse-stable, and permit no accumulation of manure or litter.

CHAPTER VII.

FARM.

In order to present to those of my readers who are not farmers or stock-raisers a clear idea of the management of sheep, I will follow a flock through a year, and will commence with them in January, when they will have become accustomed to winter food and treatment.

The amount of food, whether hay or grain, which sheep or other animals require to keep them thriving, depends on the condition in which they were when they were brought into the barn, and the kind of building in which they are kept. It has been found, that, when sheep commence the winter fat, they can be kept so with very little extra care; first-rate hay and plenty of fresh water is enough for most of the winter. But, if they come in poor, it is very difficult with any amount of feeding to get them fat, or keep them improving. To insure the best condition, some farmers give their sheep a little grain every day, after the frosts set in in the fall, to replace the sweetness of the herbage, as it withers under the frost, — a gill of oats per day per head would be ample for this purpose.

A perfectly warm barn may be made above the surface of the ground; but the best way to secure warmth is to dig a cellar in a side-hill which faces to the south or east, selecting a place to which water from a spring may be readily brought through pipes. Build a solid wall on the west and north, and board up the east and south, leaving large windows, which must be carefully glazed, as sunlight is of great importance to the health of the sheep. Carry a drain under the walls and across the floor of the cellar, to keep it perfectly dry. Over the cellar erect a suitable barn to hold hay and grain, but not for stabling cattle, as their water would leak through, and injure the wool. The room may be divided into as many small apartments as is desirable by using racks for holding the hay, as division fences, taking care to set them in such a manner that the hay sent down through a tunnel from above can be easily distributed to each rack without extra labor, and without carrying it over the sheep, sprinkling hay and seed on their wool, which is very injurious, dirtying the wool, and causing irritation in the skin, which induces the sheep to tear out their wool with their teeth, or by rubbing against projecting surfaces in their efforts to allay the itching. Set the water-tubs convenient to each apartment, so that all may drink at will; if the racks are properly made, hay and grain can be fed in the same rack with economy. Shut off a small space, which should be built up for bucks, like a room. When they are allowed to run with the sheep, their long horns catch in the wool; and as they are often cross, they bunt the other sheep, perhaps killing a pregnant ewe, or destroying her lamb. In such a cellar as this, the sheep will be warm all winter, and ewes can be permitted to lamb in March with greater security than out of doors in May, as the young lambs are protected from the damp ground and cold currents of air. One hundred per cent in lambs may be reasonably expected, whereas the merino left to lamb in the fields rarely give over eighty per cent.

The cellar should be connected with extensive yards on the south and east, to which the sheep should be admitted whenever the weather will permit, in order that they may get as much exercise as possible. Want of exercise is very injurious to breeding-ewes in particular, some flocks having been nearly ruined by confinement.

By January, the sheep will have become accustomed to their winter-food; and if they are in good condition, and the hay is of the best quality, their grain may be slowly reduced until none is given. Keep salt with a little sulphur in some accessible place: the sheep like it, and its free use is thought by many to counteract the tendency to stretches. The feeding should be perfectly regular in time and amount; in winter, feeding three times in the day, and once in the evening, would be none too much; and, every day, all the remaining hay, straw, and stubble should be cleaned out of the mangers, and given to colts or horses.

Early in February, the sheep should be sorted; all the lambs, wethers, barren ewes, being removed from the breeding-ewes.

If the ewes were properly marked when tupped, it will be easy to know when to expect them to lamb, as they are regular, rarely exceeding one hundred and fifty-two days.

Strong ewes rarely need any assistance in labor, but the lambs often come weak, and, if they are born on a cold night, might die before morning. To prevent mishaps, good shepherds visit the flock once, and better twice, between the last feeding and morning. The new-born lamb will soon get sufficient strength to stand up, and will immediately try to suck: if he once gets his stomach full of his mother's milk, he will take care of himself; but if he seems to be unable to find the teat, or the mother will not stand still, the shepherd turns the ewe's head into a corner, stands over her, holding her tight between his legs, his face towards her tail. he moves the lamb up to the mother's udder, and inserts the teat into its mouth; if it does not incline to suck, by inserting his finger a little way into its mouth, and tickling the tongue, or roof of the mouth, it will be induced to try. If it really makes a vigorous pull, it will soon learn to take care of itself; milking a few drops into its mouth will sometimes stimulate an unwilling lamb; but it often happens that all is useless, and it will not suck: for this case, the bottle is the only remedy. A common pint-bottle with an India-rubber nipple is the best for convenience. The milk of a new milch cow warmed to the temperature of the body, sweetened with molasses or brown sugar, and stiffened with a few drops of whiskey, should be ready; and rather than tire lamb, mother, and shepherd by ineffectual attempts to make it suck, give it a good feed. It will soon gain strength, and compel its mother to stand for it. In very cold nights, lambs should be wrapped in a piece of old carpet, buffalo, or be well covered with straw: they are easily chilled, and yet may often be saved by timely care. I have known a very valuable sheep grow up from a lamb, which was so far gone with cold and hunger, that he was wrapped up, placed in a warm oven, and fed with whiskey and milk from a spoon for several hours, giving a few drops at a time, until it could run round, and bleat as loud as the best lamb in the pen. As soon as the lamb is able to run about, all solicitude is over, for they will gain very rapidly.

Within a fortnight of their birth the lambs' tails should be cut off about two joints or vertebræ from the body. This is done by laying the tail on a block of wood; press the skin back as much as possible, so that when the bone is cut the end of the skin will project beyond it; after cutting the tail, the two flaps of the skin may be drawn together with needle and thread to check bleeding. The tail should be cut with a quick blow, of a dull chisel; if bleeding is profuse, the end of the tail may be seared with a hot iron, which effectually stops bleeding and saves the lamb's strength, which often suffers from the loss of blood, but when the operation is made just right, there will be very little bleeding, which can be neglected. The older the lamb is, the more he will bleed and suffer from it. The male lambs not to be preserved for bucks should be castrated within a few days of the docking, so that the lamb need have nothing farther to impede its growth.

Running with their mothers, the lambs will early learn to eat some hay, grain, &c., and will thrive if the mothers have sufficient milk. Some over-zealous breeders feed their choice lambs with cow's milk for some weeks, by which they increase the size of the lamb.

After the lambs are all born, there will be but little for the shepherd to do until shearing, other than the regular routine of feeding and tending. In old times shearing was postponed until June; now the sheep are sheared early in May, before they are turned out to pasture, which saves the trouble of tagging. If the sheep are to be turned into the pasture before shearing they must be tagged; that is, the wool on both hind legs, from the roots of the tail down, should be cut off. The change of food from dry to green will cause the sheep to scour, and if the long wool is on the legs it gets very much injured in value; the tags are laid aside in the wool-room until shearing, when the clean wool is rolled in with the fleece, the remainder put with the sweepings of the wool-room floor, to be sold as dirty wool.

When the sheep are not sheared until June, they suffer from the heat through May, and sometimes shed their wool; and, after shearing, the hot summer sun blisters the skin, and often checks the growth of the wool for the year. When sheared early in May, they must be sheltered at night and during cold storms; in a fortnight, enough new wool will have grown to defend them against any ordinary weather.

Whether sheep should be washed before shearing is a mooted point: we know that a large percentage of the weight of wool is dirt and grease for which the buyer does not want to pay; if this could be thoroughly washed out the remainder should command a high and corresponding price. But to wash completely, the sheep should be soaked in warm water with potash in it, and then be carefully scrubbed until every vestige of dirt is removed. The usual practice, merely dipping the sheep in cold water, or letting a stream run over them, an attendant squeezing the water out as fast as possible, can remove but little dirt. Buyers careless or ignorant pay alike for all kinds of washing, and of course discriminate against the good work. If wool is not washed, the buyer takes off a third of the weight from all wool alike, which is also indiscriminating and unjust.

A sheep kept well in clean stables, with no exposure to hayseed, mud, or filth, will get but little dirt into its wool, and whilst some sheep are full of coarse heavy yolk, properly called grease, others having only a light, soft oil, of course the wool of the latter has less waste than the former; but if all unwashed fleeces are shrunk alike, the heavy wool is most profitable to the farmer. Sheep sheared early should never be washed, as they are liable to take bad colds from carrying a heavy wet fleece until it drys; besides the rough handling which they must undergo is bad for them.

