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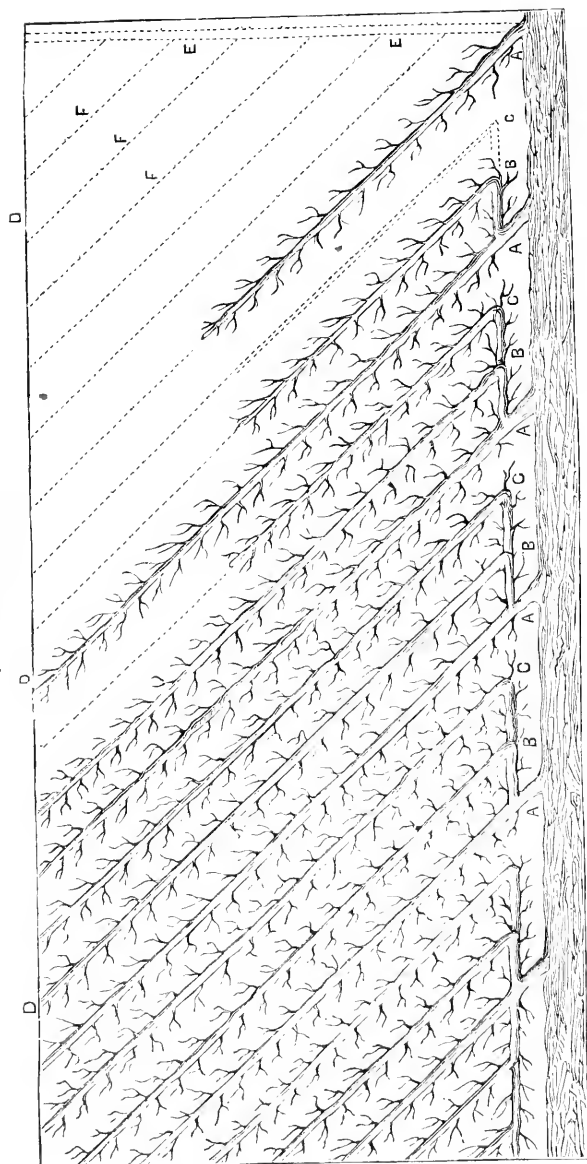
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CORDON TRAINING

OF

FRUIT TREES,

DIAGONAL, VERTICAL, SPIRAL, HORIZONTAL,

ADAPTED TO THE ORCHARD-HOUSE AND OPEN-AIR CULTURE.

BY THE

REV. T. COLLINGS BRÉHAUT.

WITH A

SUPPLEMENT,

CONTAINING

REMARKS ON CORDON TRAINING; THE CULTIVATION AND
PRUNING OF PEACH TREES IN POTS; THE BEST
VARIETIES OF FRUITS FOR POT CULTURE;

AND

GENERAL REMARKS ON ORCHARD-HOUSES ADAPTED TO
THE CLIMATE OF THE UNITED STATES.

By C. M. HOVEY,

PRESIDENT OF THE MASSACHUSETTS HORTICULTURAL SOCIETY;

EDITOR OF THE MAGAZINE OF HORTICULTURE, AND AUTHOR OF THE FRUITS OF AMERICA



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TO THE

CLERGY OF ENGLAND

AND

PERSONS OF MODERATE INCOMES

THIS WORK IS RESPECTFULLY DEDICATED

BY

THE AUTHOR.

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CORDON TRAINING.

CHAPTER I.

INTRODUCTORY.

MOST books, whatever their size or subject, are better understood for some sort of prefatory remarks, and in an age and country in which horticulture meets with such high patronage, it may seem presumptuous for an amateur to treat of such a subject; it may appear uncalled for; and may even require explanation of his motives.

This feeling is not altogether without its uses, and the author hastens to say, that this short work is the result of much leisure time, which an enforced idleness, the result of over-fatigue in the charge of a large parish, unexpectedly created.

Summer after summer, and winter after winter, was passed by him abroad. It was impossible to be unemployed, and thus he was enabled to observe the various modes of fruit culture practised in different countries.

This is an advantage, which is not always within the reach of the most experienced gardener. But with the exception of certain indigenous fruits, it is not necessary so to wander to be convinced of the inferiority of continental gardening, taken as a whole, compared with that of England. It is only as we return northwards, that we can appreciate the skill by which the very necessities of climate have led to the introduction of methods which have more than compensated for the want of sun heat. A liberal use of glass enables us, even

without artificial heat, to obtain dry and equable temperatures, which rival the climate of the most fertile portions of France; and this without risk of damage from the spring frosts, which, in those localities, are so injurious to vegetation.

It is not too much to anticipate the day when every small garden will be considered deficient in one of its most indispensable requisites, if it fail to have its orchard house, as well as its modest vinery. Persons of moderate means will ever find the orchard house a source of amusement and profit. It is easy to construct; equally easy to stock; the management is simple and readily understood, and the author is very desirous of showing how a moderate amount of expense will enable any one to be his "own gardener," and be thus liberated from a degrading dependence on the caprice of unskilled men.

To his brethren, the clergy, scattered in villages, and thus necessarily somewhat dependent on the limited resources which these can supply, it seemed to him a grateful task to state his own experience, and if he shall be able in any degree to simplify the practice of fruit culture, and thus save a portion of their invaluable time, his own labor will certainly not have been thrown away.

There is no doubt that fruit culture is, as yet, very imperfectly understood, even by scientific men. Great advances are, however, being made daily in this interesting branch, and it is certain that few things tend more to further this progress, than a simple and honest description of experience. Every one can thus greatly judge for himself; and, by comparing his own observations with the notes made by others, who are not more skilful, but who have more leisure, he may reach a certain standard, which must be of immense value in practice. It is difficult to account for the reticence observed in these matters, and this is, doubtless, one great reason why we do not advance as we should.

At the same time it is absolutely necessary to be cautious in drawing conclusions from isolated facts. There are many

concurrent circumstances to be taken into consideration, which are not always allowed, at the time, to have their due weight. It thus often happens that the observer who feels almost certain of some new and important discovery, has too often to recant his errors before the close of the season. All these doubts greatly check and embarrass the amateur, but they have their uses in preventing rash and vain experiments, as well as in saving unnecessary expense. But in cases where, after a certain time allowed for reflection, a succession of ascertained results have arisen, any one, actuated by the simple desire to communicate his own advantages to others, can never be open to censure. A man who does this only fulfils his duty.*

The author, as stated, had been in delicate health for a long period; and this cause has rendered him desirous of making known to invalids the benefits arising from the study of fruit-culture, which in all its branches is so suitable a pursuit for such persons. In the form of orchard-house culture little can be better adapted to restore health; for from the dry state of the atmosphere, and the free circulation of air uncharged with the odors emanating from flowers, a walk in almost all weathers is secured; while the mind, diverted from gloomy thoughts by the sight of the beautiful young trees, either in full blossom or laden with fruit, or even in their rest, gains a healthful tone, and finds all suggestive in the highest degree. The writer never suffered, as he feared, from draughts of cold air; though, of course, common pre-

[* These are invaluable hints, and should be well considered. We know of nothing that has so much retarded true progress as the publication of so many so-called important discoveries in cultivation, which are trumpeted as the basis of all success. These engage the attention of young amateurs, and often older practitioners, who, led away by the apparent success of the discoverer, change their whole course of culture just in time to learn that the "important discoveries" are an entire failure. If this was only once it would do no great harm, but hardly has the cultivator recovered from his failure before he follows some other equally wild notion, to be in turn attended with no better results. The advice of the author to follow only well-known authorities is of the utmost importance.—C. M. H.]

cautions must be observed, as in rough weather, or in periods of frost.

His own orchard house has been to him a source of untiring pleasure, and he has learnt in it more of the habits of the various trees than could ever have been expected under the old systems. The variety of the trees is so great, their habits and products are so different, that the attention is soon arrested, and the cultivator cannot avoid remarking all this. But if, in addition, he has the patience to follow up the seasons, note-book in hand, it is truly astonishing how much a mere amateur may quickly and readily learn. Open-air culture has, of course, its own peculiar charms, though not so fascinating, and no doubt is preferable in very hot weather.*

Another motive which presented itself, was the wish to make known the decided success of a *novel method* of fruit culture, called generally "Cordon Training." One form had been found extremely adapted for the back wall of a lean-to orchard house; this was the Diagonal Cordon, with three leaders,—a form which may be considered as the perfection of the whole method. It has a certain resemblance to the single oblique training practised so successfully at Montreuil, near Paris; very important modifications were required, however, before any practical result could be depended upon.

The climate of France is so different from that of England, that what is proper in the one case becomes almost useless in the other; and the whole system now presented to the public is so altered, so combined, and, in the case of orchard-house culture, so fundamentally different from the French system, that it may be considered as a *separate method*, originating from several others. Examples of this will abundantly occur as the various forms are entered into and described. It will be sufficient here to state, that the repeated summer pinch-

[* Our American climate fortunately is sufficiently warm and genial to remove all the trees in orchard houses to the open air in June, or the sashes may be removed with safety. If orchard houses are found less preferable for labor during hot weather than the open air, in England, they would be far more oppressive here. But this objection does not apply with us.—C. M. H.]

ings, by which the shoots on the spurs are rendered compact and fruitful, are partly described in a work published in 1812. This suggested the system put in practice at Chartres very lately. In the orchard house it must soon supersede any other, and is recommended in the eighth edition of Mr. Rivers's excellent work. Of course in the case of Diagonal Training, important modifications have been introduced, rendered necessary by the angle at which the trees lie, and also by the exigences of the climate.

As the French have no cultivation worth mentioning under glass (and indeed it is only in England that this invaluable advantage is properly appreciated), the treatment of these spurs requires peculiar changes, more especially in the case of potted trees, in which the scientific research of Mr. Rivers has created a new field.

With respect to the actual results as yet obtained, the back wall of my orchard house, which is a lean-to, produced this year at the rate of three peaches per square foot.

On this wall alone the produce was at the rate of 600 fine peaches and nectarines (some of the former were nine inches in circumference,) so that a house 100 feet long and proportionately broad, might reasonably be expected to produce 2000 nectarines and late peaches on the back wall, and at least as many more apricots and mid-season fruits upon the rows of trees in pots.

This crop, by no means an extraordinary one in fair seasons, could reasonably be hoped for by following the Cordon Training which is here described.

One word more as to the expense of orchard houses. At the usual rate, one 30 feet long by 12 broad, should not cost more than £30. The returns for this outlay would be great under fair management, the more so as £3 or £4 in addition would be sufficient to stock the house with trees, half of them in bearing state. A week's visit to the Continent would cost quite as much as this handsome ornament to a garden would, and afford, in the course of time, far more real amusement.

CHAP. II.

GENERAL PRINCIPLES OF FRUIT CULTURE.

The details, brief as they are, of this work, would not readily be appreciated if a few general principles, obvious and reasonable, were not first stated. General maxims are often neglected in practice, so that it becomes necessary to repeat them in a short work such as this, because they render the details more intelligible.

Many unskilled persons assert that the scientific culture of fruit trees has neither the effect of increasing their productive powers, nor of prolonging their vitality.* Both these statements are untrue. Experience has fully proved that certain principles are necessary to be followed; under these the results have been good: it is the deviation from them that is the cause of failure.

It seems pretty certain that the office of the ascending sap is to nourish and increase the volume of the whole tree, while, by its passage through, and change while in the leaves, and by its return to the roots, it promotes the production of fruit. The sap becomes stored up, and ripened by the action of light and heat, and in proportion as this action is retarded or augmented, the tree is either productive or barren. A certain action communicated to the sap will develop the whole system in redundant wood. All this is modified by attendant circumstances, but it is the general rule.

To regulate, distribute, and harmonize all these functions is the duty of cultivation, and surely the preservation of the balance between root and branch, and between fertility and extension, can but have the effect of increasing the amount of production, and also by economizing the vitality of the tree, lengthening its life.

The locality chosen for any particular tree is of great importance, and demands much reflection. In this the amateur must submit to be guided by the experience of others, while

he carefully observes for himself. Before any final decision, he should make a tour of the gardens in his neighborhood. He should attentively note the varieties which flourish best in the soil and aspect which correspond with those in his own garden. The fruits most common in the neighboring markets should also be considered, unless they are of an inferior description. These observations will not appear trivial to an amateur. Every one has experienced the value of such things who has commenced a career of horticulture. In these cases a reference to the catalogue of a respectable nursery is invaluable, and may also be a great subject of amusement.

One hint more. In selecting the trees, let no one be influenced by the mere price, for it is of the *greatest importance* to have well grown and healthy trees to begin your experiments upon and to avoid discouragement in the outset.

The selection then being made, the amateur should remember, that the natural tendency of the sap is to flow upwards and towards the extremities of the branches, so that without due care, especially at the commencement, the centre of the tree, and the lowest branches (in the case of those on walls) become less vigorously stimulated, and are thus dwarfed in comparison with those higher up. This will cause an unequal distribution of fertility, and quickly destroy all the harmony and symmetry of the tree. The leaves, according to their number and healthy state, draw up and attract the sap. Therefore a branch, once enfeebled, has, by its *very want of power*, an increased chance of decay. We must, therefore, endeavor to avoid this feebleness.

Again, by this irregular distribution of strength, the whole tree is disturbed, and eventually ruined. For when in this diseased condition it receives any shock, as by an attack of blight (perhaps by two or three successive attacks); by injury to its roots from any cause; by any of its branches breaking in a gale of wind; the first irregularity of form becomes so considerably augmented, that few trees are able to remedy this defect by a spontaneous effort of nature, and the expectations of years become frustrated in a single season.

When, then, we perceive a commencement of this want of due vigor in any branch, we must hasten to remedy it. There are various ways of obtaining this object, but I refrain at present from mentioning many of them. One excellent plan is to allow a *larger* number of leaves on a *weak* branch than on a strong one. The reason for this has been stated above. The leaves are the lungs of the tree, and attract and modify the sap, which is little altered till it reaches the leaves. When it does reach them, it ceases to be sap, properly so called; it becomes the "proper juice." Discharged into the bark, it is thence carried, by cellular channels, throughout the tree.

From this "proper juice," that is, converted sap, the fruit attracts what it needs to produce flavor. The more the tree secretes the better. Pruning and training here play a great part. By removing a great portion of the leaves on a vigorous branch (cutting them in two is the best), and by allowing as many as possible on a weak branch, we equalize both. Removal of some of the leaves produces flavor in the fruit. But we speak here, chiefly, of the growth of the tree, and its regulation. Another method of strengthening a weak branch is to untie it from the wall, and allow it to swing loosely in the free play of sun and air on all its sides,—one, at least, of which would otherwise receive nothing. Of course, then, to tie down a branch to the tree has a contrary effect, and the more we approach the horizontal position, not to speak of the extreme method of bending it downwards altogether, the more the branch is checked in its development outwards. So, if it is desired to lengthen a branch, it must be directed upwards; and a branch tied, for a season, vertically, and exposed at the same time, in wall trees, to the free action of light and air, will grow much more rapidly than another tied to the wall, and carried into a horizontal line. This is a useful maxim to remember, because it may be so readily applied in nearly every case that can occur.

If we wish to give a temporary check to a too vigorous branch, we must diminish the number of *leaf-buds* on it, and

allow a rather too abundant crop of fruit on the *fruit-buds*, while, at the same time, the weaker side should be raised vertically, and not allowed to bear at all. Of course the tree will not look so pretty in this way for the season, until the winter pruning shall harmonize the whole; and this is often a reason for neglecting this very useful plan. By pinching off the green ends of branches some time before the others, those first reduced in length are checked in their growth, because they have not so many leaves from being shorter.

In cases of great necessity, you may even cover over the leaves of a strong branch with some light but impervious material, for a week at a time. It should be *no longer*, taking care to observe if the foliage becomes injured or not. Nevertheless, I do not recommend this method, which is more practised in France than in England.

If it be wished to prolong any branch (no matter its vigor) we must concentrate the whole power of the sap into *one or two buds* by cutting down to them, taking care that these buds are healthy, and, above all, placed *exactly* as the new extension is desired to be. *Terminal buds* are always more vigorous than lateral buds, because the sap is conducted more directly to them. To lengthen a branch, always remember to cut well down to the bud selected for the new shoot, not, however, so near as to weaken it, but near enough that nothing useless be left beyond, because, during the drying up of that part, the bud is checked, and the object is to advance its growth. To obtain fruit-buds, on the contrary, every aim must be directed to keeping them, for one or two years, as the case may require, in a dormant state. To effect this, you must divert the full current of the sap away from them, so that it shall pass them by, but without completely drying them up, which would be a great fault. A leaf bud or two must, therefore, be suffered to extend *beyond* any flower bud, *i. e.*, one properly so called. The sap having passed vigorously up the main conduits of the tree, and in the leaves having been converted from sap into "proper juice," must be so diverted from the flower buds as only to nourish their fertility

without causing them to elongate in the form of branches. Nevertheless, in the case of the peach, should any bud remain absolutely dormant for two seasons, it will hardly ever be developed at all.

When trees have obtained a certain size, their ramifications have the effect of diminishing the rapidity of the circulation of the sap; and thus it is that trees of a certain age are more productive than those which are young; for the sap has so many irregularly-disposed branches to supply, that it cannot well stimulate any single part and pass by the rest.

By cutting your leading branches very short for a number of seasons, as in the case of that absurd form now happily abandoned—the “pillar” or “quenouille”—the tree becomes fruitful, it is true, but at the expense of size, form, and beauty. In the case especially of standard trees, by pegging down any too vigorous branch, it is completely checked, for the reason stated previously; but in this case the lateral shoots, becoming *vertical*, have an extreme tendency to grow, and require incessant pruning. This rule is applicable to young growing trees, chiefly pears and apples; but if applied to an older tree, *and all the branches* should be thus bent downwards, then as soon as the tree becomes more fruitful, the branches should be loosened, and they will retain a sufficient inclination to obtain the required result. The ends would otherwise dry up, and the vertical shoots, absorbing all the sap, would become converted into wood-shoots of great vigor and difficult to restrain. In some cases the tree would be exhausted by excess of production.

One maxim more, and this part is ended. By removing the earth from the principal roots during the summer, so as to expose them to the air, the tree is much checked in its vigor. This shows the danger of growing crops too near to the roots, as, independently of the exhaustion of the soil thus induced, the risk of injury from the spade and removal of the surface is very great. For this very reason, transplanting an unfruitful tree often makes it bear well, when other methods have failed.

CHAP. III.

SEASONS FOR PLANTING AND PRUNING.

The season for planting is a busy, and it must be confessed, a somewhat harrassing period. It is "dig sine otio." The time which succeeds the first rest of the sap, that is, the early part of winter, is the most suitable for the work in hand. If neglected, then that period which immediately precedes the first movements of vegetation is the best.

As to young trees in the orchard house, any time during winter will do for them. If they are ready to bear, of course, the less they are disturbed late in the season the better their chance of setting their crop will be. But then, these trees can be bought now ready potted, and thus a new house may be stocked at any time. If destined to continue in pots, when carefully packed, no injury is done to them, and if for plantation in the borders, they are equally ready, summer and winter, with ordinary care; and therefore a tree established one or two years in a pot is ready for any use.

For out-door planting, if not on too large a scale, trees thus potted are far the safest; their roots are more established, and are infinitely more full of fibres, and the indispensable spongioles are not cut off in transplanting. This is the rule in the case of more valuable and delicate trees: pears, plums, and apples are easily managed. By having a portion of your trees in pots, you may be ready for your house if not already built, and time will thus be gained. You may house them, or leave them out of doors near some sunny spot, protecting the surface of the pots from drenching rains, by a few slates. Some branches placed to windward, and a mat around them, will preserve any fruit tree from injury; or it may so happen that a friend has a spare corner in his own orchard house, or a slight shed can be run up. All these are simple means and obvious resources, if the season for planting should come on

us before we are quite ready to undertake the whole at one single time.*

As to out-door planting on a larger scale, a mild day with a gentle sun-heat is the most favorable time. Never plant the trees *on a level with the surface soil*, but let them be raised up above it in their own little mound, some four inches above the surface. By the end of the first season the natural subsidence of the ground will bring them to their proper level. This is very important to bear in mind, but is very seldom attended to, although it is ruinous to the tree to neglect this precaution.†

The earth from the bottom of the pit, which should be ample and large, should be placed in one side of the hole, and that which came from the surface on the opposite side. Then when your tree is planted, the upper soil should be placed near the roots at the bottom, and the earth from the lowest part, mixed with some leaf-mould and sand, will serve well for the top. Place the tree on a gentle mound in the centre of the hole, lightly powder the earth over and between the central roots, but press down rather firmly the earth over the extremities of the roots, having first well spread them

[* This advice is for the mild climate of Great Britain: in this country such protection is insufficient, as the November and later frosts would freeze the earth in the pots, and not only injure the roots,—which should never be allowed to freeze,—but the pots would be broken. If there is no place to house them safe from frost, the pots or tubs should be sunk six inches below the *surface* in a dry soil, and covered with a foot of leaves or strawy manure, and here they should not be left out later than the middle of December. The proper place is a cellar where the frost does not penetrate.—C. M. U.]

[† This is another item of advice which is not altogether applicable in our dry climate. A great deal has been written about planting trees too deep, and it is well that cultivators should understand that such an error should be avoided. But on the contrary it is not absolutely necessary to the success of the trees that they should be planted “in their own little mound above the surface,” and that it is “ruinous” to neglect it. All good cultivators advise planting the quince *below* the surface, and of thousands of trees so managed we have not yet seen the first instance of failure. In regard to other trees, the rule should be, to plant level with the surface, so as to fairly cover the roots, unless in swampy or low wet ground, and then “its own little mound” may be safest. Our hot sun, and long summer droughts, would soon exhaust all the moisture from these little mounds, and leave the tree to perish.—C. M. U.]

flatly in every direction. A stake to which the tree shall be firmly tied completes the operation, not, however, forgetting to have the name of the tree written on a label attached to it. Zinc, or wood painted, is best for labels. Avoid all stimulating manures in contact with the tender fibrous roots, adding only vegetable mould, and calcareous matter with it. No tree should be planted in damp situations: but if this be unavoidable, a drainage of four to six inches of stones, or oyster shells, will tend to remedy this.

There is some variety in the soils proper to the various kinds of fruit-trees. The plum, the cherry, and the apricot, require an argilo-calcareous soil. The situation should be *rather* more moist than dry, and they will do well where there is no *great depth* of soil. It is useful to remember this: because light soils, especially if at all sandy, are not adapted for peaches. These require a firm and rather unctuous loam,—deep, but permeable,—and they must have abundance of calcareous matter.* In the case of wall trees, the borders should not be less than six feet broad, and should slope gently downwards, and be well drained. This is indispensable in the case of peaches. These borders should never be cropped. No early potatoes should ever be allowed to encroach on the ground devoted to wall trees. Fork lightly up these borders, removing the weeds, but unless the soil be very heavy do not dig them up. Mulch the borders in July, but *never before* that month; because the ground is not warmed enough till that period to shade it from the sun by mulching: but after that time this operation is *invaluable*, as it checks evaporation and saves watering. In the late autumn lightly

[* This is the very opposite of the advice of American cultivators, which is to plant the peach in light soils. Indeed, no soil has been thought too light for the peach, except a perfect sand. We are inclined to believe that much of the decay of our peach orchards, and the so-called disease of the yellows, is to be attributed to a long course of *starvation*, applied to the peach tree. Certainly it can do no harm to try a generous treatment, and allow it to have a decent soil, and a little manure. We know that no such thing as the yellows exists in Great Britain, and we know too that the finest looking peaches—to say nothing about their flavor—are raised on walls and under glass in that climate.—C. M. H.]

fork in this mulching, which will then be quite friable. You may renew it in the summer, as occasion requires; indeed, the proper time to nourish the tree is during growing and bearing season, and not when it should be at rest,—that is, in the winter. In cold localities, however, mulching in winter has the advantage of protecting the surface roots from the frost.

The pear also requires a good deep soil, but not retentive of moisture. Leaf mould (very old manure), but not near the roots: loam and sand together form an excellent compost. Moor earth near rivers must be well drained in heaps, and a little unslaked lime added to correct it. If the soil be too heavy in any case, powdered charcoal, or burnt earth, are the usual palliatives.

The apple (which unfortunately is generally considered fit for any situation) prefers, on the contrary, a rather drier soil than the pear, and if in rather a gravelly spot, so much the better. Canker proceeds from neglect of this, a fertile source of discussion. The unwholesome sub-soil supplies vitiated food to the spongioles, and the sap thus corrupted breaks out at the weakest portion of the bark. Sometimes, however, the conjuncture of a sudden excess of pruning is the cause of this fatal disease, as it is of gum in other trees. Therefore, in weak trees, especially in the tender apricot, do not prune all the trees at one single time. On a due attention to the soil proper for each variety depends, in a very great measure, the success of the whole matter. No expense or care bestowed in this way, nor attention to these details, can ever be thrown away.

There is no doubt that pruning *during the summer months*, is too much neglected. There are so many demands upon the precious hours at this period, that this indispensable act has not often its due attention; then, when the winter surprises us, we are apt to find a huge, entangled, overgrown mass to unravel, demanding very much more labor and skill. This is a vicious custom with unskilful gardeners, because a severe use of the knife in the winter is to them the great

resource and panacea for all evils. All their errors, they think, are thus obliterated until the next season's wood shall recommence. A tree severely cut back, and tightly nailed in, looks so very knowing, and argues so much forethought! No matter the age or kind of tree, a smart semicircle is described over its unhappy limbs, and branch after branch disappears "at one draw." The employer, meanwhile, looks on with amazement and wonder. The growth, progress, and periods of repose required by nature are highly suggestive to the thoughtful mind. The period of rest is now come, that of active labor ceases. All that was necessary to be done should have been accomplished before the stage of repose. Some little supplementary work still remains, for plants, as well as animated beings, are never absolutely idle; but the severer discipline applied to the tree should not be reserved for the winter pruning. During their stage of growth, superabundant vigor is restrained and checked, because at that early period wounds are not so difficult to heal, and the mere growth of the tree will soon cause them to disappear. A tree neglected during the summer will soon show signs of this forgetfulness. It will then be no proper remedy to use the pruning knife with energy. It is as in life; we can only hope with reason to turn aside the violence of a wrong bias at the outset. An even balance should be preserved; no part of the whole system should run riot while the remainder unfairly languishes. Neither should winter pruning ever take place during a frosty season, for the knife lacerates the hardened wood and induces decay. To delay the pruning till the tree begins to feel the first movements of spring vegetation is also pernicious, for then the check is too great.

In the case of the peach, however, a mere beginner had better delay his pruning until he can fairly distinguish between a flower bud and a leaf bud.

Should the number of trees be great, the proper plan would be to commence with the apricots, then the peaches; after these the plums, the cherries and the pears, reserving the apples for the last. A simple rule, but not generally known.

It is best to have more than one pruning knife, for peach pruning demands a sharp-pointed instrument.

To save time, a pair of strong pruning scissors is very convenient. With scissors the work is very rapidly done; there is nevertheless this disadvantage in their use, that they must be kept very sharp, or the buds will be quite torn away. Besides, it is impossible to cut very near to the buds, so that at the winter pruning another clean cut must be made with a sharp knife nearer to the part selected.

These cuts must always be made "at one draw" (as gardeners say), for the sake of appearance, and that the wounds may heal more rapidly.

CHAP. IV.

DEFECTS OF SOME METHODS OF FRUIT CULTURE.

No doubt the climate of our country has many faults to answer for; its severe spring frosts are indefensible; its vicissitudes are highly reprehensible; and as to its autumnal gales, which shake off the hopes of the season prior to their complete maturity,—if that period ever does occur, according to a noted French authority,—the least a patriot can say in their defence, the better for his truthfulness.*

But has the art of Horticulture nothing to answer for? It is true we can point to noble examples, such as Lindley, Rivers, Thompson, Knight, or Duhamel, Van Mons, and many others; but it is when gardening is practised by men of moderate incomes that we are astonished at its mediocre results. The chief reason is, that the lower class of hired gardeners is often ignorant, prejudiced, and traditional in a wonderful degree. But so widely spread is the love of gardening, that

[* With this honest confession, seldom admitted, our American cultivators can duly appreciate the enthusiasm in orchard culture in Great Britain—an actual necessity—and not, as with us, auxiliary to the production of the best fruit.—C. M. H.]

very large sums are yearly spent even by persons of limited incomes, on their fruits and flowers. But the results are really disproportionate. How seldom is a well-kept garden to be seen. How seldom does the proprietor know the reason of his numerous failures.

This little work is offered therefore in the simple hope of helping some such person, who, having less leisure, cannot do as I have done, follow up my own trees, year after year, note-book in hand. My experience on this account cannot be valueless to him, and I have therefore freely given it.

One grand defect which is observable in the general treatment of fruit trees is, that very little difference is made in the care bestowed on the various kinds.

The dormant buds, which are the hopes of ensuing seasons, are treated on similar principles, the consequence of which is, that the centre of the tree is denuded of fruit, and an appearance of age is, by this means, induced, long before the tree has reached the period of decadence. As the sap ascends far more powerfully in the main channels than in the more distant and feebler portions, one would suppose that this would be a *guiding principle* in the treatment of the whole tree. But, instead of this, what do we generally see? In a few years, by unskilful pruning, the whole of the centre of the wall-trees and the interior parts of standards, are without fruit. It now abounds at the extremities of the branches; and, year after year, retires further and further from the centre of all. Large bare spaces are visible on every tree. Invaluable south walls are profitless; and there is no remedy but to cut back the unhappy tree.

But, independently of the disfigurement of the garden wall, and the serious loss of time, this cutting back is an absurd and unnecessary plan. In the case of the peach, it hardly ever succeeds at all; especially if done in the winter, as is generally the case. Any method which should obviate this precessity must be useful, and, undoubtedly, "Cordon training" does this, as will be shown.

By keeping close to the centre of our work, instead of wearing out the whole, we refresh and stimulate incessantly the latent energies of the tree, because we seek for them in their chief source, *where nature has placed them*—the main stem. On the contrary, it is evident that an irregular excitation of particular and distant portions, while the remaining (and far more important parts) are left languishing and inert, must end in confusion, inferiority of production, and diminution of the flavor of fruit. As to the tree itself, it cannot fail to decay in some place or other, and be finally condemned as a disfigurement to the garden.

Another radical defect in fruit culture is the vicious custom of too rapidly inclining the bearing branches towards the horizontal line. By this plan the lowest stage must inevitably become the shortest and the most feeble, while, by all the rules of harmony, it should be the longest. This defect *once* commenced is fatal and irremediable, and some of the best portions of the wall and tree are lost for ever.

Many trees are trained fan-wise, and this, with proper precautions, is suitable only for strong growing varieties, and for those which, like the pear, are of long duration.

But, on the authority of M. Dubreuil, even the pear requires about sixteen years to reach to the top of an ordinary wall, admitting the necessity of a proper lateral extension. On the same authority, it is certain that the life of the peach is not valuable after twenty years, and if half of that period, *at least*, be spent in raising it to the summit, it is evident that it only arrives there when on the point of diminishing in production. During the time, therefore, that these trees, and others also, are reaching to the utmost limits assigned to them, the valuable wall space is unoccupied and useless.

This very serious defect has led to the introduction of the "Cordon system," by which the space of time required to cover a given superficies is abridged by two-thirds. As life is too precious to be wasted, and we naturally look for *speedy returns* for all the care and money which we bestow, if this system can really shorten the period of fructification, without

corresponding disadvantages, it would be very proper to adopt it in preference to older methods, especially as it is adapted for all purposes required, and for all varieties cultivated.

CHAP. V.

CORDON TRAINING—ITS ADVANTAGES AND USES.

Cordon training derives its name from its fanciful resemblance to a cord or chain. A certain number of leading branches are carried out, and on them spurs are developed, so that the branches look somewhat like twisted cables or chains. It is not an entirely new plan, but has the advantage of being based on well-known and valuable methods long in use. In the present case its value chiefly consists in its combinations, and modifications required by the peculiar character of the climate of England. In the case of in-door culture much more novelty was admissible, because in this instance the dry and equable temperature aided powerfully in its success. Objections made to cordon training in the open air, which, however, are not based on experience, being generally made by persons who have never even seen the trees during one season, in orchard-houses, fall at once to the ground.

But for an amateur to take up cordon training and to endeavor to practice it, irrespective of the exigencies of our rainy skies, and to expect results attainable in other dry and sunny localities, is simply absurd.

I have myself carefully studied the system, and followed it out on a fair scale for some years, both in the open air and in the orchard house. While, therefore, convinced of its value, I trust it will not be considered presumptuous in me to say, that I believe that an important portion of this peculiar system would prove a total failure unless it were carried out ex-

actly as described in these pages. But as it is so simple that any one can understand its rules, there can be no reason why mistakes should occur, nor is the manual labor so great as to prevent even ladies from undertaking it. I offer my suggestions to amateurs with a certain confidence, since I have tried and rejected most of the systems which are, *at this day*, considered excellent in France. One form was quite unsuitable to the extreme dampness of our climate, which induces a too luxuriant growth in the autumn; while the want of proportionate sun-heat renders it impossible to have *well-ripened wood*,—and without this, what tree will ever bear?

Another form, more adapted to meet these difficulties, was far too complicated in its system of dis-budding,—which, by the bye, is a plan requiring much caution in its adoption, and is not very necessary at any time. It is true this last system produced a fair crop of fruit, but it required too much attention to make it generally valuable. Proceeding, therefore, on a new mode, which arose out of the cordon system itself, I gradually adopted it, and after two years' trial of this *new combination*, I do not hesitate to recommend it *as the best* which exists at the present day. A large and important portion of this system—the management of the spurs and the growths on them—is very similar to that recommended by Mr. Rivers, in the chapter on “Summer Pinching.” Some of the terms used in horticulture are so droll as to excite wonder at their use, but it would cause confusion to endeavor to introduce any new ones. But certainly “pinching spurs in the summer” seems no particular recommendation in gardening.

As was said before, cordon training has the immense advantage of being simple. There is no elaborate tying-in of summer shoots, as old as Shakspeare: “Tie up those dangling apricocks;” indeed few ties are required even in the winter. The forerights are preserved, which are of much value in increasing the amount of fruit. The spurs are compactly and regularly distributed, and are thus more easily sheltered from the weather, and more readily examined and

pruned. No long straggling shoots are ever seen. The supply of new wood of the proper bearing age, and the regular distribution of the leaves, ensures a succession of crops. The fruit is all produced close to the main stems. All parts of the tree have a fair chance. The produce is doubled, since half of the intervals between the branches is only required. Twelve inches are sufficient for the parts where 18 or 24 inches were formerly required. The trees are as readily detached from the walls to clean them, as vines are from the wires, and from their simple forms no injury can happen to any portion. The trees are only lightly secured to the rods (which are safer, after all, than galvanized wires), and it is easy to clear off cobwebs and insects from the back of the trees, an advantage of incalculable value, as the gardener well knows. All these, and others, are the results of cordon training.

But one of the *chief* recommendations of the system is the *rapidity* with which a high wall is clothed with productive spurs. *In four years* a wall, twelve to fifteen feet high, can be covered with fruit-bearing wood, all disposed in regular, beautiful, and harmonious succession.

This will be obvious by a reference to the Frontispiece, where the different years are indicated by their progress; and as a tree, planted at the angles shown, *must* grow fast, and yet be fruitful, what can be desired more? What is shown in the Frontispiece is a representation of one kind of cordon, and that the very best,—the “diagonal,”—with three leaders on each tree. The trees are planted in the ground at thirty-six inches from their neighbors to right and left, there being thus twelve inches of interval between each leader. In France the single cordon,* with laterals of fourteen inches, succeeds well, but it would fail in England. The double cordon is better adapted; these two forms clothe a wall with

[* The objections to the single cordon do not apply in our climate, which is quite as dry and favorable for that system of training as in France, where Mr. Bréhant admits it succeeds well. Hence, those cultivators who would like to try the single cordon can do so, as we shall give in an appendix an engraving and details of that method, though undoubtedly generally understood from the above account. The single and double differ only in the number of shoots and planting the trees nearer together.—C. M. H.]

amazing rapidity, and if suited for our climate would supersede all others. The triple cordon I have never seen but in my own gardens; with laterals in the old system it would not advance fast enough, which is one important condition in its use. A quadruple cordon would take so much time to complete as to make it less desirable; it might, however, suit very moist localities better. With spurs, as now recommended, the triple cordon unites most of the conditions required for success. It covers the wall rapidly, and bears well and regularly: nothing better can be said in its favor. Its form is also so regularly beautiful, that even casual observers must be struck with the harmony and grace of the whole tree. No gentleman likes to have his valuable walls covered with trees as unproductive as they are ungainly; but any one who has seen a *well-managed* cordon on the diagonal plan, will not fail to give it the palm as to beauty.

By means of light guiding rods the young wood creeps *as straight* as a walking stick, upwards, and *on this* depends much of the handsome appearance of the trees. So that were a wall of these trees drawn, each of them ascending with mathematical regularity, it would not be exaggerated: a moderate amount of skill and patience would easily effect it. The various forms of cordon training remain to be noticed. They are the diagonal, the best suited for a wall; for in-door or out-door culture it should always have three leaders. The vertical, useful for trees trained against the pillars of the orchard-house, where they bear admirably; they also answer well if planted in the borders. If for walls in the open air, then the number of leaders should not be less than five, or there would be danger of the trees producing too much wood. The spiral: round wires for trees in pots, or round the pillars of the orchard house, where they have a pretty effect. It will also suit large pear standards in the open ground, or in the borders of the house. Lastly, the horizontal—*i. e.* all fan-shaped, (palmette of the French,) or laterally developed trees; all standard trees in the open ground or within the house, and planted in the borders.

CHAP. VI.

CORDON TRAINING IN PEACH TREES.—THE DIAGONAL CORDON.

“If any one tree has occupied the attention of cultivators more than another, it is surely the peach.” So says the editor of the *Gardener’s Chronicle*; and so many have done so, that it may almost be asked if the matter be not exhausted. The article from which this is quoted proceeds to lay down three conditions as necessary to success in peach culture, which is what we are now considering. The first indispensable condition for success is, that the soil must be *well drained*; and secondly, that the wood must ripen *thoroughly*; and thirdly, that as the wood of the *first* and *third* year produces no fruit, it must be looked for only on the wood of the *second year*. I hope to be able to show satisfactorily that these requisites can best be obtained by cordon training, combined with attention to other important particulars.

The peach, like the pear, is a standard of perfection among fruit trees; but each requires a widely different treatment. The peach coming from a climate tropical in its summer heats, drier at most seasons than ours, and yet subject to extremely severe frosts, when transplanted to England is placed under very different conditions. These arise chiefly from the want of sun-heat at the necessary period; but above all, from the excessive moisture of spring and autumn. As to our frosts, these are not often injurious to the tree itself, but they affect the blossoms when setting. Nevertheless, precautions can be used in out-door culture which somewhat obviate this disadvantage; yet it is difficult to know how to ward off the drenching autumnal rains, which ruin all hopes of ripe wood. It is here that cultivation under glass is most valuable.

It is no wonder, then, if the tree should have been written about till the very name of peach becomes odious to readers of horticultural subjects; and it is not a matter of surprise, if even the ancients blundered amusingly when they wrote

about this exotic. Thus we find Columella making the funniest mistakes; and Pliny (the Rivers of his day) setting him right, and re-establishing the fruit into popular favor. Nevertheless, even Pliny only knew of five varieties. By the 16th century some forty kinds were known and described; and, of these, the oldest and that most carefully depicted is the "Lucca peach," which is supposed, on good grounds, to be the "Late Admirable" of the present day, and the "Pêche Royale" of the French. (*Duhamel*.) The "Late Admirable" is not the same as "Bourdine" (which ripens later), as others assert. But this only shows how little is really known about the fruit common in the middle ages.

In the tropics the peach succeeds pretty well, that is, it grows finely; but there is little fruit on it. Vegetation is *too continual for the fruit-buds to form*. This is curious enough, as it is just the case, from excess of humidity, in our climate. Between the 30th and 43rd degrees of latitude, the care bestowed on or required by the peach is almost nothing, and beyond the 50th degree it declines to bear at all. Thus wrote M. Noisette; an excellent authority,—but, then, he knew nothing of orchard-houses. How few Frenchmen of the present day really believe in our successful culture of fruit at all, I leave to continental travellers to declare. "They grow, it is true," said one of the learned men at Angers to me, "they grow, as my friend (quoting a well-known name) declared to us as we walked the streets of London together, but they never ripen." The eminent cultivator referred to had frequently visited England, and knows all our best nursery gardens too. Another, and certainly a clever authority, residing at Brussels, considers our system of pear culture as "disastrous," and ascribes it to ignorance of common principles; the trees round London, though numerous, being quite "unproductive."