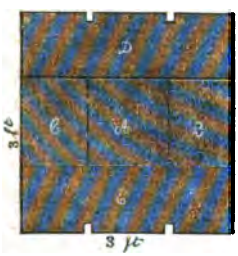
Every physiological argument is against the practice, and nothing in its favor but the cost of the dirt to the buyer. When the time comes that men who buy are really good judges of wool they will pay for wool according to its quality, which will encourage farmers to take pains to produce a really good article.

The clean floor of any room or barn is selected for the shearing-place, and when there is no suitably clean floor, sheets or canvas may be spread under the sheep. As whoever reads this book will either be a shearer or have to employ one, it is needless for me to enter into any details of the process. When the fleece is removed the sheep is set upon its legs, its toes cut short with a chisel or toe-shears, and its owner's initials and its own number are stamped in lamp-black or venetian-red on the sheep's hind-quarter or side as fancy may dictate.

Sheep-breeders who wish to sell in the succeeding autumn are careful not to cut the wool close, but leave rather a thick covering of wool, say one-quarter to three-quarters of an inch on the forehead, along the legs, and about the scrotum, wherever, in fact, it is desirable to have a sheep look well wooled when he is offered for sale. This is not a fair practice, unless the buyer is notified, for it is impossible to judge in the autumn of the sheep's capacity for fleece. Ewes are not as often treated in this manner as bucks, as they are usually judged by their general appearance and lambs; but a buck may sire many lambs, and whether he is worth five or five hundred dollars depends on particular points of merit, a thick and uniform fleece being one of the most important.

Too many merino buck-lambs are raised in Vermont at present; the number of breeders has largely increased, and every farmer hopes to sell his buck lambs or yearlings for great prices, and therefore, instead of converting all but the undoubtedly most valuable into weathers, all passable bucks are permitted to grow up, with the hope that some few may sell the whole lot for high prices; as a consequence, they become a drug, and are peddled about the Western country, and often sold for a trifle at last, and when sold can do very little to improve the stock of those who purchase them.

As soon as the fleece is removed, the folder of the wool gathers it up in his arms, and lays it down on a large, clean table, the inside down: he carefully spreads it out to its full size, cleans it from dung and other impurities, turns over the two sides to meet in the middle, folds over the ends, and then doubles it all together, and ties it in a firm square bundle with stout twine. As this is rather a nice job, and must be firmly and well done in order that the discolored surface may all be carefully closed in, and the fleece be neat and white, wool-boxes have been invented into which the fleece is laid after the ends are folded up. String being first laid across the box, the sides of the box are then pressed together, compressing the wool into the smallest compass; it is then tied with the strings which lay under it. A cheap and good box may be made as follows: Take a board, *a*, *b*, *c*, three feet long and one foot wide, cut it into three equal parts, and attach *a* and *c* to *b* by hinges, then attach two boards same size *d* and *e* to *b* by hinges, screw two small hooks to *a* and *c*: when the fleece is twice folded lay two strong strings lengthwise of *a*, *b*, *c*, and two across *d*, *b*, *e*, at equal distances. Lay the fleece in the box, covering the central part; raise *d* and *e* to a right angle with *b*, then raise *a* and *c* to a right angle also; fasten the sides *a* and *c* into *d* and *e* by letting the little hooks attached to *a* and *c* drop into the notches made for them in *d* and *e*; thus the whole will be held compact: tie the strings tight, open the box, and you have the fleece solid well shaped; store the wool in a cool dry place; cover well from dust.



Merino sheep, partly owing to their thick, close wool, are but little troubled with ticks: such as there are will take refuge in the lambs as soon as they are admitted to the company of the old sheep after shearing. In a week they will be all in the lambs, and may then be all killed by dipping the lambs into a decoction of tobacco, which may be made by steeping "five pounds of tobacco to every one hundred lambs in hot water until the tea becomes strong enough to kill a tick as soon as it is immersed: or three pounds of white powdered arsenic are dissolved in six gallons boiling water, to which add forty gallons of cold water;"

in either case stir the solution, and immerse the whole lamb in it, saving the eyes, nose, and mouth. Keep it in the water long enough to soak the wool; then take it out and set it on a grating over the tub to drain; one dose will kill the vermin; it is a good plan to dip the old sheep in the same manner, as additional security.

When the ewes are sheared, their number, weight, and quality of fleece, and quality of lamb should be entered in the Sheep Register, that we may know in the fall to what kind of bucks the ewes should be bred. Ewes vary very much in their qualities; and by carefully noting the variations, we may increase or diminish any given characteristics by using bucks of like or unlike peculiarities. Vermont farmers often carry their ewes many miles, and divide their flocks amongst several different bucks, and are exceedingly particular as to the merits of the animals they use.

When the sheep are sheared, marked, and dipped, they are turned into pastures, where they are expected to range during summer. In some convenient place set a box, with some tar in its bottom, into which sprinkle salt and a little sulphur; or put in it only a lump of rock-salt and a little sulphur, so that the sheep may lick it as often as they wish; or salt them a little every week. Sheep will do very well in good pastures where there is no water, as they get the dew in the morning and evening feeding, and the juices of vegetation reduce their thirst; but water is very grateful to them, and they thrive better if they can get it.

With the exception of salting the sheep and occasionally tarring their noses, they are left to themselves until August, when the lambs are separated from the ewes, leaving with the lambs one or two dry ewes, or cossets, to keep them tame, and teach them to follow the shepherd. The lambs should be turned into the best pasture which can be given them, and far enough from their mothers not to hear them calling. In a fortnight they will have ceased to miss the mothers' milk, on which they have, of course, depended but little for some weeks. After the lambs are taken away, the ewes should be carefully watched lest their bags swell: when they do, bathe the bag with warm water, and grease it, and draw a little milk out; they will then soon dry up.

As the feed on the hill-pastures gets short, move them on to the after-grass in the meadows. If the grass is very rank, let them stay at first only long enough to fill themselves with it, and then drive them back to the hill until their stomachs become accustomed to the new food, and their eagerness for it abates, when they may be left on the meadows until winter. It is very desirable throughout the season to change the sheep from one pasture to another; they improve more rapidly if their pastures are frequently changed, thereby being able to get a greater variety of food.

When the lambs are taken off the ewes is the usual time for looking over the flock, and drafting out by themselves the inferior animals, and the fat sheep which are to be sold during the fall. About the 10th October, if the ewes have not got fat since lambing, give them a little grain daily up to the time of buck-service, and for a week after. They are more sure to conceive and give their fœtus a vigorous start if they are themselves in good condition. The 20th October is time enough to begin to serve the ewes: a good adult buck will serve one hundred and fifty to two hundred ewes at the rate of five or six a day without harm, if he is well managed. He should be fed well, and only allowed to serve the ewes once; as the ewes come in heat at different times, the flock must be examined every day; and the quickest and best method is to put the ewes in a pen, connected by a door with a pen or room in which the buck is. Let them in one at a time, and as soon as they have been served, or prove not in heat, remove them; if served, mark them on one side with the day of the month, and record it in your register against the ewe's number. In this way you can examine a flock of ninety ewes in an hour easily, and save all the hurry, bustle, and injury to the ewes which is liable to occur when the buck is turned in to the entire flock: the ewes should be returned to the buck until the seventeenth day after service, as they will come about again within that period if they have failed to conceive the first time.

During the summer, the bucks must be kept away from the ewes; if the bucks run together, they will fight more or less, but gradually get used to each other, and the weaker decline fighting with the stronger animals. About a month before their working season commences, begin to feed the bucks grain, half a pint a day, and increase until you give a quart of corn and oats mixed, with plenty good hay and fresh water. When serving-time is over, gradually discontinue the grain to the minimum which will keep him vigorous: good hay and a few roots during winter will be sufficient without grain.

After the middle of September, careful farmers house their sheep every night, and take them in whenever there is a prospect of continuous or severe rain. This practice may be carried too far, and the sheep's vigor be diminished by too much sheltering: they are able to contend with any reasonable weather; and unless one wishes to sell his sheep, and fears that rains will wash the wool, removing the yolk, and make the wool look dry and towy on the ends, he had better leave his sheep out during all moderate weather until winter. Carefully-sheltered sheep get to look almost black; the oil in the wool collects dust and dirt on the outside of the fleece and crusts it over, so that some very oily sheep would seem to have been painted with lamp-black; but when they are painted or rubbed with lamp-black to impart an artificial blackness, it is apparent upon careful examination; for, however severe rains a sheep may have been in, an oily sheep will be sure to show it under the belly and legs, and in all sheltered spots between the wrinkles, whilst no amount of blacking can make those places greasy.