The transition from this amusing prejudice on the part of our continental friends, to the opinions of the Chinese respecting peaches, is not so abrupt as may appear at first sight. The ruddy and pointed peaches are considered, in China, to

be symbols of long life. They are in consequence profusely used as ornaments on their walls, and even on furniture. Porcelain peaches are appropriate presents on the New Year. The peach has also the valuable quality of being an antidote against evil or low spirits; but the brown peach, though beautiful, is the cause of sin and death.

Probably some allusion is here meant to the wide-spread tradition of Eve's offence; more especially, as one variety called "Yu" renders the eater thereof immortal. So much for oriental opinions. With respect to details in peach training, these have had the share of attention from many quarters. But before entering into them, I must quote Lindley's words respecting the formation of flower and of leaf-buds; which are so explanative, and, I hope, agree so completely with what follows, that it will be useful to record them here. "Physiologists know that whatever tends to cause a *rapid* diffusion of the sap and secretions of any plant, causes also the formation of leaf-buds instead of flower-buds; while an *accumulation* of these fluids produces flower-buds. In a leaf-bud the leaves are highly developed, and their axis has a *tendency to elongate* as soon as stimulated by heat and light. In a flower-bud the leaves are in an imperfect state, (which is called calyx, corolla, stamens and pistil) and the axis has *no tendency to elongate*. Hence a flower-bud is a contracted branch. It is, therefore, easy to be seen that so long as the fluids of a tree circulate rapidly, and *without interruption*, only leaf-buds (*i. e.* undeveloped branches) can be formed. But if the motion of the fluids be languid, and the parts *are formed slowly*, flower-buds, which are contracted by nature, and have no disposition to elongate, only will appear."

For these reasons, most sound as they are, the Diagonal Cordon, which is now to be described, appears the best adapted to unite the conditions of fertility with due attention to the necessity of extension. In other words, this cordon grows and bears well. As will be seen, the term "Diagonal" means leaders—one or more, but generally three—trained against walls at an angle of 65 degrees during the first year,

and at an angle of 45 degrees during the succeeding years. The reason why the trees are first planted at the angle of 65 degrees, is that otherwise the shoots on the upper side would grow faster than those on the lower, and that they would injuriously compete (by their vertical position), with the growth of the leading extremities, the growth of which it is sought by all means to encourage.

The position of 45 degrees, to which it is inclined as soon as the leading shoot has obtained the proper pre-eminence and strength, and is thus able to defend its rights—the position of 45 degrees is the most favorable to obtain *fruit and wood* above all inclinations at which any fruit tree can be placed. Therefore, as soon as the leader is strong and vigorous enough, the tree should be lowered to this angle, and, by means of light guiding rods, be made to ascend, at this angle, to the top of the wall. From being tied lightly, at every two or three inches, to the rod, it must grow perfectly straight.

The trees are planted at intervals of 36 inches from stem to stem along the wall, as seen in the Frontispiece, where they are all at the angle of 45 degrees, even the tree only in the first year; but this was unavoidable; that is, the trees are laid in at 3 feet from each other only. My own trees are planted and trained at 30 inches of interval, but this is too little—36 inches are preferable. Each tree, in the engraving, is represented as having either three leaders fully grown, or in the case of the tree of the first year, it has dotted lines indicating the future position of the other two leaders. In the tree of the second year, the second leader has ascended half-way up, while the first leader is completed. In the case of the tree of the third year, the first and second leaders being completed, the third leader is now half-way up. The two trees of the fourth year have all three leaders complete, and the complementary tree which fills up the corner is shown as having its leaders fully developed. The extreme corner is completed as seen by extra short leaders, and in the first year's tree the corresponding corner is indicated to be filled in by an upright leader with short side branches, so as

to cover the whole space. This filling up of corners cannot be done so well with trees on the common method.

Of course, in the first year, all the trees, if planted simultaneously, would all be alike, having one leader and blank spaces for the two future ones, and in the second year the whole wall would look like the tree of that year; and so on. But at one glance the different years can be seen and understood. I must add, that if the trees shall be planted at 36 inches from each other, the intervals between the leaders will of course be 12 inches, *i. e.* the shoots on each leader extend 6 inches either way. Forerights are also preserved (not represented, to avoid confusion); but this is a very important part of the system, and adds much to the beauty of the whole, making each leader like a green cable having blooming fruit embedded in appropriate bowers of leaves; not buried, but visible and well exposed to the sun's rays.

I do not remember seeing any trees trained exactly in this fashion, and as to the combination of culture, under glass, with the great advantages to be gained by this *particular Cordon*, it is this which has chiefly induced me to publish the results at all. By this excellent, but too little known method, the most splendid crops can be grown, and it is not too much to anticipate the time when every back wall of an orchard-house, or of a forcing nectarine-house, will have its Diagonal Cordon on three leaders. One will not do; two are only rather better, but with three success is certain. More than three would take too long a period to cover the wall, by extending the four years necessary with three leaders, to five or six years, in which case little time is saved. Neither can a Cordon on other principles than closely spurring-in be very successful. At any rate it is far inferior in every way, and unworthy of competing with the one now described, especially in the quantity of fruit obtained.

I can cordially recommend this kind of Cordon to amateurs, having had the greatest success with it of any. It will not suit span-roofed houses, which have, of course, no back walls.

But lean-to houses are far warmer. Perhaps a union of the two would be useful. Span-roofed houses are handsomer, and, when very large, extremely beautiful. In this case other kinds of Cordons are more suitable, such as vertical, with pyramidal bases, which will be described presently.

The formation of a Diagonal Cordon with three leaders is thus commenced. Straight, well-grown trees, one year old from the graft, are selected. These trees are planted in the open ground in October, November, or December, but the earlier the better, and in the orchard-house, at any time during the winter, except in frosty weather. They are laid at an angle of 65 degrees against the wall, in either case at an interval of 36 inches from one another. One third of the top of each tree may be removed; but there is no objection to the whole row being cut to an equal height, unless in the case of particular trees. A healthy front bud is chosen, in *every case*, to cut down to; therefore when I said equalize them, of course it is far better to regulate their height by the bud you cut down to; because you must have a healthy leaf-bud, and below it must be no blank spaces where there can be no shoots.

If blank spaces occur, then reject that tree or it will cause you trouble; but if you choose to retain it, either because of the sort, or because you fancy it, then cut down well to a good bud, no matter how high or how low you meet it. It must be in *front*, because the wound is thus far less difficult to hide. This is of *great importance* in Cordon training. If you must cut to a side bud, then you have no very straight stem after all the care bestowed on the rest. There must be no unhealthy wood near the leading bud. How often, by neglecting this simple rule, has the trouble of years been wasted! Cut, sloping upwards at a gentle angle, till you get to about an eighth of an inch above the bud. The trees are then well tied to the wall; the young laterals are brought forward on either side neatly, and the back shoots are generally cut in to one or two buds; for if you cut them off there will be no reserve to supply accident. Sharply cut back these

slender laterals to two eyes or buds. At this stage these are small, therefore be in no hurry to cut them off. Then the forerights are to be similarly treated, *i. e.* cut back to two buds, and the trees are ready. If the wall has wires or rails, these must be at 12 inches of interval. Then a light guiding rod is tied above the end of the leading branch in order to direct the future young wood. Prepare and place this at the winter arrangements. Water freely for some weeks. No wall under 11 or 12 feet high is eligible for Cordon training. If in the open ground it should have a good coping of one or two feet to ward off the drenching rains: If, as was said before, you do not immediately require the trees, or have not your wall or house quite ready, then pot the trees till that period, and no time is lost; at any rate, a reserve of some half-dozen should *always* be kept thus potted in case of any accident or otherwise.

Thus, if one of your trees become unsightly or deformed, or refuse to progress, then remove it without delay, and place one of your potted trees (the most vigorous) in its place. This the amateur must particularly attend to in Cordon training. Trees one year old are cheap, and so are pots, and there is no excuse for not having a reserve ready trained on the same system to supply vacant spaces.

With respect to the color of walls for orchard-houses (lean-to's), white is preferable to black, though the latter has certain advantages, but which are most attainable out of doors: I mean with respect to radiation, but white is certainly preferable for Cordon training, as so much of the wall is covered with leaves that no burning can take place. A coat of lime-wash is invaluable on account of that "*rubra cura*"—the red spider, which is the pest of peach-houses, and requires to be kept down by regular syringing and ventilation. The white color adds also very much to the appearance of a house, and if a dash of rose or pink be added, the effect is considerably heightened. Then with pillars of a clear blue, and ruddy gravel walks between the well-kept borders, the whole may be as ornamental as any conservatory; and there is no

reason why a little gilding should not be shown on the cornices, &c., especially as the house should be devoted to chrysanthemums in the autumn.

To return to the plantation of the row of young trees on the Diagonal plan. A little watering as needed is the completion of the first year's work.

In the spring of the ensuing season, the two eyes or buds to which the laterals have been cut will generally each produce a shoot. If we call these two shoots, on which the future work will be done, the "right and the left shoot," and the original first growth a "spur," it may tend to simplify the matter. These two shoots are, then, the "second growth" on these "spurs." As soon, therefore, as these second growths have made six leaves—any small leaves at the bases which have no buds in their axils, do not count—pinch down to two leaves on the *upper* side of the tree, and to three leaves on the *lower* side. The reason for this difference is found in the more vertical position of the upper shoots, and therefore in their greater tendency to elongate. As to the lower-side shoots, they, from their position, will be only too inclined to become covered with fruit-buds, and in their case we must look for obtaining some leaf-buds also.

To repeat: these second growths (*i. e.* the right and left shoots) having reached 6 leaves or 4 inches, must be pinched back—if on the upper side of the Diagonal leaders, to two leaves, and if on the lower side thereof, to three leaves. In a short time each of these leaves left will put forth another stage of young shoots, springing from the axils of the leaves. This is the "third growth." As soon as this "third growth" on either side has reached three leaves, pinch back all to two leaves. A "fourth growth" must be closely pinched in to one leaf, and if anything more grows, pinch it closely in also. These third and fourth growths would be bearers of buds, able, in ordinary seasons, to bear the next year, as well as the buds on the second growth; but in practice, the object being to keep the spurs and the growths on them *within six inches*, these late growths must be held in the light of "feeders" to

the others, just as two eyes are left beyond a bunch of grapes to draw the sap to the fruit. These successive growths in the summer pinchings may exceed the six inches by an inch or two in some cases, especially in forerights, while they may only reach to five inches in other cases; nevertheless, the rule is to keep them *as near as possible* at this extension. In the winter pruning they will be shortened in *alternately*, as will be described.

At the risk of tedious repetition, I must refer again to the Frontispiece.

The tree in the right-hand corner (marked 1st year) will represent the appearance of the whole of the row of trees at the end of the first year's training. This is the second year of plantation.

The tree with its single leader A will have reached more or less to half-way, or two-thirds of the wall, supposing this to be 12 feet high. A certain portion of the tree (that of last year to which it was cut back,) will now appear clothed with wood. The spurs on either side of the leader A will each have their two shoots pinched back successively to, say, 6 inches in all. The foreright spurs and shoots on them are also to be treated by pinching them as if they were on the upper side of the leader; but they are not shown in this diagram, to avoid confusion. At the base of the single leader A, and at 12 inches from the surface, a strong shoot from one of the spurs has been allowed to extend for 12 inches laterally, so as to be in readiness to form the second leader B when required; but if allowed to extend, and to be turned up when it reaches the 12 inches (which it is destined to do), so as to form the second leader B, then it would injuriously affect the growth of the first leader A. From this rule no deviation must be permitted. I have spoilt too many trees from impatience, not to warn others against this error. Cut this lateral back in winter to a healthy bud, and guide it by a light rod perfectly at right angles to the leader A. The tree which is now being described does not show this lateral, because it is in the corner, but the second year's tree will show

what here is meant. The dotted lines indicate the position of all future leaders, and thus E E explains how (in the case of the corner tree only) a *future* vertical leader in the direction E E will ascend, and future diagonal leaders be developed from this, the only vertical one, as marked F F.

Winter Pruning.—Let us suppose that when the leaves drop off from the trees there will appear two shoots on each spur, each shoot composed of the various growths of this season. Now the fruit will only appear on the wood of the *second year*. In this case the fruit buds nearest to the spurs themselves are on this wood, and the fruit will appear at the base of the spurs, and only in some cases at their top. Of course the trees are very young to bear, but they will do so in many cases, and if this occur, then only one or two peaches must be allowed to remain on each tree.

By the close spurring-in practised during the summer, and the not having had recourse to the old and ridiculous method of choosing long weak shoots for the bearing wood, the buds at the base of the spurs will generally become fruitful. All the fruit, if any, will appear on the bearing wood at the base. The young tender laterals on the young extremity of the leader, which has ascended some way upwards, must be pinched down to two buds previously to this period.

The two shoots on each spur must now be shortened in. One must be left long for fruit (if possible), and the other must be cut short to furnish new wood to bear alternately. The long shoot must be cut to any triple bud you can find within the six inches prescribed. If you find no triple bud on either shoot for bearing, then cut them both back alike to the two leaf-buds *nearest to the spur*. But if, as is generally the case, you find the triple bud desired, leave this shoot long, and cut the other to two leaf-buds, to furnish two new bearing wood shoots for the year after next. If you find a triple bud to cut down to in the case of the shorter shoot, this is an additional advantage, as it is fruitful, and you have a double chance of peaches. But the whole system revolves on these two shoots, which in time become three or four,—one of them

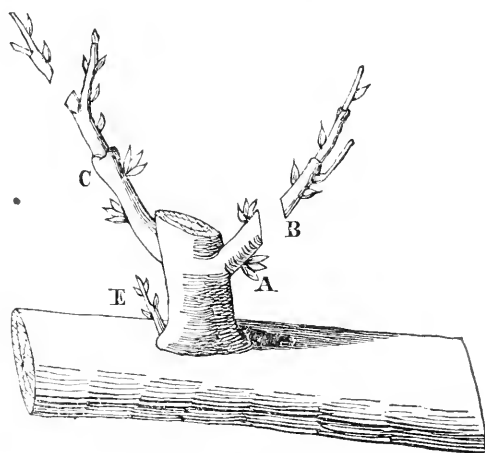
being left long to bear, and the other being cut short to succeed it. In this way a succession of fruitful wood is sure to be obtained, while on the old method, when once a shoot had borne, it was slightly shortened in, and permitted to bear on the new growth; so that in time the fruit was produced so far from the centre, that a severe pruning, most injurious to the peach, was needed. The shoots on the spurs multiply in time, and are cut back, or left long, as required. Every successive pruning must have for its object to keep the bearing wood close and compact, and allow on the long shoots left for fruit just enough of leaves to nourish the fruit.

Two shoots for each spur are required. If any spur have not the necessary two shoots on it, then it is a vast defect, and must be remedied by pinching back judiciously at first, and by endeavoring to encourage the single shoot to become double; of course the nearer to the spur the better. In this case all our endeavors must be directed to obtain the two shoots, *quite irrespective of fruit*, and at this winter's pruning, if there be but that melancholy single shoot, then vigorously cut in to two *leaf-buds*,—not the fruit-buds,—for if you do the spur is ruined for ever. However, even then the *whole tree* is not spoilt, for there are so many spurs, and so many shoots, that a remedy can always be found. A practiced eye will see the difference between a fruit and a leaf-bud almost at once—certainly by midsummer; while a mere beginner would be puzzled to decide till the ensuing spring.

Second Year's Training.—We come now to the tree in the Frontispiece marked “second year.” The first leader A will rapidly ascend and reach the top of the wall, and the lateral left to form the second leader B, having also shot out, is turned up sharply, when it has reached twelve inches from its starting place. It will, in the course of this year, reach to about half-way towards the summit of the wall, as seen. As soon as the first leader A has reached the top, pinch off the end; this will strengthen the second leader. The second leader will be shortened a little at the winter pruning, as the case may be, always remembering to cut to a front bud.

The pinching of the various growths on the two shoots goes on thus this year. That on the longer shoot must be pinched in *more closely* than that on the shorter one, because it would extend too far otherwise. It may reach to seven inches without any confusion, and if a foreright, and in the orchard-house, it will even be better so. Thus the new wood *on the long shoot* may well be pinched off to one leaf as soon as three leaves are formed, and the next time also to one leaf, as soon as two leaves are formed; and so on.

But the shoot or shoots shortened to two buds will require to be allowed to grow by a *leaf more at a time*. Thus, as



1. FRUIT-SPUR ON THE PEACH, SHOWING THE SUCCESSIVE GROWTHS, AND ALTERNATE PRUNING.

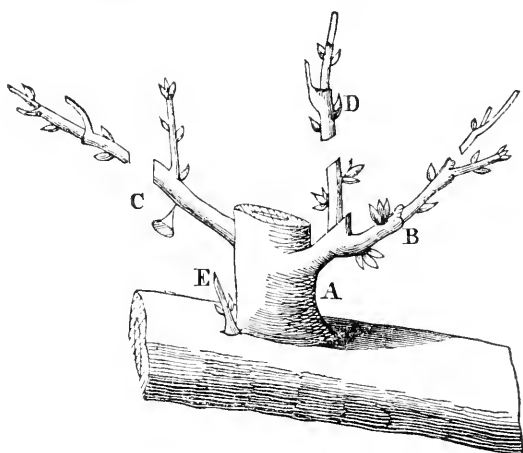
soon as four leaves are formed, pinch back to two leaves, and afterwards to one leaf. All this will be readily understood after a season's practice. Of course those natural shoots which make their terminal buds—and are called by the French "*rameaux à fruit bouquets*," because they appear like a small nosegay,—should not be touched wherever they appear. They will soon be known, and generally spring from the bases of the spurs. See FIG. 1, of fruit-spurs on the peach, where it is seen springing from the base of the spur, and is marked E. The present winter's pruning of these two shoots

now requires notice. Taking FIGS. 1 and 2 of peach spurs,—A indicates the original spur; B the right shoot; C the left shoot; D the right shoot which has developed another one, and E the natural fruit-spur.

FIG. 1.—Here, on the spur A, the right shoot has grown by successive starts (as seen by the divisions) upwards. The little elbow above B is that part of the shoot which was left beyond the *last bud* pinched down to, and often dries up rapidly. Two triple buds appear on the second growth, which are to be carefully left. They will be found in FIG. 2, as developed into two new shoots marked there B and D. But at present the shoot is to be cut back to them, and failing them, to two leaf-buds for wood shoots. Never cut, by any means, to single flower-buds, because there should always be a *leaf-bud at the extremity of every part*, no matter where or of what strength. In a triple bud the central one is a leaf-bud, and the other two flower-buds, and thus it unites every necessary qualification.

The left shoot in FIG. 1 is also seen. The second growth has, or may not have, its two triple buds; most likely it will, because that is the place to look for them, and pinching-in helps much to this important end. Then, higher up, appear the third and fourth growths, the former having a neat little lateral, which is far more likely to be fruitful than a powerful shoot. These latter shoots, called “gourmands” by the French, were the bane of the old systems, and do what you would, if on the upper side they always would come. In vain they were cut back; in vain they were twisted and pinched off; the least neglect produced a vigorous shoot, like a leading branch, just where it should not be. Of course the sap rushed with tenfold violence into these enticing corners, and of course the gardener did not see it, and then, by the winter, the rest of the branch was languid and feeble, and the tree spoilt. But in this system all this is rendered nugatory; there is little or no danger of this occurring. Instead of this giant, we see a neat little fruitful shoot, which, crowned with an appropriate bud, is very like a natural fruit spur.

Leave these alone, and cut down close to them, as seen in FIG. 1. The branch is then, with its short right shoot, ready for wood-bearing or not, as the case requires, and its long left shoot cut for fruit, having a chance thereof at the two triple buds *on the second growth*, and on the neat little lateral before so commended. As the nearer wood is the ripest, if the fruit appear on the triple buds below, so much the better; at any rate there are plenty of chances, because this little lateral, though born, say in August, will probably be quite ripe—at any rate it will be in the orchard-house.



2. FRUIT-SPURS ON THE PEACH—ALTERNATE PRUNING.
SECOND APPEARANCE.

In FIG. 2 we have the same spur A, and on it the same second growth B and C, only B has developed into two long shoots, and these have been successively treated as recommended. In the winter the new development D is cut back to two new buds, generally triple, and its fellow left long for fruit, of which there *must* be a great chance somewhere or other. You can hardly fail now. The left shoot C has borne a peach or nectarine, where the triangle near C indicates its place. After bearing it is cut back, so as to secure new wood.

In succeeding years, by the time the wall is covered, say in four years, all the leaders should have their spurs crowded

with these *long and short shoots*, two, three, and four to each; and as I said before, remembering to have a *leaf-bud at every extremity*, and to keep *half short* for wood, and *half long* for fruit, how can any one fail to have fruitful trees? This is all the care required for the spurs and growths on them, remembering that if the long shoots in summer, from their very length, grow to seven or eight inches long, they have always the corresponding short shoots on the *opposite leaders*; and as these may not extend beyond some five inches, one will fit into the other. At any rate it is of no matter, for after this experience a man must be dull indeed who could not manage to get his wood compact and short somewhere. There is no danger of not having superabundant shoots of all kinds, and you can cut them clean out of the spur whenever you like; besides, they may have grown into two shoots, as many do, immediately from the leader itself, and then you have abundance of room. Let my readers be assured of all this, and practice it fearlessly: "cut boldly and fear not." As Mr. Rivers says of potted trees, "Any one can manage them;" and I daresay any lady could manage a Diagonal Cordon easily and successfully after reading these instructions.

As to the getting the third leader to grow, it is now easily seen; and when the three leaders are fully grown, all that is required is to allow a foot or two of the extremities, as in vines, to grow upwards, and then to bend them downwards gradually, and cut them off in the autumn. This exhausts the superfluous sap, and keeps the upper shoots fruitful. Nevertheless, I must beg to say that it is the lower shoots that are likely to languish first, and therefore they must not be too rigorously pinched in, but rather favored, and rested from time to time. The finest fruit will be *near the top*, which proves the abundance of the sap and juices at that part.

A Belle Beauce peach in my own orchard-house bore thirty-two fine peaches on the leaders A and B, but of course the top of A was not very ripe, and half of B was quite youthful. Reine des Vergers, which bore early in August, had twenty splendid peaches, all on the lower part of A, it being in the

second year. Galande had twenty-eight on a similar part, in spite of the backward season, and the nectarines Early Newington and Hardwicke Seedling (a delicious nectarine), were also very fruitful on this leader A. Malta, Chancellor, Bourdine, and Pucelle de Malines were magnificent, though very young trees. I like Malta by far the best: Noisette calls it his favorite. Leroy, Rivers, and many others speak highly of it; and, being not too vigorous, let me seriously recommend it. It is a September peach, and the one that hangs so well on a tree: no mean quality.

Nectarines, however, and clingstones (Pavie peaches), which come late, and will find their day of triumph in England *before long*, are best suited for the back wall, because they are the most valuable. So prolific is this plan, that I would not recommend the mid-season peaches for it; you can *have them in the pots*. A very early peach, but not the little nutmeg peaches, should be placed in a warm corner, and trained in this way. Acton Scott is scarcely good enough. Early York or Crawford is better, or some of the new American varieties, which before long will be our very best early peaches.

Stanwick nectarines crack, but they have done tolerably well with me this unlucky year. They are really splendid, though they generally require forcing.

I only repeat, to end this chapter: keep to the wood of the second year; and as every shoot which has borne fruit will not again bear, it is well to cut off the shoot which has given fruit *as soon* as it has done so. This is better for the practiced hand to do than for a mere beginner, and should not be done in the early stages of cultivation.

CHAP. VII.

SPIRAL CORDONS.

The training these is essentially the same as that of Diagonal Cordons, because they also have an upper or vigorous

side, and a lower or weak side. If planted in the borders of the orchard-house, and trained round wires, they have an admirable appearance. Twelve inches of interval is also required between the ascending stems, and not less than two trees should be planted to train on the same wires. These Spiral Cordons bear remarkably well, and for pot culture are unrivalled. The sun and air have free access to the open centre; the leaders are kept down, and the spurs on them, with due respect to the outrageous verticals, are easily managed. They should, in the case of pots, be pinched in more closely, as it is difficult then to allow a clear twelve inches of interval. The outgrowing shoots are, of course, not included in this difficulty. Wires are best to train round. When the leaders are fully covered, and your space well filled in, then lower the leaders, and twist them freely round the wires. If in pots, place them close to the glass, but not so as to shade others behind them. If for pear trees, in the open ground, very handsome specimens may be obtained, and really fruitful, only the centre *must* be kept well open. They are very easy to syringe in the orchard-house, as access is easy to the interior parts. I do not think that trees difficult to fruit would do, as some parts are rather in the shade. The free-growing varieties should be selected in preference.

CHAP. VIII.

VERTICAL CORDONS.

Select a straight tree, as before, well furnished with laterals; remove one third of the top, and cut in the laterals to two buds. Should any weakness appear in the lower laterals, cut down to one half of the whole length, because the *lowest stage* must be the longest, and it must be encouraged. Plant in a pot, or in the open ground, or border, as before. In the ensuing summer the two buds on each lateral will develop:

these must all be pinched as soon as six leaves long, to three leaves, then to two leaves, and then to one leaf; but in the lowest stages it is necessary to allow *one leaf more* at each pinching, until that part has a predominance over the rest; in other words, until it has a pyramidal form. Therefore, the lowest spurs all round should be well encouraged, and if disposed to become fruitful, then left as long as possible—*i. e.* hardly pinched at all, and the whole tree kept to the pyramidal form altogether. If the lowest shoots grow freely so much the better; merely pinch them back, according to their vigor, and if laterals grow on these, pinch these to two buds each. The object in view is to obtain a fruitful pyramid in a vertical position, and the pinching is only to obtain this; but as the top grows very freely, it must also be kept under, and occasionally pinched back, according to the vigor of the tree. In this case the amateur will soon know how to proceed. If the Vertical Cordon, however, be destined *as a reserve* for banks in the Diagonal Cordons (and this must be kept in view), then pinch all the shoots pretty equally; but if the lower ones are inclined to become single shoots, then this must not be allowed to be. Endeavor to have these reserve trees regularly supplied with spurs, and two shoots on each; and if a tree obstinately refuse to come to this shape, it had better be rejected as time and patience wasted.

The vertical pyramids must not exceed the diameter of the pot they are to fill (generally a thirteen-inch pot), at their base.

If you plant the Vertical Cordon against pillars in the orchard-house, it need not be pyramidal of course, and this is another use for the potted vertical cordons to supply. Against pillars, with their ends trained up to the rafters or sideways, my own trees are splendid, and they are an amusing variety because you may develop a second stem before and another behind each pillar, and the fruit on the part near the glass will be very fine. These trees will require removal, probably annually, as they grow, to check undue luxuriance. A few ties are all that is required, and they are easy to syringe

and take care of in every way. No strong-growing variety should be planted either in pots or against pillars in the borders. Out of doors Vertical Cordons require very high walls; they are then useful, but unless they have a large number of upright leaders they are apt to grow too freely; and for peaches, there is really no necessity for adopting this form in out-door culture.*

CHAP. IX.

HORIZONTAL CORDONS.

Under this head, for practical purposes in Cordon training, may be ranged all fan-shaped or "palmette" trees on walls; all standard out of doors; and bush trees in pots. Every one knows how to commence the training of these,—how twelve inches are to be left above the soil, and how fan-shaped trees are to be thence carried out. In the case of wall trees, light rods should always guide the young branches, and these should never be brought toward the horizontal line, till well established, otherwise, adieu to the symmetry of the tree,—the lowest stage being too short. But if these trees are trained horizontally, then let the branches be depressed year by year from an angle of 75 to 65 degrees, then 45, and lastly to about 30 degrees. Any approach to the perfect horizontal line is useless, except in the case of two small branches developed from the lowest stage to fill up the lower corners. The Cordon system is equally applicable here,—*i. e.* that part of it which relates to the management of the spurs and shoots.

[* The Vertical and Spiral modes of training trees are admirably adapted to pot culture, and amateurs who are growing fruit trees in this way will be well repaid for their labor, in the superior beauty of vertical or spiral trees, compared with the ordinary bush or no system plan. A little extra care is necessary in the commencement, but their after treatment requires little more attention than when grown without system.—C. M. H.]

As we are now treating of peach trees, of course the upper shoots must be trained like those on the upper sides of the Diagonal leaders, and the lower shoots like those on the lower side of these leaders. The branches to be shortened by one-third yearly, and when older, by one-fourth, and finally by one-sixth of their length; the main stem encouraged fairly to grow. An interval of twelve inches is sufficient between each stage of branches, while, in old methods, eighteen or twenty were needed for the enormous shoots to bear their solitary peach. Of course the crop in fruit ought to be doubled, and would be but for fear of sacrificing the tree.

But how long time it takes to reach the top of a ten or twelve-foot wall we all know well enough, and when there, the tree is beginning to decay. A system valueless for such splendid fruit. For pear trees, which last longer, it will do well enough, but the Diagonal Cordon is far superior, even for peaches under the glass of a forcing peach-house. If then it be desired to reduce peach trees, trained on some queer old method, to the newer plans, the shoots must be pinched in, and cut off by degrees till the spur with two shoots thereon is reached. Then some strong shoots should be selected to fill up the blanks between the branches, and laid in to the wall, being very slightly shortened in the winter. Their laterals should be pinched in to two buds, and with care, the tree will become reorganized in two seasons, *without injuring the crop*; because that shoot which is *to bear the fruit* can be left to bear it, being only pinched off at two leaves beyond the fruit, and cut back *behind* the fruit *immediately* after it is gathered. The other non-bearing shoots may be closely pinched in and cut back, as required. There is not very much difficulty in doing this. After a severe blight this July, I cut off the miserable ends, and refreshed the trees, and brought them well into shape,

As to the treatment of peaches and nectarines in pots, it is easy enough. Treat the spurs and shoots like the Diagonal, only rather more closely pinched in, as there is less room. On the bush tree (like a currant bush), all the branches, say eight

or nine, are full of these spurs, and the treatment of them is easy. At the lowest parts, the short, natural fruit-shoots generally obviate any trouble in this way, which is convenient, because there the branches are, necessarily, near to each other. Of course the upper spurs of bush trees require closer pinching-in than the spurs on the lower sides, and two shoots on each spur are required.

CHAP. X.

CORDON TRAINING IN APRICOT TREES.

The apricot is a magnificent fruit. It probably came from America. Thence it passed into Greece and Italy, and so on to our ungenial climate, and is pretty generally cultivated, capricious as it is in bearing. The apricot does not force very well; it dislikes a confined atmosphere, and succeeds best in breezy situations, with abundance of sun. Indoors it requires great attention in the blooming season, and careful watering at all times, or it is liable, either from this cause or from deficient ventilation, to drop its fruit after setting. De Jonghe considers this to arise from not being grown on its own stock, and this may be the case. The more sun and air apricots have the darker will the fruit be, and the better the flavor. Of all in cultivation, I find the Kaisha the best. Some new varieties, as yet unknown, from Lombardy, promise extremely well.

Diagonal Cordon training is well adapted to produce fine fruit on the apricot. The triple system, with the same intervals between the leaders, is the best suited for this tree. If grown out of doors on espaliers, thick straw palliasses behind the espaliers are necessary until the fruit be half grown, and then removed to give free circulation. But at best, in England, the tree bears only at long intervals. The spring frosts ruin the tender blossoms. It is far best cultivated under

glass, except a few hardy varieties—the names of which are given in the list of trees at the end,—which are useful for preserves, but not very enticing in flavor.

The shoots on the leaders should be pinched to four inches as soon as they are six inches in length, and the successive growths on them pinched to one inch more, as soon as they become two inches long. In winter pruning cut back in order to develop the buds at the base of each shoot, and as these are numerous, and more easily developed than in the case of the peach, there is no difficulty whatever in replacing a shoot as soon as worn out, or unsightly from pruning. The appear-



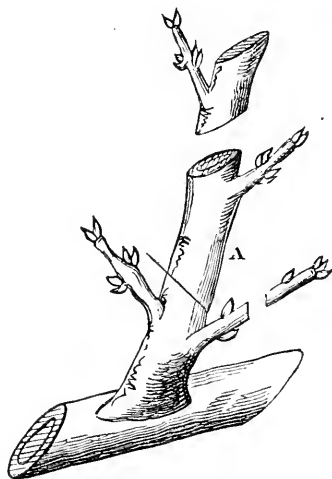
3. FORMATION OF FRUIT-SPURS ON THE APRICOT. FIRST WINTER'S PRUNING.

ance of an apricot shoot at the first winter pruning is like that at FIG. 3. In this figure the shoot is shortened in by one-third; the fruit-buds are seen about half-way up the sides, and the latent buds appear at the bases.

The second growths in FIG. 4, which will eventually grow out from these buds, having the appearance as seen in this last figure, must be left to bear if on the middle of the spur, but the one or two near the base will be full of leaf buds, and must be shortened to two buds to form a succession of shoots. About one-third of the whole shoot is removed at this winter pruning; and the whole length is easily kept with-

in the six inches allowed, because these short laterals will form much of the bearing wood. Remember, however, to shorten some of these, in order to have fruit as near the base as possible.

In FIG. 4, the next winter pruning would be just over the two lowest laterals at A, as the upper shoot would then have become much elongated, and be fruitful. This has in its turn to be shortened, while the lower would have pushed out in one or two places, and so on. One long shoot and one short one, as in the peach, is also an excellent plan, but is not shown



4. FORMATION OF FRUIT-SPURS ON THE APRICOT. SECOND WINTER'S PRUNING.

here to avoid confusion. Do not prune the apricot all at once, as it is a tree liable to gum, and take care the ties are not growing into the bark for the same reason, nor induce plethoric growth by over-feeding the tree.

Horizontal trees are easily grown in this way. Develop two very long branches, stretching at an angle of forty-five degrees on either side. When fully grown, lower them to the horizontal position, and the shoots already allowed to extend from the *upper sides* only, being now vertical, will, in one season more, ascend to a great height; they will make, at the same

time, laterals, which must be pinched in rather closely at first. Pyramidal apricots in pots look very pretty. They are easily grown by continual close summer pinching-in to five or six leaves. The leader, if kept under by several shortenings in, will produce fresh shoots along it. These pyramidal apricots are much recommended by the great authority of Mr. Rivers, and they certainly can be placed very near to each other, say about two feet. If planted in borders they require annual lifting and re-planting, and, of course, not so much water. Apricot trees, trained spirally as half standards, are very pretty and prolific. In some cases this is necessary, in order to get the fruit near the glass.

CHAP. XI.

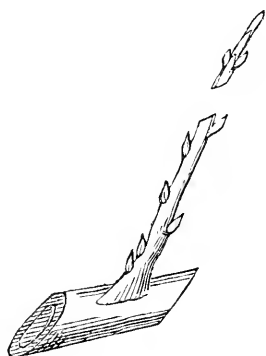
CORDON TRAINING IN PLUMS AND CHERRY TREES.

There were plums in the gardens of Charlemagne. The Reine Claude recalls the memory of the first wife of Francis I.; while the Damascus plum came back to Europe among the Crusaders' baggage. Since these periods this pleasant fruit has daily increased in favor. Nevertheless it is not cultivated so much as it deserves to be. Plums are in season for nearly five months, and are invaluable for kitchen use.

Everyone knows this; but that which everyone does not know is the amazing variety which exists in the present day, and among them are some extremely valuable plums. Amongst them are the Early Prolific (Rivers), the Jefferson, now, however, becoming appreciated, and rivalling the Green Gage (Reine Claude of the French), besides a number of others to be found in the lists of the day. These plums can be kept for some time in muslin bags, and they thus become shrivelled, but luscious in flavor. It is easy, therefore, to

have plums for about five months on the table in some form or other.

As to cultivation in orchard-houses they do admirably, but had better be placed out of doors about June or July, so as to improve their flavor, except in cold climates far north. I recommend the Early Prolific as far superior to the Early Yellow, a French sort, which is early, but a shy bearer; then the Gages; then Jefferson; Reine Claude de Bavay, a standard of perfection; the Quetche; Coe's Late Red; and Hurling's Superb, for orchard-houses. But every one can choose, and hardly go wrong, where the variety is so very great and really good.



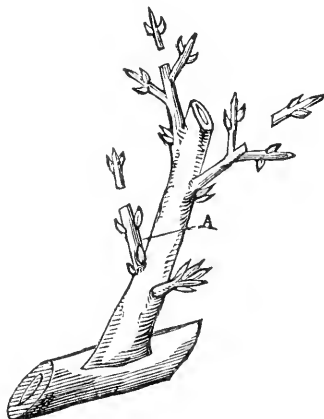
5. FORMATION OF SPURS ON THE PLUM. FIRST WINTER'S PRUNING.

The plum, however, is a coarse feeder, and apt to be very vigorous—too vigorous for fruitful purposes. It must, therefore, be kept in hand. The choice, and not too luxuriant sorts, will suit the Diagonal Cordon; while, for the Horizontal, where there is plenty of room for lateral expansion, select the more vigorous kinds. The plum, contrary to the apricot, improves in flavor from a wall. The treatment of the leaders is as directed for the others, with intervals of twelve inches between them in every case.

In FIG. 5 is seen the young shoot of the plum at the winter's pruning. The top must be shortened in, as in the apricot, by about one-third, keeping it to four inches long. The

pinching-in during the summer is as in the apricot. As soon as six inches long pinch back to four; the next growth (as seen in FIG. 5) pinch to one inch. Pinch the others closely in, as also seen. In the first winter cut back to four inches. During the ensuing summer endeavor to *suppress*, on the shoot, the too vigorous *triple buds*, selecting the *feeble buds* for the work in hand. Never neglect these plum spurs, or they will develop into rank luxuriance, and become unfruitful for several seasons.

If, therefore, a tree be perceived with luxuriant growth on it everywhere, and the extremities waving defiantly in the breeze to the height of some three feet over the wall, which is not unusual, then look for no fruit on any of those parts



6. FORMATION OF FRUITFUL SPURS ON THE PLUM. SECOND WINTER'S PRUNING.

for two years. In fact, they must be cut out, for the spur would become fearfully thick at the base, and compete with the branches for the sap. Then, if cut out, how very trying to the tree is this excision, and what ugly places appear on the branches. Keep, then, those vigorous triple buds suppressed, and work with the weak ones.

Rightly managed, the spur will in a season or two look like that at FIG. 6. This shoot will be shortened to within six inches, *i. e.* the spur will be four in length, and the laterals about two more. In FIG. 6 this is seen. The little lateral

at the top is, say, two inches beyond its parent, and has some neat flower-buds on it. Merely shorten it so as to keep it compact. The next lateral is treated on the same principles, while that below on the left hand is shortened in order to become a future spur, because the buds at that part are naturally leaf-buds, and inclined to extend if cut back to, according to the principles laid down in the beginning, of concentrating the sap into one or two buds. On the other side, the right hand, is seen a group of buds which will be fruitful the next season, and must not be touched, just as in the case of the peach. After the laterals at the top have borne, and the shoot, cut back near the base, has made some other ramifications, then will be time to remove the top and its laterals at A, to let these new shoots take their place, leaving the lowest group of buds alone. Others will also spring up, possibly nearer the base, and so on. There is no difficulty whatever, and it is very easy to keep these spurs within five inches, or even four. Of course, if for a Diagonal Cordon plant, as also apricots, it should be at 36 inches from stem to stem, as in peaches. Above all, avoid all ill-drained soils.

THE CHERRY.

This delicious little fruit, probably the gift of Lucullus to the Italians, requires very free ventilation if kept under glass, and only a few varieties are worthy of this care, except in places where birds abound. The very earliest is the Belle d'Orleans, and, as such, is suitable for orchard-houses. The Duke tribe are splendid, and the New Royal is highly spoken of. I have not seen it. Some late kinds are useful to keep, if there is space for them in the house, and they can be kept in muslin bags. The treatment of the spurs is like plums, and very easy, because the groups of round flower-buds soon form at the base, and by pinching freely in can be kept fruitful. It is a capital plan to *break* the shoots instead of *cutting* them; and as cherry shoots grow very freely, they must not be overlooked: if so, then it is best to break them *partially through*, and let the broken ends shrivel up before cutting

them off. If grown as bushes in the house, spur them in *more closely*, and shorten the branches freely. A damp situation is quite unsuitable for a good cherry tree, and they require calcareous matter in the soil. As to Morello cherries, it is a waste of time and labor to grow them on north walls—better leave them to the birds; while if placed in a fair position, this sort will rival many of the others.