I have described the year's management of a flock of merino sheep; but there would be no material difference if they were mutton and long-wool sheep. I have entered rather lengthily into the merits of the merino, because it is the best known, and because I believe that over the immense plains of the South and West, where the carcass is of little value, they will prove the most profitable. But there is unquestionably a field open to long-wool and mutton sheep of no less importance in the thickly settled parts of the country. Whether Leicester, Cotswold, Southdown, Oxfordshire, or Flemish sheep are to be the source from which the American mutton-sheep will arise, time will show; but nothing is clearer than that, whoever can produce a sheep which will come early to maturity, yielding lambs which will weigh eight to ten pounds to the quarter, and sheep fifteen to twenty-five pounds to the quarter, which is hardy, a good worker, adapted to our rough hills and briery pastures, will realize as great profits as Mr. Hammond, and will find an immense sale for his stock.

There are several gentlemen now engaged in the business, with various success. Most of them are too rich to feel the acute interest in the subject which makes a man keenly alive to all the considerations which affect stock-raising. Not by any means every man who loves animals and keeps them is competent even to begin to raise an improved breed of any kind: it requires a peculiar quickness to see and appreciate the good and bad points of animals; a readiness to remember how each animal he has bred resembled or differed from the rest; a power of combining facts connected with his own and others' breeding, and deducing from them the theories which can be followed to a successful conclusion.

The man who is to make an improved breed of sheep will very likely know nothing else: he will see sheep, think sheep, dream sheep. They will be always present in his mind; and such a man will yet be found to produce the American-mutton sheep, and he will reap a golden reward.

An improver of foreign sheep, in adapting them to America, will find many unexpected obstacles, in climate, soil, and food; and when he has overcome them all, he will very likely have an animal widely differing from the parent stock. The merino-breeders, after having attained great exeellence, thought they could, perhaps, get on faster by importing new and superior animals from Spain; and several competent persons went to Spain and other European countries to examine the flocks in their native localities, ready to pay any price for first-rate stock; but no importations were made which were equal to the sheep already here. This seemed strange, and unaccountable upon any other theory than that the sheep had deteriorated in Europe.

Some of the Spanish breeders claimed that the French invasion had broken up the flocks, mixing varieties; and that, since that invasion, no breeders had taken sufficient care to restore their animals by careful management. I do not believe that this is the cause of the apparent depreciation. Our best farmers are satisfied that their sheep can be much more surely improved by keeping them in small flocks, and will divide even fifty sheep into three or four flocks, when they have room. By this plan, each sheep gets a better chance at the food than when many are pushing at the same time. The shepherd can easily study each individual, learn its defects, and decide how to breed to improve its progeny. During the season, each sheep is studied carefully, and defective animals sold; but in Spain, the flocks vary from hundreds to thousands, owned by a few rich men, and managed by hired shepherds. Although the best men are got for shepherds that can be hired, no hired man can be expected to take the care of his master's sheep, and feel the intense interest in improving them that he would feel in his own, where every improvement would give him money and reputation.

If a few extra sheep were to be imported from the best of the Spanish flocks, and divided amongst men like the Atwoods, Humphreys, Hammonds, Spragues, Buels, Griswolds, and Campbells, who have improved the American merino, in another forty years there would be sheep derived from them so greatly in advance of the imported progenitors, that they would seem to have been of an inferior variety, could they be compared with their descendants.

Improvement in stock-raising in America is the most promising and profitable business to which any farmer can turn, and will prove a surer mine of wealth and fame than the gold, coal, oil, and copper-mines, which seem to our farmers to be the short and tempting roads to prosperity.

CHAPTER VIII.

ORNAMENTAL GROUNDS.

In the first edition of "Country Life," I have discussed very fully the advantages of living in the country, the beauty we may find there, the principles which should govern us in selecting our homes, and arranging them afterwards; but I said little or nothing about cities. It might seem that cities were to be denied all participation in natural beauty because they are the places in which men live for the convenience of business and social intercourse; but this would be a very narrow view of the subject. I believe every city offers abundant opportunity, if it is well improved, for the cultivation of flowers and flowering-plants; and often, in their parks and public gardens, may be found the finest opportunities for producing beauty with earth, grass, and trees.

As I propose to devote some space to this branch of the subject, I will first draw the reader's attention to some of the prominent defects in the present treatment of public grounds in cities; and, as I am best acquainted with Boston, I shall apply my criticism to that city, conscious that what is true of one is applicable to all.

The necessity of large and frequent open places in cities to promote the health of their inhabitants is universally admitted; and when land is set aside for such purposes, it has always been considered proper to plant it with trees; but hitherto very little care has been taken that such plantations should be made with any other view than to furnish abundant shade. It has been taken for granted that a variety of trees will not flourish in cities; and, therefore, the plantation is always of the same kind, and of very few varieties. Elms, lindens, horse-chestnuts, and latterly maples, are planted in endless repetition; and either indolence or ignorance prevents any earnest attempt being made to plant the many other forest trees, some of which are more beautiful, and less liable to the ravages of insects and premature decay.

Let us consider, first, the Boston Common, a very undulating and beautiful surface, of about fifty acres, with several hills of considerable elevation. Nature seems to have given man a chance here to produce something beautiful; and, according to the reverential enthusiasm of generations of Bostonians and New Englanders, man has done so. But, in truth, man has done nothing towards improving this beautiful surface. Regardless of the undulations which imperatively demand that the foot-paths shall follow the hollows, or gently wind up the hills, every path was carried as straight as the compass could run it, careless of how or where it should strike the hills, or cut the valleys. If such straightness came awry to a valley, and made an awkward hole, the surveyor ruthlessly filled up the valley, and destroyed its undulatory beauty.

The lesson that Nature teaches us, that the cattle practise, that is the foundation of the river's pliant power, has been neglected: the crookedness of Boston streets, which are a real inconvenience to traffic, are shamed by the straightness of the walks and paths over the broad field which has been preserved for the health and beauty of the city.

The broad, straight malls, with their double rows of trees, were well enough: their stately formality bordering the noisy streets seems to bring us by gentle gradation into the presence of the quiet beauty of the Common itself; but with the malls, the demand for straightness and formality ceased. When we look at the surface, and see how by planting the trees in groups on the hill-tops and sides, winding the paths around, rather than forcing them over the undulations, we might have broad lawns and open grassy play-grounds, ornamented by trees and shrubs, which, well placed, would have made the surface appear still more diversified, all now sacrificed to the straight paths which have been cut across it, each defended by rows of lindens or maples, like so many grenadiers on guard, we feel that man has thrown away the whole to take a part.

The plea of convenience does not weigh in the argument, because we all know that a curve is no shorter when it stands upon its diameter, as a base, than when it lies on its side. Paths, which would have wound their way through the hollows, gently ascending the hills at the easiest angle, would have been as short as those which now go straight from point to point, and would have cost less and have granted opportunities for skilful planting now gone forever.

The ignorance or carelessness which made these paths has been farther exhibited in the plantation, which is mainly composed of three species of trees, the elms, maples, and lindens; and lest these trees might really be too beautiful, the city causes their stems to be yearly scraped and painted with a filthy mud-wash which removes all the color and variety of the lichens from their trunks.

No one can deny that the tops of the elms in their dignity and grace, with their beautiful tracery of branch and twig against the sky, are truly beautiful. The foliage of the maples and lindens is very refreshing in the hot summer days, and the dullest person must feel real pleasure in seeing on some bright spring or summer evening, the gay children, happy people, bright sky, blue water, golden yellow grass, rich green foliage of the Common; but all this is only a part of what might have been, and should teach us the more loudly to condemn those, who, from ignorance or design, have mutilated the beautiful pleasure-ground we might have had.

When the artistic world is startled by the discovery of some grand old Torso, or fragment of Grecian sculpture which has lain under the dust and ruin of ages, but which, when exhumed, shows us how great was its conception and execution, do you think it is admired the more because it is mutilated? Far from it. The artistic soul enjoys the beauty which remains whilst mourning the mutilation.

This should be the sentiment with which we should think of such wasted opportunities as the Common. Why are elms, maples, and lindens planted row upon row? Because they are the only trees worthy our love and admiration? Beautiful as the elm is, the Venus of the forest, shady as the linden with its sugar-loaf of foliage, glowing and grand the maple with its redundant wealth of autumnal colors, like a painter's palette, on which are gathered together the yellow and red of the brilliant summer sun, yet stationed in rows, with no grouping of one against the other, lending and receiving no new glories by harmony and contrast, they are deprived of the largest part of their power and beauty.