I find cherries do remarkably well as Diagonal Cordons, and they do not, as I feared, grow too strongly to be treated in this way.

I have a high south wall of these cherries intermingled with good plums, and they look very promising, all on the Diagonal plan. Some of my best are the Duchess of Pallau, a new and splendid variety, as a fan-shaped Cordon, and an Early Black, extremely well grown, because the branches, with the addition of a guiding rod, will grow as straight as pipe sticks, and look magnificent. Pyramidal bushes in pots are very handsome. As soon as four leaves appear on the shoots, pinch in to three, and *favor the development* of the base, but not so as to exceed the diameter of the pot.

CHAP. XII.

CORDON TRAINING IN PEAR TREES.

This most valuable fruit is a general favorite, and requires a somewhat peculiar treatment, because it differs from the preceding, especially from the peach, in this important particular, that as soon as a fruitful spur is formed, there is no necessity to *renew it*,—it will last as long as the tree, with due care. No alternation of bearing wood is here needed, as in the peach, and therefore it is the basis of a quite different treatment, which is also applicable to the apple.

The pear, however, resembles the peach and nectarine in this respect: that it is equally suited for the various forms of

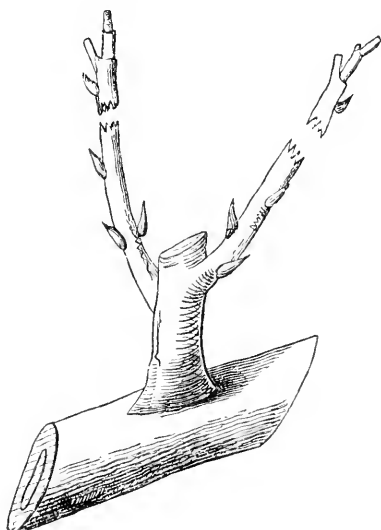
Cordon training, and thrives best on the Diagonal plan. In fact, there is really no other way of managing it, and the forms in use are based on the same principles, only misunderstood; and this is the reason that pear trees bear well in many localities, although our continental neighbors will not believe it. The pear so naturally follows the system described here, that it leads the pruner into it, do what he will.

Many objections, too, having little real force in the case of the peach, have none whatever in the case of the pear.

It is a curious fact, that though the pear is confessedly a most valuable fruit, and one so generally cultivated, its real history is the least clearly ascertained. There is a quaint tradition that the Sabines planted the Rousselet pear, on what occasion is not said. The loss of their wives and daughters would hardly be a suitable time for pear planting, unless it was intended to console lost fair ones by reminiscences of home, and "perry;" for this ancient beverage is clearly alluded to by Pliny, who calls it "excellent." From the Sabines we ascend through the dark ages, unilluminated by horticulture, to that period when St. Martin, the good bishop of Tours, had the honor of having a pear named the "Bon Chrétien," as a reward for his virtues. This is about all that is really known about the history of this fruit.

The pear accommodates itself to almost any shape, and thus to describe and to practise Cordon training is equally simple. Choose for a Diagonal Cordon, young and straight trees, *of equal vigor*, one year old from the graft, and, in November or later, lay them in against the wall, just as in peaches, at the same intervals,—and also, the first year, at 60 or 70 degrees of inclination. But do not, as in the case of peaches, cut off the laterals to two buds at planting, as the pear requires all its foliage for the first year. Merely take off one quarter of the extremities of the laterals. During the ensuing summer encourage the growth of the leader, and pinch in a little of the new wood on the laterals to equalize their vigor. In October cut these laterals in to two buds, and reduce the length of the leader by one-third, above a healthy front bud.

The next summer, these two buds, on each lateral, or spur now, will develop themselves. As soon as these new shoots have reached six inches in length, pinch them back to four inches, or about eight or nine leaves. The next growths pinch back to one inch more, and so on. Any short shoots near the base which spring out, or any that make their terminal buds under four inches in length, must not be touched, as they are becoming fruitful *of themselves* from being near the leaders, which shows how natural this system is. Pinch so as to leave as much of wood *above* the last bud left as you

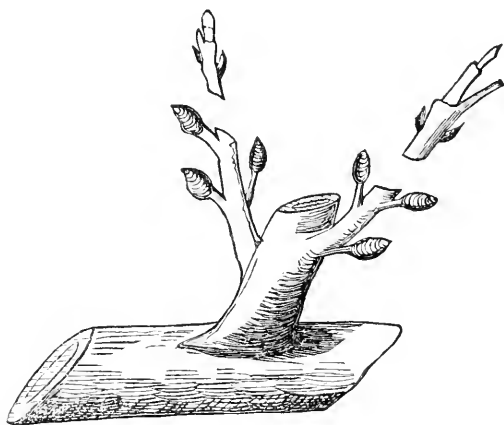


7. FORMATION OF FRUITFUL SPURS ON THE PEAR. COMMENCEMENT.

can, because this exhausts the sap, in drying it up, and the buds below have a greater chance of being left dormant, that is, not "stimulated to elongate," as Lindley says. The young shoots must not be allowed to grow till they are, say, ten inches long, instead of six inches. If they have been thus unwisely neglected, then it is too late to pinch in. If you did, some of the buds at the end would break out into short laterals, just what is undesirable. If, however, they have reached to ten or twelve inches unperceived, then bend

them backwards, and twist them into a knot. This checks further growth, and they can be cut back in the winter. If they are very vigorous shoots, from the tree being of a powerfully growing kind, or from the shoots themselves being in a vertical (a most dangerous) position, then the evil is much greater.

You must partially break them through, about half way, and in addition pinch off the ends of the rampant shoots, and let them hang thus, and shrivel up, till the winter pruning; and even then, probably, a season will be lost before fruit ap-



8. FORMATION OF FRUITFUL SPURS ON THE PEAR. COMPLETION.

pears at that spot. In the case of Diagonal Cordon training against walls, all forerights must also be preserved. The leader will soon reach eight or ten feet, and can, in the winter pruning, be lowered to 45 degrees, there to remain in future. As in peaches, a strong lateral shoot having been reserved to form the second leader, which is also, of course, twelve inches distant, it will be shortened-in a little, and so ready to be bent upwards as the second leader next summer. In fact, the principles for forming a Diagonal Cordon, with triple leaders, are similar to those in the peach, with the *marked exception* of the treatment of the spurs. In the winter pruning of these spurs, and the two shoots on each, which

having been several times pinched in, look like FIG. 7, they must now be *broken*, not *cut* at four inches. The original spurs add an inch or so to the total length, but it will always be easy to keep the shoots and spurs under six inches. Some of the shoots may have less than the three buds shown, which is of no consequence, for one fruitful bud is enough on each shoot. At the completion of the pruning (see FIG. 8), when in winter, the ends are finally to be *cut off*,—not *broken* now, as in FIG. 7, where the object is different. When the ends are finally cut off, as seen, then nothing remains to be done, for the buds will have that appearance of protuberance and roundness that they can no longer be mistaken. They are to remain, therefore, on the shoots, one, two, or three, but never more.

The three leaders will shortly be completed, and the wall look remarkably well. An immense saving of time is gained in this way. There are other irregular forms to be met with among the spurs, but they cannot be entered into in so brief a work as this is. I will therefore only add, that as soon as a pear has been produced on a shoot, cut off the pulpy part to which it held; but only cut off the *extremity*, otherwise the latent buds, for other seasons, will be destroyed.

CHAP. XIII.

HORIZONTAL, VERTICAL, AND SPIRAL CORDONS IN PEAR TREES.

In all of these, the spurs are managed exactly as before described. The Vertical Cordon may have the shape described in the Miniature Fruit Garden, page 17; *i. e.* it may have five leaders trained upwards. Trees on this mode bear very well. It is recommended by Mr. Rivers. The distances and spurs may be as described in the Diagonal Cordon. A great variety of fruits is obtainable in this way,—no small advantage.

Spiral Cordons are treated in the same way as to spurs and distances. Three trees together may thus be grown (each on a single Cordon), if so wished, because the length of the spiral neutralizes the otherwise too great growth. Or one tree with three leaders may be trained thus. Most handsome and prolific trees they will be, and very amusing to watch. They are also very suitable for small gardens, as standards. Indeed, there is no better form in this case.

Standard pear trees require some peculiar variations in their treatment. The shoots which are *nearest* to the main stem, and on the branches, will be generally weak, and should not be interfered with, as they are almost sure to become fruitful in time. The next on the branch, *higher up*, if under four inches in length, should also not be interfered with; but those on the highest portions of the branches will always grow freely, because the sap flows thither vigorously.

That mode, which is the same in principle, of bending the branches towards each other, is also a good way of checking a vigorous tree; but with a weak-growing tree it is useless. Moreover, the ends of the branches thus bent should be let loose in time, or they will dry up, and the vertical spurs must be closely watched.

Horizontal, or fan-shaped pear trees, are trained on these same principles. The lowest stage of branches must not be lowered too soon, as before said.

These must be pinched to four buds, and the further growths each to one bud more. In the winter they must be *broken* at three buds. The *very strong* shoots should be only partially broken through, instead of pinching them off, and broken off *quite* at the winter pruning. The horizontal shoots are more fruit-bearing than the vertical. These last are annoying, and grow fast; of course there are no spurs with two shoots on them, as in wall cordons, but each spur is a single one.

The maximum of inclination of any branch from the main stem is seventy degrees. As the tree grows, shorten the leaders each winter, and the leading side branches by one-third.

then by one-fourth, and finally, by one-sixth of their length ; so that the tree should grow in a pyramidal form, and the lower stages be *always longer* than those above them. This golden rule is too often neglected ; but the tree should not be allowed to become pillar-like by letting the leaders be too long, or by dwarfing the lowest stage of branches.

The following brief notes on training Pyramid standards were made by me at Angers:—

1st year of planting. Plant in November, and trim off one-quarter of the side branches only.

2d year of planting, 1st of training. Leave twelve inches of stem ; select six buds for branches and one for a leader. Cut the branches close in to the stem, but not too near. The tree now looks like a walking-stick.

3d year of plantation, 2d of training. The first stage of six branches will develop itself, and allowing an interval of twelve inches, six more buds for the second stage of branches must be chosen, and one to continue the leader. Incise semi-circularly *over* the three lowest eyes to check the sap, and develop them. Pinch in, and break in winter the laterals on the first or lowest stage of branches, now pretty long ; keep them much longer than the second stage.

4th year of plantation, 3d of training. Allow twelve inches more of interval for a third stage. The 2d stage will now progress ; continue the leader vigorously upwards. Pinch laterals on the 1st and 2d stage to four buds, and break in winter to three buds. One half of the new wood on lowest stage must now be cut off.

5th year of plantation, 4th of training. Another interval ; another stage. One-sixth only of the new wood on lowest stage should now be cut off. Regulate the upper stages from this one, and, tapering upwards, ascend to thirty feet by six feet at the base. Manure no deeper than three inches,—*i. e.* old litter lightly forked in,—and do not disturb the upper soil more than is needed for weeding, &c. Mulch in July, *after* the ground has become heated, but *never before*. Graft pears in August.

As to apples, the treatment is similar to that recommended for pears. Bushes are the best form, with branches connected with their neighbors. These bushes should be at intervals of four feet.

CHAP. XIV.

REMARKS ON TREES IN POTS.

THE Cordon system, in its various forms, is admirably adapted for potted trees.* My own trees in pots have succeeded admirably, and there really seems no other way of treating them. The only real difficulty I have ever experienced in Orchard-house culture, has been to keep away the red spider.† The green aphid, when neglected in the spring, has sometimes destroyed the fruit of whole trees, with the ends of the young shoots. But as this did not form a part of the Cordon system it produced confusion in every part. But there is a remedy. The green fly is easily destroyed by mixing two ounces of tobacco in a quart of boiling water, and when cool, gently brushing the leaves *upwards* with a soft brush dipped in the infusion. The blue aphid on the plum, and the dreadful black on the cherry, are to be similarly welcomed. The brown aphid feeds on the young shoots of peaches in early

* See pages 54, 55, and 56, Orchard-House; by Mr. Rivers.

[† We are a little surprised at this confession of Mr. Bréhan. That the red spider is a pest to the cultivator, we must frankly admit; and in ignorant hands difficult to eradicate. But after all, it is no great terror to a skilful man. It is quite as easily got rid of as the green fly, and of the two insects the latter, on some plants, is the most troublesome. One single fumigation with sulphur, *carefully* done, will destroy every red spider, or a dose of whale oil soap will effectually clean the plants. The proportions of the soap mixture are *one pound* of soap to *six gallons* of water, using *hot* water to dissolve the soap, and diluting with cool water. The sulphur should be *fumed* on a warm flue, *not burned*, and six pounds may be used in this way, in an ordinary-sized house, without any injury to the plants. As to destroying the red spider by syringing with water, there is no such thing; it will keep them in check, but nothing more. We have known many gardeners to insist upon this, but we never saw them accomplish anything.—C. M. H.]

winter, and must be dealt with in like manner. But all these fade into insignificance when compared to the pest of the house, the red spider. This dangerous foe requires early attention. A small magnifying glass will discover it, like a grain of red sand, slowly walking over the under side of the leaves. But, after a little sad practice, one glance at the yellow spots on the upper surface of the leaf is enough. This disaster arises generally from confined and heated air, and insufficient syringing. Indeed I found that near the ventilators,—I mean those at the top, where the air is rarified by its ascent,—and at the very lowest parts of the stems, where it was difficult to apply the syringe, and behind even a slight pillar, three inches in thickness, which screened a few leaves from the shower of water,—in these *three places alone*, did the red spider first come, and was so rigidly syringed down that he made little further progress. But the Gishurst compound is an excellent cure, and not dear to purchase, say two ounces per gallon of *rain water*. Syringe the afflicted parts well; or, I should say, *under* them, because it is often by syringing above the leaves in a graceful manner that the only efficient way of watering the under portions, *where the insects are*, is neglected. With these precautions, and avoiding this sprinkling when the sun is on the leaves, (so as not to burn them into holes,) the amateur may be at peace.

I always followed Mr. Rivers's directions in planting pretty closely, and wish now to add, that it is of much importance to pot early, even just as the leaves are falling, because the trees are less checked. In October and November, then, let the bush or pyramid trees, &c., be potted very firmly with plenty of drainage and calcareous matter, good loam and very old manure. The whole should be firmly beaten into the pots, and some loose manure suffered to lie on the surface. Then give a good watering or two, and let them rest without water, unless the roots shrivel during the winter months. The orchard-house is then supposed to be gay with chrysanthemums for which it is extremely well adapted. Range the trees neatly side by side at the lower end of the

house, and by elevating a row or two of the flowers, they may hardly be seen. Ventilate in fine weather, but shut up in frosty and windy days. As to the trees which have borne during the past year, the amateur will know how to manage them; that is, the roots which have penetrated through the five holes—the best number—at the bottom of each pot, must be cut off, and five or six inches deep of the old soil being neatly picked out of the pots, to about four inches of the edges, fresh good loam and manure must be added. By no means let the trees be taken out of the pots, as ignorant gardeners will be sure to advise. Soak once or twice with water, and place the trees with the others to rest. In cold localities the house must be well shut up when the weather is severe; and should the temperature sink below zero, then some dry hay among the pots or round them, and over their surfaces, will be very useful.

As February comes, place the trees three feet apart from stem to stem in their places. A house of thirty feet will hold at least thirty fine trees. I have many more, but these are pyramidal or slender Cordons, and take far less room than the bush trees. Therefore the amateur must be guided by circumstances, as he can always remove superfluous trees in July out of doors to make room for the rest.* Some of the fruit-bearing bushes may also be placed close to a warm wall, between the wall trees, to ripen their fruits, which they will do a week or two later than if kept in-doors. I found the

[* In our warmer climate, and brilliant sun, the trees may be removed to the open air the 10th of June, where peaches more particularly will only acquire any flavor. A peach grown in an orchard-house, unless the sashes are wholly removed in June, is worthless, only to look at; flavor it has little or none. Perhaps plums and nectarines had better remain in until all danger of the eurenlio is over, when they should be exposed to the open air, choosing, as Mr. Brehaut advises, a sheltered place where the wind will not shake the trees or bruise the fruit. Every tree left in the house is done at the sacrifice of *quality*, though the beauty and size of the fruit may be enhanced. In September, when high winds often occur, it may be well to remove pears back to the house to prevent the loss of the fruit.

Though most American cultivators know the character of the climate of Great Britain, it may be well to remind them of the great difference, by a brief statement of the temperature of July, as compared with our own. The data are

fruit smaller in size, but generally finer in color. By March all pruning must be over as before directed, and watering, except in severe frosts, begin. Ventilate in mild or sunny weather, but let the house be closed up in windy weather, or at night. Changes of temperature or high winds are now fatal to the blossoms, and the trees look most beautiful. A handsome orchard-house of great length will look extremely like a well-filled conservatory at this period; the various-colored blossoms making a gay and cheerful appearance, all the more precious because of the coldness of the out-door weather. But on sunny days, with the ventilation then needed, the air will soon be heated by some 10 degrees, and be refreshing to the invalid, resembling that of a southern climate.

Having spent many winters in the south, I can answer for the resemblance in the dry and fragrant temperature; perhaps the less we talk about the latter quality in the south the better, except among the orange and lemon trees. I can imagine nothing more refreshing than for a studious man to have a long walk like this opening out of his study. Every time he raises his eyes he is delighted with the lovely view, and when, unable to resist the temptation, he arises and strolls through his young trees, all so familiar to him, how can he refrain from being thankful for such precious gifts! A house 100 feet long will furnish him, in its two paths and extremities, with 250 feet of space for exercise, unexposed to the weather, and from which he cannot but return to his labors much strengthened and revived. These young trees are highly suggestive. In their growth, in their production, in their rest, and in their decay, they are all potent images of our own harassing career, and of its final close.

taken from a table kept at the London Horticultural Society's Garden at Chiswick:—

The night temperature varies from 36° to 52°, and the day temperature from 66° to 80°, rarely more than 72°.

In our climate the night temperature varies from 50° to 75°, and the day temperature from 70° to 100°.

In fact many of the nights of July are as cool as with us in April, when a fire is required in our early graperies.—C. M. H.]

When the young trees are in bloom they require much care—they should be well watered,* or the fruit will not set, and a gentle shaking will tend to facilitate this important operation. A rather high and constant temperature is also now very necessary. When, about the end of April, the fruit begins to “make its first swell,” (as gardeners say), begin to syringe but gently, and under the leaves only, and do not neglect to water the trees, especially in warm weather. Ventilation is now of great importance, and, in May, all these cares are doubly needed. Worsted netting will diminish draughts, and keep out sooty particles, so that orchard-houses, by this simple precaution, succeed admirably in large towns. The summer pinching-in of the young shoots on the spurs will now have fairly commenced, and the amateur be in full career, as this is an important period.

Syringing early, say before 8 o'clock,—and late, after 6 o'clock in the evening, when there is little sun to hurt,—must now be carefully attended to, under penalty of insects' tyranny. Trees three years old require two or three quarts of water at a time, and I find it far better (as indeed it is in the case with flowers), to *soak them occasionally* than to sprinkle the surface daily. Trees seven or eight years old require one gallon of water at a time,—thus a good garden engine is very useful and saves time. Trees in the borders of course require less water, but they should be soaked when it is done.

By the time June comes, the fruit will be getting large, and syringing be required vigorously. There is now no danger of shaking down the young fruits. Some plums can be put out of doors, and some apricots also, but not unless so needed from want of room. Every care must be given to ventilate the house *by night* and by day, or the worst consequences will follow. The potted trees should be lifted up once this month, and once in July, to check the luxuriance of the roots getting into the borders. Plenty of watering and syringing in July, and fresh compost placed on the surface of

* No syringing is here meant.

the pots, to be washed in by the daily waterings. July or August is the best time for removing trees for fruiting in the open air, as the season is most propitious for them; and after having been prepared by the two previous breakings-off of the roots, (when lifted, as before directed), they suffer no check, and the fruit is of a suitable size for being completely ripened. Some trees can be placed near a west wall to retard them by a fortnight, so as to have a succession of fruits. When the windy autumn comes, care must be taken not to let the ripe fruits be shaken off by gusts of wind. Ventilators to leeward are then invaluable. When October and November return, the potting of new trees (to increase the stock or as a reserve), and the renewing of the top soil of the older trees, takes place. This is a busy time, and should be carefully attended to. Unless watched, servants will not take sufficient care, either in syringing, ventilation, or potting, the three most important duties of the orchard-house.

This is, in fact, the *only real drawback* to the success of the matter. No one can fail if he attend to these particulars, but wherever you read of failures it is caused by some prejudiced domestic or inattentive master. I find 13-inch pots the most useful size; but trees, in 18-inch pots, are extremely enticing to cultivate. Of course the rows nearest to the lower portions of the house must be bush trees, with open centres; then should come handsome spiral Cordons of all kinds, and, in the higher rows, pyramidal apricots or peaches; and, if a lean-to, Diagonal Cordons on the wall.

Trees in pots bear very well; the branches should not be pinched back too abruptly, but allowed to elongate much farther than they will ultimately be cut down to in the winter. If the ends are too closely pinched in, then the lateral shoots will grow too fast; and if these too be also shortened, the tree may be unduly dwarfed. Neither, on the other hand, should a rank luxuriant growth be encouraged, by allowing too great length in fast-growing sorts, or by stimulating the roots by excess of water, and too large supplies of manure, because these trees will not readily bear under these

conditions, and if once they get into the habit of thus extending, it is surprising how difficult it is to keep them under in pots.

But with ordinary skill, and the attention required to the common things of life, there need be no apprehension entertained of failure in pot cultivation of fruit trees. There is an annual crop of feeding roots from above, and one from below, and if unpruned, these last would descend into the border, and thence draw too potent nourishment. Lifting the trees in June and in July prevents all this. If the trees be in borders, then annual removal (which is less severe, whatever may be said, than biennial,) has the same effect. The roots are kept compact, and a healthy development of spongi-oles induced close to the root stem.

CHAP. XV.

HOW TO SUPPLY BLANK SPACES IN CORDONS.

It will occasionally happen that, in spite of every care, blank spaces will appear on the leaders of the various kinds of Cordons. These occasion the only disfigurement possible in the whole system, unless in the case of severe blight out of doors, which calamity is common to all kinds of training, and, therefore, requires a remedy, which is, fortunately, simple and efficacious. Wherever, then, a whole spur has died off, or been destroyed by accident, one of the shoots of the spur immediately below this spot should be allowed to grow to twelve or fifteen inches in length. It will do so by mid-summer, or at least by the beginning of August, during which period is the proper time for applying it to fill up the vacant space.

It is done thus. See that this shoot fit flatly and neatly to the spot on which it is desirable it should ultimately grow,

and having marked lightly the *boundaries* of the proposed excisions and incisions, which are to be $1\frac{3}{4}$ inches in length, both on the shoot and on the leader: the succeeding process resembles budding roses. For a cut $1\frac{3}{4}$ inches long being made lengthwise through the bark of the leader, two more transverse cuts are next made through the bark, one at either end of the first cut. Take care not to cut too deeply, and do not lacerate any part, or the place where the descending fibres of the new roots are to be will be ruined. Carefully then lift up the bark and make it thus ready, as in budding roses, to receive the new shoot under the bark. This shoot, having been marked where it is to meet the opened bark, must be now operated upon. A slice is to be scooped out of it, cleanly and neatly, $1\frac{3}{4}$ inches long, and the shoot must then be neatly slipped into the orifice, and under the bark of the leader.

I must not omit here to state that a bud must have been managed to be left in the side of this shoot, which is just *opposite* to the sliced-out part, so that when it has been slipped into its place under the bark, this bud shall appear protruding, exactly as in budding roses. Proceed then with white worsted to bind carefully round all the parts operated on, *leaving out the bud*, and bind the shoot into the leader. By this means you will exclude all the air. If neatly done it will surely succeed. All which I did last year succeeded, and were so firmly united that they bore fruit, but did not ripen it.

In the ensuing spring, the ligatures being removed, the shoot will be found united, inarched in fact, into the leader. Then divide the shoot, just behind and under where it is growing into the leader, leaving it there as a new spur, while the remaining portion, *still attached* to the lower spur, is bent back to its former position, and cut back to two buds, as required. Thus there is a new spur gained, without loss to that from which it was supplied. In this way all blank spaces are readily filled up. Should, however, any one be desirous of budding to fill up this blank, then let a triple bud be selected; but it is, at best, a hazardous experiment, except

on very young wood, while the plan recommended is far safer and quite as easily executed. This method is much in use in France, and called there "greffe par approche herbacée." A neat illustration can be seen in M. Dubreuil's work, at page 7, ed. 1857.

CHAP. XVI.

OBJECTIONS TO CORDON TRAINING ANSWERED.

The first objection to Cordon training seems to be its apparently artificial form, by which the tree, being closely spurred in during the summer, is more rapidly exhausted and its duration diminished. You hear people after passing by the Cordon trees with "faint praise grudgingly given," even to visible results, come at last to some other specimen, trained on obsolete systems, and exclaim, "Ah! this looks like a tree." A sigh of relief at their torture being now over, proves the sincerity of their present words. How often has it been my fate to hear such observations, not from prejudiced and ignorant men, but from otherwise well-informed people. I really think that in this, as in many other cases by the bye, that the fairer half of the creation has shown a higher discernment. It is truly astonishing how soon intelligent ladies will surpass us in horticultural pursuits; and, no doubt, the day is at hand when the *soi-disant* lords of the creation will surrender the management of their orchard-houses to the more enterprising management, certainly to the more patient investigation of causes and results—of their help-mates. They at least have generally taken on trust what they did not immediately apprehend; and at the end of the season been able to rejoice in their decision.

But in the case immediately referred to, all experience, as yet, proves that no exhaustion of the trees, nor shortening of their lives, takes place. And if it did, the remedy is so obvi-

ous and so cheap as to make this objection futile ; for as long as half-a-dozen trees in pots can supply a reserve, nothing further need in reality be urged. Still it must be added, that if excessive production be the cause of the destruction of the trees after a certain number of years, then this is by no means an unpleasant occurrence, for the fact is, that they at present bear very little in proportion to the time and labor devoted to them. But how long it will take to exhaust the trees is not confidently stated by any one ; and for this excellent reason, that no trees have as yet been exhausted after fifteen years' trial, nor are any cases likely to occur for a longer time.

When we consider the "fast habits" of the present day, it would seem strange if trees did not partake of the general rapidity of circulation ; and no doubt a "fast nectarine" has good cause to look back at its "slow but not sure" rivals toiling painfully up the walls.

In the case, too, of horizontal Cordons and standard pear trees this objection does not apply, for these are the slowest portions of the system, and by no means the most productive.

But the next objection is of a widely different character. Now it is argued that the sap of the tree, far from exhausting the whole, will, by being kept within undue bounds, act with such vigor on the shoots, that they must become elongated or wood shoots, and bear no fruit, especially in our moist climates.

To this it is answered, that in the dry atmosphere of the orchard-house no such result need be apprehended ; while in the case of trees in the open ground against walls, the growth of the leaders depends mainly on the powers of the roots, and these are greatly checked in their lateral expansion by the nearness of their neighbors. At the most, thirty-six inches is but a limited space for roots of trees to expand laterally. Again, root pruning, or annual lifting, is quite as easy of application to any cordon tree as it is to other trees ; nay, easier, for many reasons.

Besides, any gardener knows, that by allowing a foot or two of the leaders to grow beyond the wall, and thus exhaust the superabundant sap by gradually bending these downwards, and shortening them in the autumn, these things greatly tend to keep the balance of growth preserved. The borders of any trees should be well drained; the trees should not be stimulated with too rich materials, and any protection to ward off the heavy autumnal rains by a broad coping (such as the old monks always had on their walls) at the summit, and some planks sloping over the border,—these last being also of a good slope. With such precautions, indispensable under any system whatever, there is no ground for such fears.

It is also for this reason chiefly, that triple Cordons are recommended by me, having tried the single ones previously. These last succeed well in France; and if any one will reflect that a Diagonal Cordon tree, with three leaders, will, on a fair wall, cover about sixty square feet, why should it be less likely to bear than another tree nine feet in extension by seven in height, which contains sixty-three square feet only? In the latter case everyone knows that a tree of this kind can, and will produce some five dozen peaches yearly; but in the case of my own Diagonal Cordons (under glass, it is true), they produced at the rate of 150 or more peaches on the same space. As to pear trees on this plan, I am convinced that they will succeed admirably, all conditions for success being duly observed. I have none whatever under glass, because the climate of Guernsey, where I reside, does not require this; but neither does it in any part of England, except far north. Out of doors I have this year some fine specimens of fruit, although many of my pear trees are much younger than the peach trees.

CHAP. XVII.

REMARKS ON THE DIMENSIONS, ETC., SUITABLE FOR ORCHARD-HOUSES.

Although a number of these interesting structures are now in full work, and are becoming more known daily, as may be seen from the number of inquiries made respecting my own, and those of others, perhaps a few remarks on their dimensions and form may not be out of place. A lean-to orchard-house, thirty feet long, should be thirteen feet wide. If the back wall be twelve feet high, that is ample; and the front should be about four or five feet high, but not more. Shutters from twelve to fifteen inches in width all along the front, which is conveniently made of half-inch boards, and about half of the same quantity of ventilation at the back, are required. Glass ventilators, swinging on pivots, instead of wooden ones, are more expensive, but where this is of no consequence, much preferable. Such a house need not cost thirty pounds.

A lean-to house, 100 feet long or more, with walls fifteen feet high, and eighteen or twenty feet wide, would be magnificent, and have a double walk—one near the wall trees, and one near the front row. In the smaller lean-to, which is only thirteen feet wide, one walk only is permissible, and that may be where you please; but near the wall trees is best, as it gives more head-room, and enables you to attend to the wall trees better. To do this, a small ladder six feet high, and exactly twelve inches in breadth, (in order to slip between the spurs,) is requisite.

A small span-roofed house should be fourteen feet wide, five feet high at the sides, and nine feet high to the ridge. One centre walk leads between two rows of potted trees on either hand, the smaller trees, of course, nearest to the sides.

A house thirty feet by fourteen costs about thirty pounds. Larger houses are twenty feet wide, sides about five feet high, height to the ridge about ten feet; the paths, two in number,

must be two and a half feet wide. The trees are placed on raised beds, bricked in: these beds, at the sides, should be four feet wide and fifteen inches high; but in the central bed, (there are three beds in all,) somewhat higher and one-third broader. Here can be grown fine pyramidal apricots and plums; pears of choice kinds, and cherries, &c.

One of Mr. Rivers's last and best is 100 feet long by 24, and twelve feet high in the centre by five and a quarter feet at the sides. It is glazed at either end, and the roof is supported by seven light iron pillars, the rafters being light. There is a central border, and two paths, but none of the borders are raised, which I prefer.

These large houses should stand endwise N. E. and S. W.; for if placed N.W. and S.E. some parts are in shade. Nothing can well be finer than these large span-roofed houses; they are most ornamental and productive.*

CHAP. XVIII.

NAMES OF SOME VARIETIES RECOMMENDED FOR IN-DOOR AND OUT-DOOR CULTURE.

In the orchard-house, the Red Masculine (*Abricot précoce*) is a small round-shaped apricot, pale, and musky in flavor. It ripens about the beginning of July, or even earlier in hot seasons. The Large Early (*Gros précoce d'Esperen*) follows it. It is larger, but not richer in flavor. I have some new varieties from Lombardy, one in particular, large and very early, is far superior to either of these. Then comes the

[* These are very suitable dimensions for orchard-houses. In our climate, we should, as a rule, recommend span-roofs, as they are more easily ventilated, and are not so hot as lean-to houses. As we have so much more sunlight than they have in Great Britain, a position running anywhere between north and south and east and west will do, according to the convenience or position of the garden or grounds.—C. M. H.]

valuable Kaisha, the Syrian importation, which is a most valuable variety—small, but well flavored—sugary, and it is also prolific. Then the Moorpark, a week later, takes you into the middle of August. The Apricot peach closes the list of really useful sorts, though you may add many more, as Beaugé, a capital late variety of the Apricot peach; and if an early sort be required, there are the Musch or the Viard to choose between.

Peaches for the Orchard-house.—Here the variety is large, but in reality only a certain number need be cultivated. In countries where the peach bears tolerably out of doors, then the *very early* and the *very late* sorts should be selected, although, as was truly said to me the other day, “If you have magnificent Royal George peaches out of doors, you may have the same sort a fortnight earlier in the house, and so the whole crop will not ripen at one time.”

Now, this is a real advantage, as every peach-grower knows, for I have literally found them fall by scores from my trees during the night, and been obliged to let them perish, they were so bruised and so common. Nets, in this case, should be spread 18 inches above the ground to catch them.

But this is ridiculous cultivation, and similar to that in the west of Canada, where, in the peach orchards, the pigs devour the greater part of the fruit beneath the standard trees. So, our object should rather be—“not so much, but better.”

In the orchard-house, then, the first fruit is the Red Nutmeg, (*Avant Pêche rouge*,) which is a singularly small peach, ripe in July. Then the Early York, an American novelty, is highly spoken of—Mr. Rivers considers it excellent. Then the Acton Scott, an intermarriage between Noblesse and Red Nutmeg. Such are the absurd names given to these fruits. But Acton Scott is useful for early exhibitions; and though a pale, medium-sized peach, will probably yet hold its ground.

The Petite Mignonne comes next, a capital variety, and to connoisseurs, the best early peach. It is rare, however, and is succeeded by the Old Grosse Mignonne, which every one

speaks so much of; but I cannot say much for it, as it is every one's duty to speak the truth; and then the mid-season peaches. Noblesse is a well-known kind to the visitors of Covent Garden. Choose the Sulhampstead variety of this, it being *by far* the best, and the hardiest for the open wall, and also forces well. Then the Reine des Vergers, a very good peach (mine ripened early in August this year); then Royal George and Red Magdalen—two old friends found in every old garden.

After these come the Malta, that excellent peach. Noisette, no mean judge calls it "his favorite;" and mine this year, even the smallest, were nine inches in circumference. Besides, the Malta peach will hang on the tree without falling, an excellent quality in any fruit. It will also be the best to send to your friends at a distance, because it bears carriage the best of any.

Then you may have the Chancellor peach; Rivers and Leroy of Angers call it "excellent," though MacEwen calls it "ugly." It is a long, almond-shaped peach—rather bitter, but otherwise curious, and good. Mine this year were very fine. Then Barrington; then Bourdine, all September peaches, but in the orchard-house rather earlier; then Walburton Admirable, that noble kind, and Desse Tardive—a most beautiful, yellow-colored, large variety. I have Bellegarde, (Noire de Montreuil,) which the French rave about. It is excellent, but not first-rate under glass, nor Belle Bauce.

Belle de Vitry ripened in September. It is a staple of the Montreuil gardens for the Paris market with Bellegarde,—and I prefer it,—but the tree is very vigorous, and may exceed your powers to keep it under. Mr. Rivers does not notice it in his catalogue, and you can do without it. Then there are the Pavie or clingstone peaches; of which I can only say, that they who make trial of them will discover something worth their labor. My own this year are very fine; but I cannot retard them as I hoped. Pavie de Tonneux, "fruit magnifique," (as Leroy says,) ripens a month earlier than was desirable; but is a noble peach.

Many others the amateur will see in catalogues, and will, in time, choose for himself. For the present, I content myself with stating what I have found very good. I must not omit, however, *Pourprée Hâtive*. If you can get it true it is of a most vinous flavor, and *Admirable Jaune*, a capital peach—yellow—and common at Angers in September. I have three trees of this kind, one full of fruit, but not yet gathered. Also *Monstrueuse de Doué* was very fine indeed from the wall. *Tardive d'Espagne*, a late pointed peach, is as yet far from ripe, and I have great hopes it will not ripen till late in October. All my desires have been to *prolong* the peach season. I found the orchard-house hastens them too much, and a late peach, truly good, is yet a variety to be desired everywhere. One that should be ripe in November, say by the fifth, and yet require no sugar to eat with it, has not yet been found.*

Nectarines for the Orchard-house.—Here I enter into the best part of the subject, according to my own ideas,—a ripe nectarine being, as I think, the finest of all fruits, and far superior to a peach. As to growing nectarines in the open air, it is simply ridiculous, and only answers in extraordinary seasons. In the house, *Fairechild's Early* is a small but early variety; then *Hunt's Tawny*, a distinct, yellow nectarine, of not too much flavor, but excellent nevertheless. Then follows rapidly in August, *Elruge*, (*Œil-rouge?*) a very old sort, as old as Charles II.'s time. It is most useful for exhibiting, as any list proves, and capital for forcing; but only of medium size.

Violette Hâtive is a very superior variety, excellent for exhibition, only medium size, but prolific and good. *Pitmaston* too is well known. These three are first-rate. *Hardwick*

[* The American cultivator need not be guided by Mr. Bréhaut's advice in the selection of varieties, as our American sorts are, with a few exceptions, better than the English and French peaches. The *Early York* has proved with Mr. Rivers one of the best, and such sorts as *Early* and *Late Crawford*, *Bergen's Yellow*, *George IV.*, *Coolidge's Favorite*, *White Ball*, and many others, are not only magnificent in size and appearance, but appear better adapted to pot culture than many of the old English and French peaches.—C. M. H.]

Seedling, hardy, firm flesh, a great favorite of mine; then the Murrey, medium size, immense stone, very racy flavor; the Duc du Telliers, a large prolific kind, very good indeed. The Downton, large and showy, but not so aromatic as the Murrey. The Late Melting, a good late sort for exhibitors. The White is also earlier than some of these, and the Newington race are all good. The Red Roman is immense, but difficult to soften, and the Stanwick is the best of all. It, however, cracks very much; nevertheless it is very sweet, and the kernel has really no bitter taste, as reported. Mine this year are very fine and numerous, and I think with care they might be grown without fire heat; otherwise this is the chief of nectarines in every way. It is of Syrian extraction; and comes, I think, from our consul there.

Plums for the Orchard-house.—The Early Favorite (Rivers) ripens the earliest, about the middle of July. Then the St. Etienne about the beginning of August—a sweet yellow plum. Then Denniston's Superb, darker in color, very prolific, and very good. Then the Green Gage for the end of August; the delicious American Jefferson; the Reine Claude de Bavay, a splendid plum; Coe's Golden Drop, first-rate for pots; the old Quetsche; the Late Orleans, and Huling's Superb. All these are very good for pot culture, and can be depended on.

Pears for the Orchard-house.—In this case each person must select according to his individual taste. Some kinds are really better, as the Brown Beurré, the Joséphine de Malines, the Beurré Clairgeau, the Bergamotte d'Esperen, the Winter Nelis, the Louise Bonne, and the Van Mons Léon Leclerc. All these are decidedly good pears. The Winter Nelis and Joséphine are the best, according to Mr. Rivers.*

The summer pears hardly require protection; but if in cold localities far north it is wished to have one or two in-doors, then choose the Doyenné d'Été and the Jargonelle.

[* Again Mr. Bréhaut's advice is of little value to American cultivators. To cultivate Bergamotte d'Esperen and Jargonelle, or even Van Mons Léon le Clerc and Joséphine de Malines, would be to make a very poor selection, when such pears as Marie Louise, Sheldon, Beurré Hardy, Glout Morceau, Brandywine, and other equally fine sorts, are to be had.—C. M. H.]

Apples.—The Newtown Pippin and Northern Spy are the best, and others are readily discovered if required.

It must not be forgotten by the amateur, that at least one half of the trees for his orchard-house should be purchased in a bearing state, because by this plan he will have fruit at once, and also have models of what his training the others should be.

For out-door culture, the best peaches are Noblesse, Royal George, Grosse Mignonne, Bellegarde, Red Magdalen; and, of late sorts, Bourdine and Chancellor. The *Élruge*, *Violette Hâtive*, and *Pitmaston* orange are the best for out-door culture; of the nectarines. *Apricots*.—The Moorpark in favorable localities, but it is a very shy bearer; the Roman, the *Hermiskirke*, a nice large variety; and the hardy *Breda*, which comes in August, and can be recommended. *Alberge de Montgamet* is small, early and hardy. The Royal apricot is also a valuable kind.