What have the oaks done, so sturdy of limb, rich in leaf, grand in outline, earnest in autumnal color, to be shut out, especially when they do not bring worms to spin their gay cocoons, filling the air with swinging acrobats, whose crowning feat is to catch on the bonnet and hat and dress of the passer-by? Why have we no knowledge of the beeches, whose sumptuous green of summer is turned to a still more sumptuous yellow in the autumn, making our northern hills golden for many weeks?

Have the richly clad hickories, whose irregular and graceful branches and lithe ascending stems are of surpassing beauty, committed the deadly sin, and been therefore excluded? Is the fact that they bear nuts to condemn them to the orchard, and exclude them from the ornamental grounds?

For what faults of omission or commission are the feathery pines, the picturesque and kingly hemlocks, the graceful Norway spruce, shut out from the sight of Boston men, women, and children?

There are thousands in that city, whose only idea of evergreen is the trimming material brought in to decorate the churches at Christmas, or to make the Christmas-tree; who, if they think of a tree at all in winter, think of it only as stripped of its clothing of leaves to offer as little resistance as possible to the wintry wind. Transport them into one of our pine or hemlock forests in winter, where the thick branches sift the sharp cold out of the winter wind, and they would think they had been the subjects of a conjurer's hocus-pocus.

Men who plant public grounds are often ignorant themselves of what trees are; they have often only seen to know by name, the elms, maples, and lindens of city streets, and when successful business or politics have placed them in authority to dictate as to the laying out of public grounds, they naturally desire the only thing they know about. It is a positive wrong committed on the public, who cannot go out into the country to learn its beauties, and see the trees and shrubs.

One who plants for the public ought to be true and generous to his employer, and instead of wilfully deceiving him as to what he might have, giving only the easiest got and commonest varieties, he should try to bring together a good collection of the beautiful inhabitants of our woods. There is no reason why we should not plant every variety of trees on a large area, like the Common. The narrowness of the street, the too great shade of the houses, which may be quoted to prevent the planting of some kinds of trees in the streets of cities, are no argument here, where every tree and shrub of New England would grow and thrive.

South of the Common is an area of about twenty-five acres, called the Public Garden. This garden is a vigorous effort of an enthusiastic person in the wrong direction. The original surface was a dead level, much of it made from deposits of city rubbish. Conscious of the mistakes made in the Common, where the irregular and graceful had been sacrificed to the straight, and not comprehending that under some circumstances the surface demands straight lines as imperatively as in another curves, the designer of the improvements, taking before him a piece of paper, the surveyor's plan of the surface, laid out thereon a series of ovals, circles, and curves, meaning nothing, leading nowhere, the paths serving rather as a bewilderment and aggravation than either a convenience or pleasing effect.

The reader of the previous pages of this book needs not be told here, that I believe in sometimes treating level surfaces with graceful lines, curves, and irregularities ; but I have laid down as an axiomatic principle, that curved lines on level surfaces are justified only by real or apparent necessity.

If you have no hill or variety of surface to cause you to bend out of the straight line, a group of trees or shrubs, a building or flower-bed, some real obstruction, should be created to give a real as well as apparent reason for the deflection.

But in this design no such idea prevailed. An oval or a circle, or some geometrical figure, looked nicely on paper, and they were therefore transferred to the ground; what was to be done with them afterward seems to have had nothing to do with their first conception.

Nor is there any harmony of detail. This design could only be excused by the dead level of a Dutch tea-garden, where petty conceits and surprises, paths leading nowhere or ending in a seat or bower, a place to be enriched by frequent flower-beds and architectural ornaments, and to have all the peculiar elaborate details of the artificial French school, is considered the height of perfection. Into this plan has been introduced, apparently borrowed from some design for an irregular surface, several moderate alterations of the surface, and a pond of regular irregularity of outline, which serves to utterly distort it, and destroy what merit it originally possessed.

As has been said, it is perfectly legitimate to wish to introduce a variety into a level surface. Taking the dead level as a base, laying out a pond of such shape as seemed best, giving the shore variety by raising it in some places, leaving it natural in others, carrying the raised portions back into little hills or undulations to give a surface, around and amongst which paths might wind giving new charms by the variety produced, would have been legitimate; but the heterogenous combinations of the Public Garden are inexcusable and very ugly. The Common is great in spite of its abuses: the grandeur of the surface will make itself conspicuous, and compels admiration however much it has been distorted; but in the Public Garden the deformity cannot be concealed, and is as incongruous as the fool's motley over a parson's surplice.

When we leave the arrangement of the surface, and come to the planting, there is no improvement, the previous faults sink into insignificance. The first excuse of the changes of surface from a level is to get places on which to raise plantations above the usual surface, by which, with well-selected groups and varieties of trees, we may increase, indefinitely, the real variation. By taking advantage of each change, however small, we may produce an effect perfectly incomprehensible to the uneducated mind; but in this garden no such thing has been done: indeed, the word plantation has no meaning when applied to it. In spring and summer there are gay flowers and bright grass, and some very common trees and shrubs, some roses, some azalias, some, I should say much, of many things arranged with no more eye to harmony, contrast, and combination than if they had been sprinkled from a pepper-pot.

Nor is the poverty of design compensated by richness and variety of material. I have never seen so many ordinary, cheap, and poor shrubs and flowers got together, excepting in a nursery; the shrubs are mostly lilacs, snow-balls, syringas, common roses like the boursault, spireas, and herbaceous plants of the most ordinary character. In summer, there are rich bedding-plants and a profusion of bloom; but the general material used for planting seems to have been bought at a miscellaneous auction, because it was cheap; and having been purchased, it must be used somewhere, and, alas, here was the spot!

I would not deny the beauty of color anywhere; it is as glorious and enchanting as music; and nature will be beautiful in spite of man's efforts to prevent. The delicate or rich green of the newly-shaven grass, the sparkling water, the rich masses of salvia, geranium, heliotrope, and verbena, make the Public Garden an attraction not to be lost from the Boston world, and they do much to reconcile one to its obvious failure; but, granting it all, it is a pitiable apology for what might have been.

This area, which will be surrounded by the finest architectural dwellings money can produce, should have been so arranged with groups of trees, conservatories, rich gardens, open play-grounds, fountains, basins, shrubberies, that it could have rivalled any foreign garden of its size, and been a spot to which a Bostonian might gladly take an acknowledged master of the art of landscape gardening, sure of his approbation.

Stretching away from the Public Garden is the broad Commonwealth Avenue, of sufficient width to permit a continuous line of planting in its centre. In the original plan for the avenue, it was proposed to introduce through its entire length a series of little openings, — I hardly know what specific name to give them. To add still more to its glory, the houses are all to be set back from the very broad side-walks, leaving large areas in front of every house.

The avenue is partially completed; and although, so far as it is made, it is planted in the usual way, there is still left an opportunity for a grand treatment. Of course, every one can suggest that these centres should have some plantation; but to be content with introducing a double row of trees, as is now proposed, through its length, is partially throwing away a chance for one of the finest effects.

Let the avenue be treated as a whole, the sides as well as the centre; although each one of the areas is small, plant them artistically. Supposing, for instance, that it has been decided that in the centre we are to have nothing but trees; introduce, in successive groups, all the trees which will endure our climate. In the first space a group of pines, next hemlocks, alone or mixed with other trees of the same genus, or the Norway spruce; then a group of maples, then oaks, then beech and walnut, then a combined group of several varieties, then the many members of the ash family, and so on. Or, better still, devote some of these spaces to shrubbery; bring in groups of shrubs among the trees, thus breaking the monotony of trees, and again combining shrubs and flowers, and at another place shrubs, flowers, and trees.

At the same time, carry the hand of culture and nature's decorations to the areas in front of the houses, which afford, as I shall show, a field for a great deal of pleasure and beauty.

The Public Garden should have been laid out and planted so as to produce the utmost beauty the space could afford, and then have been connected by the grand avenue with some large park, yet to be made in the new land near Roxbury, where there could be a large basin of water kept ever fresh by the Charles River or the changing tide.

Treated in some such manner, the beauty would increase each year; and, eventually, the combined avenue, trees, shrubs, flowers, parks, and buildings would have become a splendid ornament to the city and the surrounding country.