CHAP. XIX.

CONCLUDING OBSERVATIONS.

This last chapter shall be soon written. By this time, doubtless, the amateur is more than satiated with peremptory precepts. But they were unavoidable. The only alternative was to introduce endless physiological discussions, which it would not have been difficult to do, but which would not have simplified anything. On the other hand, without a few general principles on which sound training is best conducted, every observation would necessarily have had to be taken on trust. The consolation is, that this defect is common to all books on fruit culture. "The explanations of horticultural operations," says Lindley, "are simple, and free from obscurity; *provided* they are not encumbered with speculations.

Chemical illustrations, unless of the simplest kind, or references to the agency of electricity, have little obvious application to practical purposes."

The object of a brief work like this, is not to elucidate the laws of vegetable life in all their minute and, it must be freely confessed, obscure details, but to narrate to those already acquainted with the art of horticulture, some experiences, with which they have not had the leisure to become familiar. Certainly there were many most interesting natural phenomena which were very tempting to enter into: respecting temperature, for example, a vital point in these matters; or moisture of soils; on the periods required by plants for rest, which is a very important subject, and one which that acute observer, Mr. Knight, has so well explained.

Certainly, few people appreciate the necessity of diurnal repose for plants, as well as their long rest during the winter months, and thus the pernicious custom of keeping up high temperatures during the night in forcing houses is still too much in favor. This vicious custom exhausts the trees, without promoting their growth or aiding the ripening process, and as it bears so directly on the subject treated of here, I cannot refrain from quoting as follows: "As early in the spring as I wanted the blossoms of my peach trees to unfold, my house was made warm during the middle of the day; but, towards night, it was suffered to cool, and the trees well syringed at as nearly the temperature of the natural exhalations as I could."*

Under this treatment Mr. Knight's trees flourished, and the blossoms were extremely large, this being a most important matter, as the size of the blossom much regulates the size of the fruit.

[* Truly does Mr. Bréhaut call it a "vicious" custom to maintain a high night temperature. Nothing, we have long been convinced, is so injurious to any plants or fruits cultivated under glass, as a high night temperature. The plants *must have* repose; and to be kept under constant excitement, night and day, is sure to weaken and eventually ruin them. Except when the weather is very unfavorable, ventilation should be freely given at night as well as during the day.—C. M. H.]

Then the subject of soils is quite endless. It, however, deserves a volume to itself, it is so important.

For example, in sandy districts which are so very soon heated, the sand seldom dries deeper than ten or twelve inches, while sea-salt becomes damp at night. On the other hand, clay heats very slowly, besides being too compact for the spongioles to penetrate, and retaining water. It has, therefore, every bad quality. Sand, however, dries up too rapidly to be suitable by itself. A mean between these extreme cases is, therefore, of general use, with the addition of peat. These exercise separate and counteracting influences. The loam consolidates; the sand lightens; and the peat unites. This is, therefore, a perfect mixture.

Nevertheless, that loam which has the most calcareous matter is far the best, for calcareous earth enters largely into the organization of plants. It also, according to Davy, depends on the action of the lime and vegetable matter together. Manures act, either by stimulating, by absorbing the moisture, or by supplying food, *i. e.*, carbon and nitrogen. Carbonic acid, at least, forms an essential part of the substances of plants. It is, however, proper to apply manure when the plants are rapidly growing, and to those parts which can absorb it, and not, as a great many do, at the stems of the trees.

The fall of rain furnishes the observer with many most interesting phenomena for remark, and thus horticulture leads the inquirer into many paths he would otherwise never have trod. Less rain will certainly fall on the top of the house than falls on the surface of the ground. The average of downpour of a day and night is one inch of water; but in the west of England it is one third more, and in the lake districts double the quantity. It is also remarkable how a high temperature with a southwest wind will absorb the vapors, and cause a delicious temperature, most healthy for men as well as for plants. But the climate of England is certainly very moist, and every precaution must be taken to carry away the superfluous waters from the borders.

Ventilation is an inexhaustible subject, and one of much moment to the horticulturist. In the orchard-house, however, it is much simplified, though I see that Mr. Rivers recommends fewer top ventilators than were of use at first, and certainly cold currents of air, especially if charged with excessive moisture, cannot be suitable to peach culture. Precautions must therefore be taken to guard against these, as also against strong winds acting directly on the ripened fruit. Ventilation is chiefly necessary to carry off noxious vapors, and it is inconceivable how soon these are generated. A minute quantity of sulphurous acid will cause every leaf in the house to drop in a day. In forcing-houses ventilation in the spring is rather injurious than beneficial. When the air is charged with moisture it is more suitable for plants in a growing state than when they are ready to rest. "The skilful balancing of the temperature and moisture of the air, and a just adaptation of them to the various seasons of growth, constitutes the most complicated part of a gardener's art."—*Lindley's Theory of Horticulture*.

Enough, however, has been said on these subjects, and perhaps by this time the reader is reduced to that condition in which Horace, anxious to prepare for his supper party, querulously tells his servant, "*Persicos odi, puer, apparatus,*" which, as the botanical name of the peach is "*Persica*," may be thus rendered: "Gardener, I am sick of your peach training."

The principal suggestions are—summer pinching reduced to a method, and perfected in the winter pruning of peaches on the alternate system; and the placing the trees diagonally at short intervals. I have not dwelt much on the obvious advantage of being able in this way to occupy a valuable wall with a succession of fruits, precious to the cultivator as this must be, because it seemed to me that the being able to shorten the period in which the wall space could be covered with fruitful wood, completely overshadowed other considerations, for in horticulture, as in other matters, the gain of a year is of inestimable value.

I only wish, therefore, to say that no apprehension need be entertained of the shoots on the leaders becoming too long to manage, (an apprehension, by-the-by, not without its cause, for Mr. Rivers writes to me on this subject, that he finds these very shoots "always fighting to get away from the tree,") but by merely allowing a few leaves to grow beyond the long bearing shoot, (as in the vine,) and by cutting it back to two buds directly after bearing, the shoots can be kept compact, fruitful, and close to the main stem.

In all these cases, the reader will readily have discerned that my favorite is the Diagonal Cordon, but with the exception of the growth on the lower sides of this form being weaker than those on the upper, the management of the spurs and shoots is the same in all cases.

I have had much pleasure in writing this book, but at the close I feel that others will profit by my hints, and that I must exert myself if I wish to keep pace with them in the friendly race.

SUPPLEMENT
TO
MR. BREHAUT'S
TREATISE ON FRUIT TREES
IN THE
ORCHARD-HOUSE AND OPEN AIR;
WITH
REMARKS ON THE CULTIVATION AND PRUNING OF THE PEACH
TREE, IN POTS;
ON CORDON TRAINING OF THE PEAR;
THE BEST VARIETIES OF FRUITS FOR POT CULTURE;
AND
GENERAL HINTS REGARDING ORCHARD-HOUSES ADAPTED TO THE
CLIMATE OF THE UNITED STATES.

BY C. M. HOVEY;
EDITOR OF THE MAGAZINE OF HORTICULTURE.

S U P P L E M E N T .

INTRODUCTORY.

ORCHARD-HOUSES, as will have been seen by the remarks of Mr. Brehaut, as well as by the treatise of Mr. Rivers, and other writers upon the subject, are, in fact, a real necessity in the climate of Great Britain, where the peach can only be successfully raised on walls or espaliers in sheltered gardens, or in houses erected especially for that purpose ; and where even the finer pears cannot be depended upon for an annual crop, so variable and uncertain is the weather in the spring of the year, often accompanied with severe late frosts, which injure or destroy the blossoms ; and when they escape these, the want of solar heat prevents the fruit from attaining that perfection which it acquires in a warmer atmosphere, and under clearer skies. Hence orchard-houses are a boon to English cultivators, and it is not surprising that so much interest has been taken in the subject, or that such a large number have been introduced into English gardens, since they were first advocated by Mr. Rivers.

But in the climate of the United States the same causes do not exist. Every fruit, unless we except the fig, flourishes in the open air, and ripens its crop in perfection even in our more northern sections of the country ; the peach, it is true, is subject to injury from the great alternations of heat and cold, during our long and severe winters, but even this is only occasional, say two years out of five, while in the Middle and Southern States it is about as certain as the pear. Orchard-house culture is, therefore, not a necessity with us,

but rather a luxury—a delightful species of culture—employing the leisure hours of the amateur fruit grower, and supplying the wealthy with superior fruit a little in advance of the natural season.

Such being the case, we cannot expect to see orchard-houses spring up as indispensable appendages to every garden, but only introduced where fruit culture becomes a pleasant recreation, when trees are valued for their ornamental aspect, or as a means of supplying the table with the most beautiful and tempting specimens. Viewed from either point, with the abundance of wealth, and general love of superior fruits yearly becoming more extended, orchard-houses must be regarded as a great source of extending and increasing our enjoyment of rural pursuits.

The peach, the nectarine, the apricot and the fig, may perhaps, be made exceptions in the northern sections of the country where the former occasionally suffer from the intensity of the winter, and produce no fruit, and where the latter is too tender to resist our frosts. For these fruits orchard-houses are peculiarly adapted; under the judicious treatment so well detailed by Mr. Brehaut, whether in pots or trained as cordons on the walls, they produce an annual crop with as much certainty as the apple in the open air. To all who esteem these fruits—and the number must be small who do not—they can be obtained in abundance by a process at once simple, economical and sure.

But even with the hardier fruits, which as we have said are known to flourish in perfection in the open garden, there is no reason why they should not be cultivated and successfully raised in pots, without stopping to make the common enquiry whether it “will pay.” This utilitarian phrase, should not be admitted into the vocabulary of the amateur cultivator. In fact a genuine love of horticulture is not barred from the enjoyment of its taste by any such ideas. The question is, will these objects contribute to our gratification? If so, that is sufficient. That fine specimens of trees in pots loaded with fruit must be attractive both from their beauty and their

value, there can be no doubt; and it is upon this basis that we must look to see orchard-houses constructed and stocked with a fine collection of all the best varieties of all kinds of fruits.

Such is our view of orchard-house culture in our climate, and believing that the increasing taste for horticultural pursuits will be intensified by extending the sphere for its gratification, we proceed to add, to what Mr. Brehaut has so well said, some general hints applicable to our climate.

CORDON TRAINING.

So much has been said upon cordon training by Mr. Brehaut, that it may appear superfluous to add more; yet as this method has not been, to our knowledge, adopted by our cultivators, though practised several years by the French, we deem a few remarks of importance, as we are sure this system of training, when once its advantages are understood, will be tried in the orchard-house, upon the back walls of vineries and cold graperies where trees are introduced, and in the open air.

For the pear we believe it will be adopted by amateurs who wish to possess symmetrically pruned trees, without great labor, and a variety of superior fruits in a limited space; and for the peach, on the new plan of protection invented by Dr. Weed of Iowa, to raise this fruit by means of a covering of wooden shutters during the winter, it will be just the mode of planting and pruning to obtain the best results.

The different kinds of cordon training are noticed by Mr. Brehaut, and he has given his reasons for preferring the diagonal cordon with three leaders; at the same time he remarks that "in France the single cordon with laterals of fourteen inches succeeds well," though as he states "it would not do well in England." With the reasons he has given, and what we know of the climate of Great Britain, we can

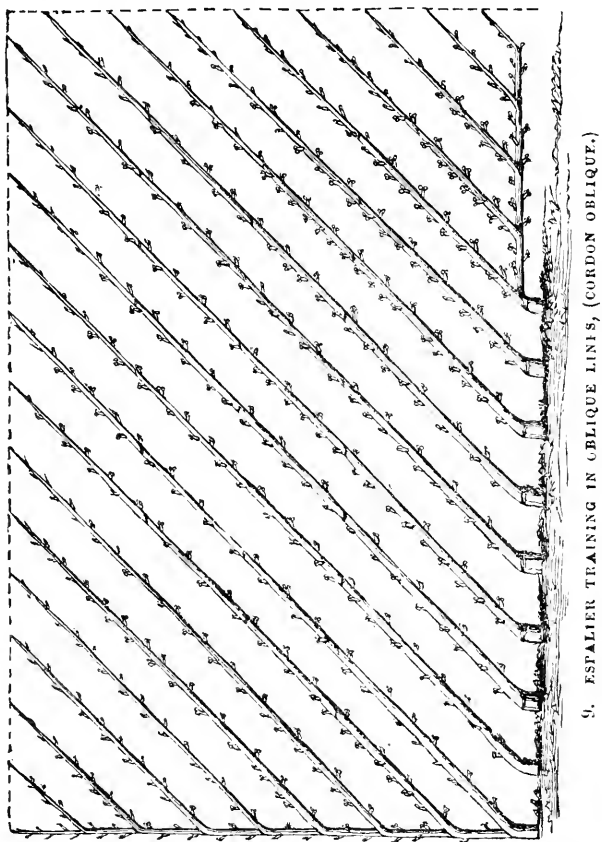
well understand this. But our climate is unlike that of Great Britain, and even more favorable to the peach than that of France, where this fruit is never seen in the perfection it attains here as an orchard fruit. The single cordon therefore answers every purpose and may be adopted with the certainty of perfect success; its advantages being that the wall or espalier is covered with bearing wood in a very short time (three or four years) and all the available space filled long before it would be by either the double or treble cordon. M. Dubreuil, the originator of this method of training, and who has practised it exclusively since 1843, has given a detailed account of it in the *Revue Horticole*, in which he sums up its advantages over all other systems of training. The principal of these are, its simplicity, being easily managed by the amateur or less skilful gardener, and the saving of from six to ten years in covering the entire espalier with the branches.

The only difference in appearance or in practice between the treble cordon, as delineated by Mr. Brehaut in the *Frontispiece*, and the single cordon of M. Dubreuil, is, that each cordon proceeds from its own root, the trees being planted just fourteen inches from one another. The management of the laterals is the same. The somewhat difficult process of bringing up the diagonal cordon being dispensed with.

In our climate we would therefore recommend the single cordon in preference to that of Mr. Brehaut.

The pear particularly may be subjected to the same system of training, and for the information of amateur fruit growers, who may wish to try it, we copy from the *Magazine of Horticulture* (Vol. XXV., p. 451,) a translation of M. Dubreuil's communication, upon the subject, remarking that we have a plantation of pears already growing, in which the plan will be fully tried, and which so far have succeeded admirably; we have no doubt of its superiority over all the old systems of fan, or horizontal training. The method will be fully understood after a perusal of M. Dubreuil's description with the aid of our engraving (FIG. 9.)

“ We know that the forms most generally employed for espalier pear trees are such that it is necessary, for a wall of eight feet in height, to wait sixteen or eighteen years be-



fore the trees entirely cover the surface which is intended for each tree, that is, of fifty or sixty square feet. It is too long to wait for the maximum product of the trees, for during this time the interest upon the cost of the land and the construction of the wall, as well as the expense of keeping the same in order, is so great that the crop affords a very insufficient remuneration.

“ We have described in the third edition of our *Traite d'Arboriculture*, under the name of “ Cordon oblique double,” a mode of training, which, adopted against a wall of at least eight feet high, answers completely for espaliers of pears, apples, plums, cherries, and apricots, in the short space of six or seven years. That which we now advise (FIG. 9) and which is only to be applied to these kinds, is called the Cordon oblique simple, and was first adopted by us for the pear in 1843 ; it gives a still more prompt result, since we can attain the same object at the end of the third or fourth year. The following is the mode of planting an espalier for pears :—

“ Choose trees one year from the graft, healthy and vigorous, worked upon the quince for strong-growing varieties, and upon the pear for the others. Plant them along the wall, at a distance from each other of about eighteen inches only. Incline them in planting at an angle of 60° , and cut off one third of the whole length of the stem to favor the development of the terminal bud, and pinch off, during summer, all the lateral shoots, in order to transform them into fruit spurs. The following year, at the winter pruning, cut off a third of the whole length of the new growth, and give the same attention to the lateral branches as before, in order to make fruit buds. During summer the new shoots should be subjected to the same operations as the preceding. Repeat them each year, until the time when the stem has reached two thirds of the space which separates it from the top of the wall ; then incline the stem at an angle of 45° at the winter pruning, and continue its length till it reaches the top. This object will be attained towards the end of the fourth year, and the espalier will be completed. It will be necessary that the first and last tree should be trained in the form in our figure, so that no vacant space will be left upon the espalier.

“ We can thus obtain by this new mode of training, towards the fifth year, the greatest product, which with the old style we could not do until the sixteenth or eighteenth year. It is proper further to notice the simplicity of this form of training, which renders its execution easy even for amateurs, or

gardeners who have but little experience, and also the convenience of having a great number of different varieties in a small space; in short, the promptitude with which we can fill the place made vacant by the accidental death of a tree. It may be feared, it is true, that the space left between each tree (eighteen inches) may be insufficient for the proper development of the roots; but this objection falls of itself, if we think of the little extension of the stem, and the space which the roots have to spread before the wall. If one fears, to the contrary, that the stem is too much confined and endangers the formation of flower buds by an excess of vigor, it is sufficient to examine the fertility of the numerous espaliers of peaches, trained in our form of the *cordon oblique* simple, to dispel these fears. One single objection: it is this, that we can only conveniently establish this mode of training against an espalier nine feet high; lower walls not permitting the stems to acquire a sufficient length, and their excess of vigor injures them at the expense of the fruit.

“Let us say in closing, that the mode of training in oblique lines, planting the trees eighteen inches apart, can be applied with the same advantage to apples, plums, cherries, and apricots, as espaliers, provided that the supports of the last may be at least eight feet high.

“The trellis adopted for this mode is made by nailing three horizontal bands against strong posts, one at the top, one at the bottom and one in the middle; upon these are nailed the trellises, which are eighteen inches apart, and fastened at an angle of 45° : each tree is trained to a single trellis to which it is tied.”

We cannot too strongly urge upon amateurs a trial of cordon training. The large and choice pears, such as Duchesse d'Angouleme, Beurre Clairgeau, Beurre Diel, and others, of similar size and character, may be grown to great perfection; and the means afforded of protection from high winds, often so disastrous to the hopes of the cultivator, just as the fruit is ripening, alone entitle it to our consideration, to say

nothing of the ornamental character of a long range of symmetrically trained trees, regularly covered from top to bottom with the largest and finest fruits.

PEACHES IN POTS.

The peach is an uncertain fruit in our climate, more particularly in the eastern and northeastern States, where a crop is only obtained about three years out of five, the trees suffering from the severity of the winter, and even when safe from this cause the buds are often injured or destroyed by late spring frosts. Those who wish to have an annual crop must have recourse to artificial means to effect this; but as these have generally been expensive and beyond the reach of all but the wealthy, the production of this delicious fruit has been restricted and enjoyed only by the few, except when outdoor crops are abundant and good. To bring this fruit within the reach of nearly all is the especial object of orchard-houses, so called, which can be cheaply constructed, easily managed, and a crop assured. That this can be done, notwithstanding the failures in many instances, there is no doubt, and it is our purpose to aid in removing any obstacles, if such there be, which prevent the accomplishment of successful results.

The true way of obtaining the best peaches, is the system of pot cultivation, for though the back wall in lean-to houses may be covered with trees on the Cordon plan, all the remaining available space, either in an orchard or grapery, should be reserved for pots. All stationary trees lead to greater care in ventilation and managing the house in winter, in pruning, &c. If the trees are wintered in a good cellar, as we think they should be, all the care, labor, and uncertainty is avoided. The house may be closed in autumn and receive no further attention until the trees are removed to it again in March or April. This was our mode of practice twenty-

five years ago, and H. W. Sargent, Esq., of Fiskhill, who has devoted much time to orchard-house culture, recommends it.

D. W. Coit, Esq., of Hartford, a successful cultivator, winters his trees in a shed with a ground floor. The shed is kept closed in severe weather, and the trees set close together, all the pots being bedded in leaves beyond the reach of frost. Even zero weather did not injure them, and he did not lose a single tree in three years.