The question of how best to treat our cities is not to be passed by carelessly; we are planting towns and embryo cities every year, and their future health and prosperity, as well as beauty, will depend on their being laid out and planted in the best manner. It is worth our while to consider the question at once, both in the old cities of the land and in the villages which are springing up everywhere, some of which are certain, in time, to rival the most populous cities of the present day.

CHAPTER IX.

CITY AREAS.

I WILL now give some directions for the treatment of small city areas, the few feet in front of houses which are often catch-alls for scraps of paper and rags, and tenanted by a little rank or half-starved grass. A primary objection to the culture of plants and flowers in cities, is, that they will be broken and stolen by thieves; but, first, I do not believe they would be stolen; second, this is not a treatise on police management.

The directions I shall give are based on the belief that what is worth doing at all is worth doing well, and that we know that any kind of horticulture is attended by difficulties. Whoever wishes to have his house adorned by flowers, shrubs, and vines, must realize at commencement, that he will have a great deal of trouble and labor. You cannot thrust a few bushes into the ground, set a vine against the wall, attach a plant-box to a window, and then give yourself no further concern about them. When you have planted you must cultivate, prune, train, and protect, sure, if you do not, that all previous preparation was wasted, and that, if you do, you will have a great amount of real pleasure.

Again, my directions will not apply indifferently to all kinds and styles of houses; a small and unpretending house, such as the thousand live in, may be clothed with shrubs, flowers, and vines, it mattering but little how they are carried over the surface. A costly house, with rich architectural finish and ornaments, should be very carefully approached, and only those plants applied to it which will harmonize with its style of architecture; and, whatever we plant must be carefully pruned and trained, each year, so as to remain subordinate to the architecture.

But for expensive houses and rich owners I shall give no directions; if they want aid, and the presence of natural beauty, they can afford to get advice when they need it, and thus they make sure to produce a harmonious result. Nor can I give, at the same time, directions for the shaded and sunny sides of the same street; houses erected on the south side must treat their front areas differently from those on the north side of the street.

Moreover, the space allotted to houses differs in every street; in some they are flush with the side-walk, no space being left even for a vine; in others there will be ten, in others twenty feet of area, and I shall not give details for all; but this, I think, may be assumed, that what is possible for the area of twenty by thirty is proportionately so for ten by thirty, and when there is but a foot or two, although the resident must dispense with the flowers and shrubs, he can have the vines, and plant boxes that his more lucky neighbor uses as a part of his improvement.

In the few square feet of a city area we must not strive for grand effects, but must rest content with pleasant color, fragrance, and variety. Though in a small way, in our beds of bulbs and bedding-plants, even in cities we can get contrasts and harmonies of color.

It may seem, when one examines the plans I have subjoined, that I have overcrowded the space; but I expect that constant care and pruning will keep all the plants and shrubs in their proper bounds, and many of the largest shrubs, as the cydonia japonica, could be trained directly on the fence, like an espaliered fruit; its thorns would deter any thief from putting his hand through to gather the flowers, and its rich coral blossoms in the spring, and dark green leaves in summer, would be very beautiful. A, B, represents corner of fence and stem of cydonia.

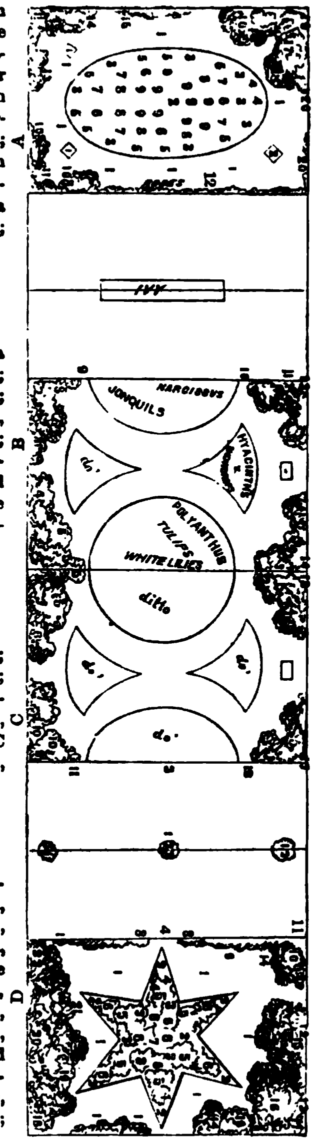
In order to get the utmost beauty from the city street, several persons living in contiguous houses should combine together to arrange and plant their areas according to a definite plan, one person giving especial predominance to roses, another to azalias, another to flower-beds of bedding-plants, another to evergreen shrubs. In the spring, one devoting most space to hyacinths, another to tulips; and later, one to the gladiolus, another to Japan lilies, another to Cape bulbs, another to verbenas or petunias. The small plots planted in this way would be like the flower-beds of a large garden, and though the different owners would have no right to gather each other's flowers, they would share the pleasure of seeing them, and could try experiments and produce a variety of plants utterly beyond the efforts of one or even ten persons.

The same method should prevail in treating the house-front or façade; let one plant against the house be running roses, another honeysuckles or woodbine (Virginia creeper), or bignonia, &c.

If we extend this kind of improvement to its utmost capacity, by attaching hanging boxes of plants to the windows of the houses, we could make many a city street more varied and beautiful than any country village.

If trees are wanted, plant them in the same manner; take care not to put the trees so near as to over-shade the flowers and shrubs, and select such a variety as the space permits, which would give the street a great interest to strangers and residents, and teach the dwellers in cities, how varied and beautiful our fresh trees are.

I will give a detailed treatment for a large area, — where I suppose the houses to have a front of thirty feet, and to be thirty feet back from the street, with walks leading to the house six feet wide; the fences separating the different houses and areas are to be used as trellises for various vines, as well as the front fences and the wire fences separating each walk from the area belonging to the same house.

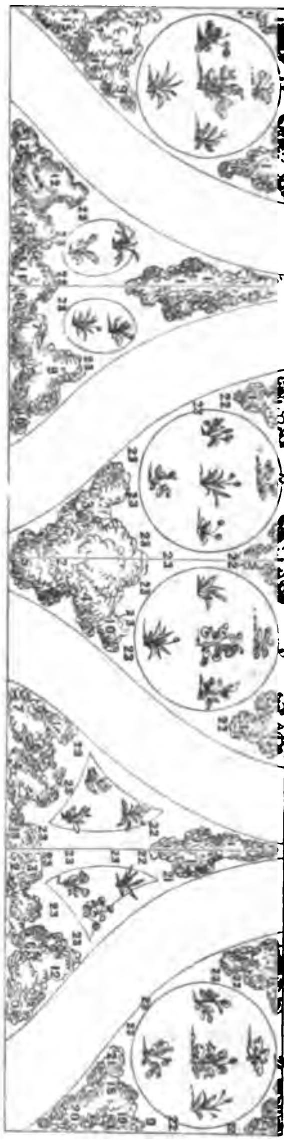


Flower-bed bulbs.—1, snowdrops; 2, crown imperial; 3, polyanthus; 4, crocus, all around the edge; 5, iris; 6, jonquils; 7, narcissus; 8, hyacinth; ⊓ vase for trailing plants; ⊓ basket for trailing plants; flowers to follow bulbs, edge with gazania splendens, centre with Mexican sage, verbenas next edge, then heliotrope and geranium; 10, climbing roses; 11, cydonia japonica; 12, ivy on fence; 13, mahonia; 14, standard rose; 15, trailing rose; 16, double flowering almond; 17, spirea prunifolia; 18, perpetual roses; 19, woodbine; 20, cobea scandens; 21, rose.

Shrubs for B: 1, spirea punifolia; 2, forsythia viridissima; 3, spirea gracilis; 4, rosa acacia; 5, clethra; 6, azalea pontica; 7, perpetual roses; 8, black alder; 9, woodbine; 10, tropeolum; 11, wigela rosea; 13, woodbine; 14, trumpet creeper; ⊓ vase. Flower beds of B and C: crown imperial next fence; then narcissus and jonquil, small beds; hyacinths and sundries; large circle, edge with polyanthus; then tulips and white and Japan lilies against fence.

Shrubs to C: 1, prairie rose; 2, honeysuckle; 3, honeysuckle; 4, privet; 5, roses; 6, mahonia; 7, shrubby cinquefoil; 8, azalea pontica; 9, cydonia; 10, phlox; 11, Roxbury wax work; 12, honeysuckle; 13, Dutchman's pipe. Between C and D, on fence: 1, rose; 2, honeysuckle; 5, woodbine; 6, ivy.

D, after bulbs: Centre with salvia, next scarlet geranium, heliotrope, points with verbena, gazania, nierembergia and mignonette; bulbs, 1, snowdrop; 2, polyanthus; 3, jonquil; 4, crocus; 5, hyacinth; 6, tulips; 7, crown imperial, after these in place or with bedding plants use Japan lilies, gladiolus, amaryllis, and other Cape bulbs; 8, honeysuckle; 9, roses (running); 10, wigelea; 11, woodbine; 12, clematis; 13, cobea scandens and woodbine; 14, roses; 15, azalea pontica; 16, daphne mezereon; 17, black alder; 18, snow ball; 19, clethra; 20, English privet; 21, roses; 22, spirea; 23, tropeolum.

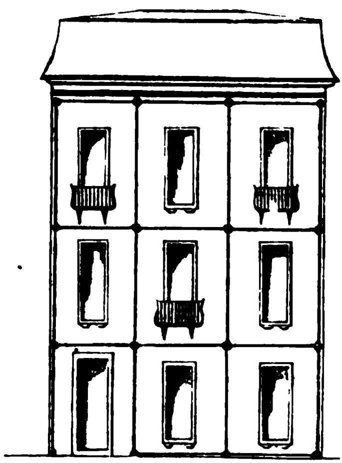


Many of the evergreen shrubs, and particularly the new variegated kinds, would be especially interesting to city amateurs, but I should recommend them rather for the shady sides of the street; and I fully believe that on the shady side, the most beautiful rhododendrons and, kalmias, and where the space would permit, pinus cembra, ilex laurifolia, American holly, andromedas, juniper, would live and thrive. As city gardening is a novelty, there would be constant opportunity for experiment, and we should undoubtedly find many shrubs doing just as well in the city as the country; whilst others, of which we had reason to expect better results, would die, unable to contend with the dust, smoke, and confined air.

1, perpetual roses; 2, holly; 3, black alder; 4, euonymus; 5, privet; 6, kalmia; 7, clethra; 8, wigelea roses; 9, azalia pontica; 10, roses; 11, spirea prunifolia; 12, deutzia scabra; 13, rose acacia; 14, cydonia (on fence); 15, spirea corymbosa; 16, standard roses; 17, daphne mezereon; 18, forsythia viridissima; 19, shrubby St. Johnswort; 20, barberry; 21, double flowering almond; 22, fuchsia; 23, snowdrops.

In this plan, by turning the paths out of the right line, we are enabled to get masses of shrubs together, which would be very effective. We might introduce some of the small evergreens, like pinus cembra or deciduous trees, like chionanthus (the fringe tree), cornus florida, halesia (silver bell), cranberry tree, the snow ball, magnolias, and others.

I have given, first, two arrangements of large areas; now let us turn to the front of the house, where the vines are to be trained over the surface. To relieve them from the heated radiation from the bricks, a simple wire-trellis like that shown in the cut should



be made, covering the brick-work, and raised four or six inches from its surface. The construction of the trellis is very simple: drive in between the bricks, eye-bolts, or pins of stout wire, say one-eighth of an inch in diameter, sharpened at one end to drive in, and turned into an eye or loop at the other; drive one at each side of the lower window, and one between, just at the edge of the underpinning; drive again at same relative positions over the windows of each story. Then take a wire about one-tenth of an inch in diameter, and fasten to the top eye-bolt; bring it down through the others, and fasten at the bottom; you can cross wires as often as the vines need. Paint these wires dark-brown, and they will be inconspicuous, and yet answer the purpose of supports to the vines perfectly; and as there will be sufficient air-space between the trellis and the wall, there will never be any danger of burning the foliage of the vines. The only danger to apprehend is the over-stimulating effects of the spring sun, which, as I have before described, causes the destruction of our partly acclimated plants, by starting the sap too early, which freezes, thus bursting the sap-vessels when the cold returns before the mild weather is fully established.

Under each alternate window of the different stories, suspend a box, which may be made as graceful in shape as you please, of two-inch plank, or of common boards; the box to be supported by clamps from the window-sills, or brackets of wrought iron, let in to the brick-work. Such plant-boxes should be about two feet deep and wide, and as much longer than the window as one can easily reach from either side.

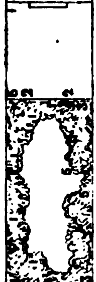
Fill six inches of the boxes with broken crock or stones for drainage; then three inches of broken bones and pieces of leather; over this fill a rich, light loam; to make sure of its quality, it would be well to prepare a compost similar to that described on page 10 of this book. In such a box, we can grow what we please, — plant along its front edge, verbenas, nierembergia, gilia, mignonette, maurandyia, and let them hang down in the air, showing their beauty of form and color, as a fringe to the box. We might commence the season with a collection of spring bulbs, to be followed by Cape bulbs, like ixia, cyclamen, amaryllis, sparaxis, homeria, nerine, tuberose. All these bulbs should have been started in some greenhouse, and be set in the boxes after the spring bulbs have gone.

In lieu of the bulbs, use the bedding-plants or annuals; set at the corner of the boxes, tropeolum, or convolvulus, to cling to the nearest wires. Be careful to select only those climbing-plants which will run of their own free will when once they are attached to the vine, as it would be troublesome, and to a careless person dangerous, to get out by ladder, or painter's window-jack, to train the vines.

It needs but a feeble imagination to summon up the rich picture such a house would present to the eye of the owner or of a stranger. Were there no back area to be improved, we could get from the front, end, or side of a house a great deal of satisfaction and a large quantity of flowers.

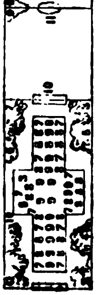
I will now introduce a plan for a series of houses, with but ten feet front area, the length of the house, or say two hundred square feet.

Crocus, on the edge; 2, groups of polyanthus; 3, jonquil and narcissus; 4, hyacinth; 5, tulips; 6, snowdrops; 7, cydonia, on fence; 8, plants on staging in pots; 10, rose; 11, rose and honeysuckle. The corners next the house could be occupied by staging for plants carried as high as the owner wishes.



1, roses; 2, honeysuckle, on fence; 3, privet, on fence; 4, forsythia viridissima, on fence; 5, mahonia. In a very small area, large shrubs, unless well confined to the fence, would crowd, and lose their beauty below, only showing leaves and flowers on the top. In the crowded space, dirt and rubbish would collect.

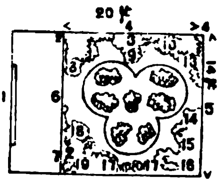
1, snowdrops; 2, cobea scanden; 3, black alder, trained against fence; 4, deutzia scabra variegata, on fence; 5, trumpet creeper; 6, sweet briar, on fence; 7, cobea scandens; 8, Dutchman's pipe; 9, lilies of the valley. Stand of flowers against house with five steps; verbena, roses, geranium, heliotrope, fuchsia.



1, roses; 2, spirea prunifolia; 3, privet on fence: 4, clethra; 5, rose acacia; 6, crocus, on the edge; 7, polyanthus, in groups; 8, hyacinths; 9 tulips; 10, rose; 11, honeysuckle. If the area is depressed much below sidewalk, bedding plants or annuals might suffer from want of sun, in which case, a raised flower-bed should be made to bring them up to the light.

But there are areas not more than fourteen feet square, and some smaller; the greater the depth in proportion to the length the better the chance for planting.

I give one now fourteen by fourteen, with walk to house fourteen by five feet.



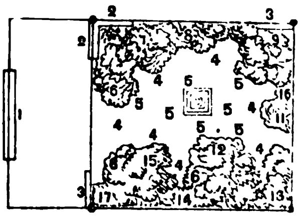
Flower bed, bulbs followed by bulbs or bedding plants: 1, ivy; 2, woodbine; 3, honeysuckle and bignonia; 4, roses; 5, tropeolum; 6, honeysuckle; 7, woodbine; 8, roses; 9, azalias; 10, deutzia gracilis; 13, dwarf wigelia rosea; 14, symphoria racemosa; 15, dielytra spectabilis, variegata; 16, variegated tartarian honeysuckle; 17, standard rose; 18, mahonia; 19, kalmia; 20, roses on fence.

For areas on the shaded side of the street, the treatment must be entirely different: we can have snow-drops and lily of the valley; and probably some of the other bulbs, like the hyacinths, will blossom pretty well; but the want of sun would be a fatal objection to most flowers.

But shade would be no objection to evergreen and variegated shrubs; of these, many varieties have been introduced to notice during the last five years, and the shaded side would be especially favorable for ivy. You must not expect the blossoms of any plants, even evergreens, to be as brilliant in the shade; but the foliage will be very rich, for it is not the severe winter cold that kills our evergreens, but the sun of spring and late winter. On the contrary, it is the sun of summer which kills many of the leaves of the variegated leaved shrubs. The white places in the leaf are practically diseased portions from which the chlorophyl or coloring matter is absent; when these leaves are exposed to the hot sun's rays, they are burned up.

I venture into this part of the subject with diffidence, because this experiment has never been carefully tried, although analogy is decidedly in its favor; for in the country we always select the north sides of hedges, groups of trees, and the like, as the best positions for both these evergreens and variegated plants.

All the variegated shrubs require only good, well-drained common garden soil. The evergreens do better for having incorporated into the soil lumps and fine particles of peat; but both should be well drained.



Plan for shaded side of street: 1, ivy; 2, woodbine; 3, ivy; 4, snowdrops; 5, lilies of the valley; 6, mahonias; 7, rhododendron; 8, rhodora canadensis; 9, kalmia; 10, golden box, evergreen euonymus (half hardy, covered in winter); 12, sweedish juniper; 13, rhododendron; 14, ilex laurifolia; 15, silver box; 17, kalmia. Wherever I have given kalmia, I mean K. latifolia.

In these several plans I have used the same scale, twenty feet to the inch. I have planted the shrubs too thickly, were they to be left unthinned, as they would ultimately crowd and injure each other; but I have set them thickly to get an early effect, believing that the planter will have sufficient sense to cut out and prune closely before the plants begin to crowd each other.

I have been thus precise and full in my treatment of the front areas, because they are generally most open to the sun; but I do not forget the back of the house, where there is generally much the largest space. The back areas are very often deeply shaded by high fences and surrounding houses. Whatever room there is should be improved. On the sunny sides, I should prepare the soil thoroughly, and plant grape-vines and fruit on espaliers. In the ground at the roots of the trees and vines, we may have bulbs and flowers; but the necessity of using most of the back area for household purposes generally forbids the introduction of shrubbery.

Mr. R. McCleary Copeland, the Librarian of the Massachusetts Historical Society, has shown triumphantly, that great success in special culture may be had in the city. He has cultivated for many years in a small back yard, hyacinths so successfully as to take the first premiums offered by that society. These beautiful flowers were grown in a grape-border, an Isabella grape occupying the wall above it; the hyacinths being replaced, when their time of bloom had passed, by Japan lilies and other bulbous plants, and later by pot-plants, which had passed the winter in the house.

In a very confined area not nearly as large as the one first shown, Mr. Copeland has raised great quantities of flowers, and, as he says, "plenty of grapes."

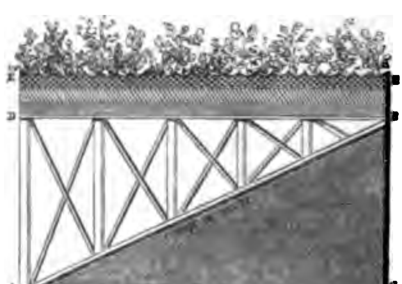
In plan on p. 884, I omit the planting of bulbs, as from what I have said any one can combine for himself; also, I have made the plan more simple by using the same numbers to designate the same plant on the four plans.

There is no need for me to dwell any longer on this part of my subject. I have given details in the earlier portions of this book which will readily teach whoever wants to improve his back-yard, how to do it; on the shady side we can only hope to succeed, as on the south sides of the streets, by planting those things which do not require sun.

Let us now go up on to the roof of the house, not for the view, but to see the opportunity it affords for greenhouse, conservatory, or even garden-culture. I do not mean the roof of the six or seven-story house, but of the projecting L, and the lower parts of the house.

Many city houses have a long, low shed, and often a two-story elevation over the whole or a part of the back yard and kitchen, which may be used for garden or green-house; in the latter case, heat might be supplied from the kitchen-range, or the furnace. In as small space as twenty by fifteen feet, we could have a collection of plants, a cold grapery, or a cold peach-house, that would be perfectly satisfactory; or, if we do not want to be troubled with glass, make the roof strong enough, and lay out a garden there.

Suppose A, B to be the slanting roof of such projection; B, C the front of the house to the yard. Carry up the posts A, D, and lay a strong floor over the area B, D; then plank up the sides D, C, E, F, eighteen inches or two feet deep; lay a bottom of coarse materials and broken bones for drainage, and fill with compost. Any thing will grow here, and



you can make the house-top as perfect a flower or vegetable garden, so far as its size permits, as if it were on the ground. I know there are objections: first, the weight on the walls of the house, — strengthen them; weight and trouble of snow in winter, — shovel it off; trouble in getting up the materials and watering, — generally it would be watered by the rain, and the materials once carried up would be there forever.

Many of the far-famed hanging-gardens of Babylon were, doubtless, made in this way; and it requires but a feeble effort of the imagination to see the beautiful addition such gardens would be to city houses.

I do not give minute details for this arrangement, because the simplicity of the garden is obvious; and when any one wishes to have a greenhouse, or other planthouse, he would naturally get advice at the time, as the peculiar shape of each roof, and its exposure, would require special arrangement.

CHAPTER X.

HOW TO PLANT TREES.

I HAVE spoken of the overcrowding of city areas, and in the earlier part of the book (see pp. 760, 763), of the evils of overcrowding plantations in the country, but I think, before leaving the subject, a little more might be said; for there is really no more serious mistake made in ornamental planting.

Whether one plants for himself or employs a landscape-gardener, he wants to get as immediate an effect as possible. Life is short, and very uncertain for all; and when a man has reached the age of forty to forty-five years, and but few Americans are ready to make a country home at an earlier age, his chances of life are less than those of younger men. But take heart! seven years will make a plantation where the trees will be from fifteen to twenty feet high: good trees, well planted, grow very rapidly; and, if the trees have been well combined with shrubs, in seven years we may convert an open field into a thicket.

Few men believe, when they plant trees, that they shall be unwilling to cut them down at a suitable time; but when the tree we have loved and protected gets lusty and well developed, it seems almost a sacrilege to cut it down. Nor can many men realize how much beauty and protection may be got from well-grown and well-selected shrubs; they have always associated the idea of trees and country together, and they do not understand a plantation which does not give shade.

Shade is very desirable in hot, summer days, and we should be careful to provide it somewhere near the house; but a little will answer for comfort, and, having secured that, we should arrange the remainder of our plantation with a strict regard to the beauty we can produce.

Many persons, who have made plantations within the last ten years, and who thoroughly love and understand trees, and who thought their trees were far enough apart, are already compelled to cut them down, or cut off the leading shoots to delay their growth, and devise all kinds of plans to prevent the trees they do not remove from injuring each other.

This difficulty could be avoided in small places, by planting only the low-growing trees and tree-like shrubs, such as

EVERGREEN SHRUBS.

RHODODENDRON, — varieties.
KALMIA, — latifolia.
ILEX, — laurifolia, scottica.
MAHONIA, — aquilegifolia.
ARBOR VITÆ, — varieties.
JUNIPER, — varieties.
BOX, — varieties.
PRIVET, — varieties.
ANDROMEDA, — floribunda.
COTONEASTER, — buxifolia, microphylla, margniata.

VARIEGATED EVERGREENS.

BOX.
PRIVET.
TAXUS, — argentea, aurea, and variegata.
THUJA, — variegata.
EUONYMUS, — japonica, half hardy (could be covered with straw).

VARIEGATED DECIDUOUS SHRUBS.

WIEGELIA, — rosea nana, dwarf, two to three feet high.
LONICERA, — brachypoda reticulata, climber, six to ten feet.
PHILADELPHUS, — variegatus, six feet.
SYMPHORIA, — racemosa, four feet.
DEUTZIA, — gracilis, six inches to two feet.
SAMBUCUS, — aurea (golden elder), eight feet; argentea (silver), three feet.

DECIDUOUS SHRUBS, — see lists on pp. 766, 767.

Then we might use for the low-growing evergreen trees, —

PINUS, — cembra.
ARBOR VITÆ, — varieties (some new and fine).
CRYPTOMERIA, — generally tender.
ARAUCARIA, — in shade.
ABIES, — alba nana.
BIOTA, — pendula (weeping Arbor Vitæ), nepaulensis, tartarica, and Siberian.
CEPHALOTAXUS, — drupacea, also Irish yew.
JUNIPERUS, — suecica, communis, hibernica, squamata (scaly leaved), very fine.
TORREYA, — taxifolia (rather large).

With these shrubs and low-growing trees, we should not need the larger trees, either evergreen or deciduous. I do not wish to be understood to discourage all tree-planting in small places, because there is a pleasure in trees which shrubs cannot give. Nor do I think that trees are satisfactory only when grown singly, and as specimen trees. I admire them as much in the grove, and well combined in groups, as single. Indeed, I think it is only by grouping, so as to get their mutual effects, that we can ever understand the full beauty aud capacity of trees and shrubs.

There are many persons who only appreciate a tree when it is grown like a specimen-plant in the conservatory, perfectly developed and balanced. In order to produce such trees, much more room must be allowed to each, and we must indulge ourselves with less in quantity or fewer varieties. I like variety as well as perfection, and should prefer to crowd a little, if I must choose between perfect trees and shrubs and few varieties, and groups with less perfect specimens.

The important point when we commence is, whether we shall plant for ourselves or posterity. If for the latter, arrange your plan so as to leave ample room between the trees as they are to ultimately stand, and fill in with such trees and shrubs as you will be willing to cut out when their duty as nurses is at an end.

If we plant for ourselves, decide whether we want specimen trees and shrubs, or close groups and immediate effects. If the former, we must wait patiently for the effect, which will come with time, and compel ourselves to cut down whatever grows too fast, and destroys the harmony of the plan we have laid out.

Latterly, great interest has been felt in growing in the greenhouse and in the open grounds plants with variegated leaves. It is a foreign taste, especially developed in Japan: the Japanese have several hundred varieties. The variegation is an unhealthy absence of the coloring matter of the leaf, and is curious rather than pretty; very often such leaves cannot stand the intensity of our summer sun; but when they will bear our climate, they are interesting as varieties; and some of them should be planted in all ornamental grounds.

The following list of variegated trees (of both kinds), as well as the list of variegated evergreen and deciduous shrubs, last given, was made by Mr. Francis Parkman, a most successful horticulturist, of Jamaica Plain, near Boston, who has found those he names hardy in his grounds, and they will doubtless prove hardy throughout our Northern States. The spotty foliage of these plants, valuable only as curiosities, will not permit them to be used in masses; they should always be grown with plenty of room, as specimen plants.

VARIEGATED DECIDUOUS TREES.

Horse-chestnut, — sixty feet high.
Oak, — forty feet high.
Willow, — ten feet high.
Acer Negundo, — twenty feet high.
Gingo, — (Salisburia) twenty to thirty feet, rare.
Ash.

VARIEGATED EVERGREEN TREES.

Cupressus, — lawsoniana.
Thuja, — occidentalis.
Thuja, — dolobrata.
Chamacyparis.
Retinospera, — aurea, argentea.

The growing interest in horticulture will insure that all new varieties will be tried, where one's grounds are extensive, and there is room for experiments; but for our thousand country homes they are of little value.

The commoner varieties of trees and shrubs are more accessible and cheaper, and are the best for general culture; no newly discovered trees have yet trenched on the merits of the white pine and hemlock, the oaks, maples, elms, and hickories of America; and whoever plants the known and loved trees and shrubs of our native land, giving them good soil to grow in, and good care in their infancy, need not envy his neighbors their foreign or variegated trees. He can produce effects with them which will make his home very beautiful, and capable of enduring the most careful criticism.

The secret of successful landscape-gardening lies in thoroughly understanding the various shrubs and trees which we can plant in any given place, and the effect they will produce alone and combined in groups. No matter how skilful one may be as an architect, how careful and successful as an engineer, unless he thoroughly knows and loves natural beauty, and understands how to produce it, he cannot hope to arrange a country place successfully. Too many persons suppose that how and where roads and paths are directed, flower-beds marked out, and kitchen-gardens planted, are the essential parts of laying out a place: these are essential as the canvas, the frame over which it is stretched, the palette, the brush, are the essentials of landscape-painting; the success of the landscape painted depends on the knowledge and use of color in the painter, combined with skill in drawing.

Inness, with a few rapid dashes of his brush, owing to his wonderful knowledge of color and memory of effects he has seen in nature, combined with a peculiar instinctive knowledge of the results of certain combinations of form and color, will make a picture of great beauty and lasting value in a few hours; other men may use his brushes, his palette, canvas, and colors, and be withal splendid draughtsmen, and yet work hours and days, and fail not only to produce a decent result, but even be utterly unable to copy successfully Inness's picture, which they have taken as a study. On pp. 581 to 587 of this book, I have briefly sketched the elements which should enter into the composition of one who would make landscape-gardening his profession; and the experience of many years convinces me that I did not set the standard too high.

Landscape-gardening in America will never attain the position it deserves; for most of the work a landscape-gardener may do will be ruined by the neglect or caprice of the owner, the accidents of time, or the necessities of a growing population, which in a few years compel the destruction of places laid out with cost and skill. Where there are so many accidents, and when as a necessity much time must elapse before under the most favorable circumstances the perfected design can be realized, it is obvious that men of other professions, who lay out grounds to put money in their purses when their own business will not support them, and who are in no wise inspired with the enthusiasm of the art, may get good reputations; for they will probably make few mistakes in the skeleton of paths, roads, and gardens which are permanent, and the world will be but slowly educated up to the appreciation of true success in ornamental planting, which is the real test of the landscape-gardener.

Men will be employed to lay out grounds, not so much because they are thoroughly acquainted with the subject as because they are at hand, or cheap. Occasionally there will be a man who knows what a truly beautiful country place, park, or public garden is, and who will give the real artist a chance to produce the best result nature will permit; and for such rare opportunities the landscape-gardener must wait, content in the mean while to do whatever he can to improve the public taste.

The following letter from Mr. R. A. Grider was received too late to be noticed in the "Essay on Grape-culture," and as it seems to give valuable directions and advice for these parts of the country where the thrip is an annoyance, I have subjoined it, copying it in full.

BETHLEHEM, PA., Feb. 25, 1866.

To ROBERT MORRIS COPELAND, Winchester, Mass.

DEAR SIR, — Fruit-growers suffer much from bugs, worms, and other insects, but experience teaches that the larger-sized bugs, although destructive, are not as much to be dreaded as the small sized, which almost always appear in great numbers, while the former are comparatively few; the larger can be readily found and destroyed, but the smaller are not easily found, and are harder to extirpate. I need not give you a long description of losses caused by the thrip or grape-vine hopper, an insect of minute size, which is found on the young shoots of the vine, early in spring, when they first begin to sprout. They deposit their eggs on the young leaves and shoots. When first born, they can scarcely be seen without a magnifying glass, but soon legs appear and the perfect insect comes forth.

Whenever an egg hatches, it leaves a wound caused by the eating of the insect; the wound turns rose color, then purple, brown, and finally black. As the vine expands in growth, so does the wound in like proportion, and, although one wound does but little damage, many wounds cause great damage, as they not only destroy the growing crop, but sometimes every young shoot over acres in extent; and, of course, destroy the wood for the coming season, leaving the vines covered at first with festering sores, and then looking as if fire had passed, and left all black and desolate. Such is the experience we have had of that insignificant little hopper, known by different names.

We made many experiments ere we learned how to destroy the eggs, but now find it perfectly easy to do so. To destroy the eggs, powder them with air-slacked lime, which can be readily done in early summer before the foliage has expanded. This should be frequently done early in the morning, while the dew is on. After the leaves expand to about one-half their size, provide free-burning torches, and, when the weather is warm and the evening dark, let two persons, — one to agitate the vine, and one to carry the torch, — visit the vineyard; one shakes the vine, the other passes the torch under and about it, the insects start as soon as disturbed, and fly into the fire. Care must be taken not to heat the foliage, but it should be passed to and fro; if this is done a few times, the thrip will be destroyed. They gain great headway only in the early part of the season; later in the season their enemies thin them out.

Many excellent practical fruit-growers believe that the black spots on the vine are caused by the sun's rays acting on drops of water after a shower, and, being condensed by the drops, burn the surface on which they rest.

Charlton, in his work on grape-culture, examined the subject, and accounts for the spots by the drops of water, which form a lens and burn the shoots; but as the wounds are found on the lower part of the shoot, this theory does not answer; as the rays of the sun cannot be concentrated there, the sun is not the cause.

I have stated these facts at meetings of fruit-growers, and have asked them to test the matter and correct me, if wrong, and have been so far confirmed.

I am, yours respectfully,

R. A. GRIDER.

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