If, however, there are no means of wintering a number of trees, some ready mode of warming the house, when the temperature falls to zero, should be introduced, just sufficient to keep it above that point, and if the house is shaded by an outside covering of straw mats, or cornstalks, as has been practised by H. H. Hunnewell, Esq., of Wellesley, the trees and buds are perfectly safe, and the crop certain. With the aid of a cool cellar, the trees may be introduced successively into the grapery, or even the greenhouse, where there is room and plenty of light and air, and an abundance of fruit obtained. Still it is for the orchard-house principally, that we intend to confine our remarks.

Mr. Brehaut having passed over the pot culture of trees rather summarily, we now supply such information as will make up for his deficiency. Our different climate would also lead us to depart somewhat from his directions.

For the purpose of being better understood we shall treat of them in three sections, viz.: the treatment the first year, the treatment the second year, and general remarks on pruning.

FIRST YEAR.—Peach trees for pots should be only one year old, and only of moderate size, rejecting large overgrown specimens; it is a common error that large trees will produce fruit sooner. They should be potted not later than May if possible. For this purpose have a quantity of ten to thirteen inch pots ready, and a good compost made of sound turfy loam and leaf mould, with a small portion of sand or old lime rubbish. Each pot should have three or four holes for

drainage, and two or three inches of the coarsest part of the compost thrown in first.

Head in the trees to ten or twelve inches, leaving a straight stem with five to seven good buds; prune off the larger roots if they interfere with the potting. Then place in the pot and fill up with the compost, making it very firm with a potting stick; fill within an inch of the rim of the pot. Set them away in a half shady place for a few days till they begin to break freely, when they may be removed to an open sunny situation, plunging the pots partly in the soil; water sparingly for a few days. As the shoots continue to grow, if the five or seven eyes all break, they will need no other care than pinching in any laterals to two eyes; but if less than five shoots break, the tops should be pinched off when 6 or 8 inches long (early in June) which will induce them to throw out more shoots, and form a handsome head upon which the future beauty of the tree depends. Thus the tree will complete its growth, with due attention to watering, by the autumn, and set its flower buds for next year. Lift the pots occasionally to prevent the growth of any roots through the holes in the bottom.

On the subject of pruning, which is in truth the important part of peach tree culture, it is difficult to lay down definite rules. Care should be taken that there are not too many main branches the first year, and as by pinching the tops of the shoots as above directed others spring out, generally three to each, there would be fifteen, but only one should be allowed to grow on to extend each branch, and the others pinched off at the second or third bud, in order to form lateral fruit bearing spurs.

As soon as the wood begins to ripen and the leaves fall, the pots should be removed to a warm situation, where they can stand on boards or a dry sandy soil, which materially benefits the roots, by keeping them warm and dry. When frosts are severe enough to freeze the earth hard, remove the trees to their winter quarters, whether in the cellar, the shed, or the orchard-house. This completes the labor for the first year.

SECOND YEAR.—If the trees have been well treated, they will have set many more fruit buds than will be wanted. Prune the trees before they begin to grow, by cutting back just half of the shoots to a good bud—a leaf bud—which can readily be known by their small size and pointed form. If there are no single buds at the right place, cut to a triple bud which contains two flower buds, with a leaf bud in the centre. If there are nine shoots, four may be cut down to within five buds of the base, and the others shortened in to about fifteen inches in length; the short branches will supply wood for next year, when the old bearing wood should be cut back to bring up young shoots in their place—always bearing in mind that the peach never bears on the old wood—and that all such is useless. If the cutting back is neglected, the trees will be tall and lank with only leaves and fruit on the ends—which may answer for the careless cultivator, but which form poor looking specimens.

Scrape away the top soil down to the fresh lively roots, and top dress with a good rich compost. This will support the trees for a time. Give all due attention to airing and watering, and especially the destruction of the red spider, so troublesome to the peach, and by the 10th of June the fruit will be of good size, and the weather so warm the trees may be removed to the open air, selecting a sheltered spot. Here they will perfect their fruit, which will be better flavored than any raised in the orchard-house, unless the sashes are wholly removed. Apply a mulching of cow or horse manure, the fertilizing qualities of which will be carried down to the roots in watering, and give increased size to the fruit. Pinch off the laterals from time to time, and so select the shoots as to have a supply of young wood for next year. When the fruit begins to color, water less bountifully than before, and discontinue all syringing; by the middle of July, if the trees are started in March, the fruit will be ripe.

After the fruit is gathered give attention to the growth and ripening of the wood, and when cold weather arrives remove to the shed or cellar as before. This, in brief, is the course

of culture the first and second year. We might add many minute directions which would extend our volume farther than it is intended, which is merely supplying a few deficiencies of Mr. Brehaut. The enthusiastic cultivator will discover them in his efforts to success.

The third and successive years require little more attention than the second. If it is desirable to secure the best results, the trees may be shifted the third year from the 13 into 18 inch pots, removing a little from the bottom of the ball, slightly loosening the sides, and removing the surface as before down to the fresh roots. Pot firmly and prune as before. It is our opinion that trees more than five years old are unprofitable and had better be thrown away, having a fresh lot to take their places. No doubt, as Mr. Rivers says, they can be kept in good bearing condition many years, as we ourselves have had them from seven to nine years; but taking into consideration the pruning and the ultimate beauty and vigor of the trees, the tendency to become bare at the base, a supply of fresh specimens will afford the best results.

PRUNING.—All or nearly all subsequent success depends upon the care in pruning. We have given the general mode of doing this, but the French cultivators have changed their views in regard to pruning the peach, and as we think justly, by which means severe cutting back annually is unnecessary, and more compact and bushy specimens obtained. We have not ourselves practiced this system, but for the information of all who wish to try it, we copy the following account of it, with engravings illustrating the same, by M. Dubreuil, who has tried it and found it to be superior to the old mode of pruning for espalier trees, and we doubt not for trees in pots also. By the aid of the illustrations it will be fully understood.

In order to understand fully the system as explained by M. Dubreuil, it may be necessary to state what is in fact generally known, that the peach tree bears its fruit on the shoots of the preceding summer; these, when growing vigorously, throw out laterals, which are termed summer laterals, because they are produced from the buds of recent formation on

the young summer shoots, and not from the old wood of the preceding year. Sometimes, according to the condition or vigor of the tree, no such laterals are produced, unless the growing shoot is stopped, or cut in, which induces the freshly formed buds to break into shoots, instead of remaining as buds till another year. These the French term *bourgeons anticipés* laterals, to distinguish them from the regular shoots, that is, those which grew from the buds of the preceding year.

According to the new system it appears, that of the shoots which push from mature buds those situated on the front and sides of the branches only are retained; those behind are disbudded as soon as they are $2\frac{3}{4}$ inches long. At the same time the others are pinched so as to preserve only the two lower well-developed leaves, as at A A, (FIG. 10.) The weak leaves, B B, are not taken into account. This pinching has the effect of causing the young buds, situated in the axils of the two



10. FIRST PINCHING OF THE BUDS OF THE PEACH.

leaves, to burst into shoots A A, (FIG. 11), and when these shoots are 2 inches long, they also are cut off above the first leaf from their origin. The secondary laterals which push from the first ones are likewise pinched to one leaf from their bases, as at A A, (FIG. 12.) Those shoots which push afresh from vigorous parts are entirely removed.



11. SECOND PINCHING OF THE BUDS OF THE PEACH.

These operations cause the production of buds which at the winter pruning have the

appearance represented by FIG. 13; they are then cut at A A, so as to leave only the flower buds nearest the base.



12. THIRD PINCHING OF THE BUDS OF THE PEACH.

When numerous laterals push, on the leading shoots, c, (FIG. 14), those situated behind are entirely removed. The others ought to be pinched as soon as the second pair of leaves have the buds in their axils sufficiently advanced. If the operation is deferred too long, the shoot lengthens and a spur



13. FRUIT SPURS OF THE PEACH RESULTING FROM THIS MODE OF SHORT PINCHING.



14. YOUNG SHOOTS (BOURGEONS ANTICIPES) OF THE PEACH, JUST AT THE PROPER TIME TO PINCH.

is produced, which at the winter pruning is like that represented by FIG. 15. If the operation is performed too early,

before the buds have commenced to form, the shoot withers, as in FIG. 16.

But when the pinching is performed at the proper time the shoot ceases to lengthen, and the lower pair of leaves remains

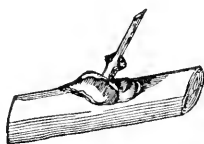


15. SPUR OF THE PEACH (ANTICIPE) RESULTING FROM THE BUDS (ANTICIPE) PINCHED TOO LATE.

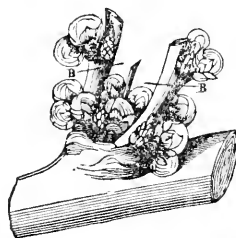
near the base. At the winter pruning the shoots have the appearance represented by FIG. 17.

It sometimes happens that, in spite of pinching, the laterals continue to lengthen. In this case a cut is made with the point of the knife on one side of the base, as at A, (FIG. 14), about half an inch in length. This cut stops the growth, and a few days after, the lateral is pinched, and the eyes are formed in the axils of the two lower leaves, as at D, FIG. 18.

All the laterals having been pinched for the first time, on several of them one or two generations of young shoots will be produced. These are



16. SPUR (ANTICIPE) OF THE PEACH, DRIED UP. RESULTING FROM PINCHING TOO LATE.



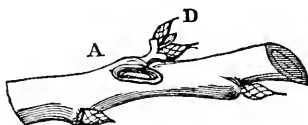
17. SPUR (ANTICIPE) OF THE PEACH RESULTING FROM PINCHING THE BUDS (ANTICIPE) AT THE PROPER TIME.

pinched above the leaf nearest to their base, as already explained, and this operation will give rise to shoots as represented in FIGS. 17 and 19. At the winter pruning they are cut as at B, (FIG. 17.)

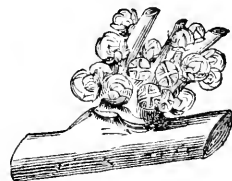
Sometimes the spur resulting from these repeated pinchings becomes entirely composed of blossom buds, as represented (FIG. 19.) If left they so completely weaken the spur that it is apt to die. To prevent this all the flower buds are cut off, and an incision made as at A, (FIG. 20.)

Finally, close pinching is not practised during the first year after the tree is planted.

Such appears to be the plan now advocated by M. Dubreuil under the name of *pincement court*, which we prefer to call

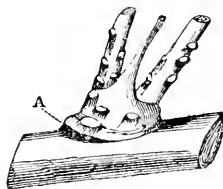


18. LITTLE SPUR (ANTICEPE) OF THE PEACH, RESULTING FROM PINCHING THE BUDS (ANT.) AND THE INCISION.



19. SPUR (ANT.) OF THE PEACH BEARING FLOWER BUDS ONLY.

spur pruning. That the method has been unsuccessful in several places he admits, but he thinks that this has been owing to want of skill in the operator. His own experience tells him that it possesses the following advantages:—



20. SPUR (ANT.) OF THE PEACH, AS IN FIG. 19, DEPRIVED OF THE FLOWER BUDS AND SUBMITTED TO THE INCISION.

1st. Economy of labor resulting from the summer tying or nailing of the shoots, and the winter tying or nailing of the main branches.

2d. Economy in the construction of the trellis. Those intended for other kinds of fruits answering every purpose, as the tying or nailing is applied only to the main branches of the tree.

3d. The winter and summer pruning given to this kind of treatment are very simple, and are more readily understood by the gardener.

4th. The fruit spurs projecting from the front of the old wood are sheltered from the sun by the foliage.

5th. The fruit spurs upon the bearing branches being very short, the latter can be kept much closer, as it is sufficient to have only a space of a foot, (30 centimetres), which will allow double the number, and, consequently, double the quantity of fruit upon the same espalier or wall.

These various advantages do not result from the influence of any exceptional circumstances. Our instruction in various parts of the country allows us to prove this in different climates and under the most varied circumstances: in the environs of Paris, in the Seine-et-Marne, the Seine-Inferieure, L'Eure, L'Orne, le Puy-de-Dome, l'Ain, la Haute Garonne, les Basses Pyrenees, la Cote d'Or, la Haute Saone, le Rhone, &c.

Let us place the two following inconveniences by the side of these advantages:—

1st. The necessity of preserving the usual space between the main branches of the tree, under the old form, with the loss of time in covering the espalier or wall.

2d. Much greater care in attending to the summer shoots (*bourgeons anticipés*) during their development.

It is evident that these inconveniences are more than compensated for by the preceding advantages. Hence we should not hesitate in adopting the new mode of pruning, particularly for the peach, submitted to the oblique or horizontal mode of training, (*cordon oblique or vertical*.) Experience has already shown the utility of some modifications appertaining to the first mode of training adopted by M. Grin.

BEST FRUITS FOR ORCHARD-HOUSES.

Mr. Bréhaut has given a very full list of the best varieties of fruits which he has found adapted to orchard-house culture, and which, no doubt, can be relied upon in the climate of England, and some of them here. But we have native varieties of some of them which are much better, and can be recommended as superior for orchard-houses.

PEACHES.—Until very recently English cultivators have refused to recognize any very great merits in our American peaches, and we believe only two varieties have attained to any very extensive cultivation, viz., the Royal Kensington and George IV., both American, but renamed by English pomologists. Even George IV., the Pomological Magazine, where it is described, says that it is an American variety of considerable importance, not so much for its good quality as a hardy kind, as for being a forcing variety of great merit.

But Mr. Rivers, who appears to have a due appreciation of many of our American fruits, and introduced many of them into his large collection, was struck with the “earliness and goodness” of the Early York, and used it as the parent to produce new seedlings, of which his Victoria is one of the progeny.

To whatever it may be attributed there is no doubt of the superiority of our American peaches, for forcing or orchard-house culture, being vigorous growers, and setting their fruit with great certainty. And as to quality, though there is no dispute about the excellence of the Grosse Mignonne, Noblesse, and some others, it is hard to surpass in quality the Coolidge’s Favorite, or Early York, or in beauty, the Early and Late Crawford.

For the orchard-house the best peaches are the following:—

EARLY YORK, (true,) with serrate leaves, not very large, but very early, beautiful and delicious, the first good peach to ripen.

EARLY CRAWFORD is a splendid peach, coming immediately after the Early York. A large, yellow fleshed fruit, often measuring twelve inches in circumference, with a deep yellow skin, and superb crimson cheek.

GEORGE IV. ripens about the same time, is of medium size, and of great excellence.

COOLIDGE'S FAVORITE. Similar to George IV. A most beautiful and delicious peach, ripening at the same time; exceedingly tender skinned, and not setting quite so abundantly, yet valuable.

BERGEN'S YELLOW is another variety, similar to the Early Crawford, but with a deeper crimson hue in the sun; large and excellent.

LATE CRAWFORD. This is another noble peach, larger even than Early Crawford, but not quite so deep colored and beautiful, and with a more woolly skin. It is, however, a fine forcer, and late, closing up the season, which begins with the Early York.

These six, for small collections, will, perhaps, be sufficient; but, where they are larger, the following may be added:—

CAMBRIDGE BELLE. A delicate and beautiful white peach, with pale blush cheek.

ROYAL GEORGE. Something like George IV.; a fine peach.

GROSSE MIGNONNE. Very fine; succeeds the last.

OLD MIXON FREE. A very large and late variety, of great excellence.

LATE ADMIRABLE. Large, late, and good.

STUMP THE WORLD. Ripening with the Early Crawford, and similar to it.

These will give a dozen of the very best peaches for the orchard-house. Amateurs, who like to try varieties, will find many other sorts in the Catalogues, worthy of trial.

NECTARINES.—Nectarines are not very extensively raised, and our own opinion is somewhat different from Mr. Bréhaute's. For their beauty nothing can excel them, but as regards their quality, until the introduction of the Stanwick, we could not speak in high praise, compared with the best

peaches. To set off a dish of fruit on the table they are, however, indispensable, and a few trees should always find a place in the orchard-house. They cannot be grown to any perfection in the open air.

HUNT'S TAWNEY. This is an excellent nectarine, rich and dark colored, ripening in good season.

ELRUGE. This old variety is still one of the best, forcing well, handsome, and of good size; it is a valuable nectarine.

VIOLETTE HATIVE is, as Mr. Bréhaut states, a superior variety, handsome, prolific and good.

WHITE. Remarkable for its clear waxen skin, good size, and good quality; as a variety it is very desirable.

BOSTON, or LEWIS. Remarkable for its superb appearance, though not equal in excellence to some of the others. It is of very large size.

STANWICK. This noble variety appears to do better in our climate than in Great Britain, where it often cracks. With Mr. Hunnewell of Wellesley, plants in pots have yearly borne and ripened several dozen fruits each, which were very large and beautiful. It is one of the latest in ripening.

PLUMS.—Since plum trees have been so subject to the black knot, and the fruit to the curculio, their cultivation in pots is becoming an object of interest; for, without much labor and expense, it is almost impossible to secure any fruit in the open air. The trees do not come into bearing early, but the certainty of a crop of fine fruit will repay all the care and attention. The following are excellent sorts:—

GREEN GAGE. For its excellence unsurpassed, but its beauty much inferior to others. It has a dwarf stocky habit, admirably suited to pot culture, and bears profusely.

JAUNE HATIVE. This is a small but very early plum, ripening in the open air, three weeks before the Green Gage; its great merit is its earliness.

JEFFERSON. One of our most beautiful native plums, with a deep yellow skin, and slightly tinted crimson cheek; rich and delicious.

BRADSHAW. A very large, long, purple plum, with a rich

blue bloom, and of great excellence; matures before the Green Gage.

COE'S GOLDEN DROP. A superb variety, very large, late, beautiful, and delicious; admirably suited to pot culture.

REINE CLAUDE DE BAVAY. A late variety of the Green Gage family; not attractive in appearance, being of a dull green, but large, late, and excellent.

No doubt many other of our American varieties, of which Mr. Bréhaut enumerates Denniston's Superb, will prove valuable, but they have not yet, to our knowledge, been tried. We would enumerate the General Hand, Ives's Seedling, Imperial Green Gage, Smith's Orleans, and Lawrence, as worthy of trial.

PEARS.—For pot culture all the trees should be upon the quince; and if such varieties are wanted as do not grow well on that stock they should be double worked. On the pear it is difficult to get them to fruit early. Of course it is desirable to grow only the large fruits, provided they are good, of which, fortunately, we have plenty. Not that a small fruit is not worthy of attention, but because they are partly for ornamental purposes, and the large fruits set off the trees to great advantage. Some of the most desirable are the Bartlett, Beurré Clairgeau, Duchesse, Louise Bonne, and Urbaniste, for autumn; and the Beurré Diel, Winter Nelis, Glout Morceau, and Easter Beurré, for early and late winter. The Beurré Clairgeau is very handsome when grown on trees in pots, and also of unusual excellence; we have seen them weighing a pound, or more. The Easter Beurré, so difficult to get in perfection, produces fine specimens in the orchard-house.

APPLES.—Probably few American cultivators will consider the apple worthy of a very prominent position in the orchard-house. Yet, we cannot consider one complete without them; we do not, indeed, know of a more ornamental object than a Red Astrachan, full of its brilliant red fruits. Considered simply for the fruit, they would not be so important; but, to set off a collection of fifty or a hundred trees, a few of the most beautiful apples are indispensable; we name a few of the best:—Red Astrachan, Primate, the Bough, Grav-

enstein, Hawthornden, Melon, Northern Spy, Washington, and Fameuse.

FIGS.—The fig is a delicious fruit, and may be easily grown in the orchard-house, if the plants are wintered in the cellar. We have had heavy crops on trees so treated, ripening all summer. The treatment is very much the same as for the peach. Young plants potted in 13-inch pots in April, and plunged out in the open ground, will make fine specimens by the autumn. The figs will begin to appear by September, and the trees should then be sheltered from severe frosts, and placed in a light dry cellar in October. In the following April they should be taken into the orchard-house, when the fruit will soon begin to swell and ripen; another crop will ripen in the autumn. The best figs for pot culture are the following:—

Early Violet, White Marseilles, Brown Turkey, White Ischia, St. Michael, and Brunswick.

APRICOTS.—Cultivators who wish to try the apricot, a very pretty and excellent fruit, may select the following:—

Royal, Moor Park, Peach, St. Amboise, Muscat, and Red Muscatine.

GRAPES. The grape does very well in pots, and very fine crops may be raised with due attention to culture. They must be wintered in the cellar or in a cold pit, where the shoots can be covered with earth or leaves. Such as succeed best are the following:—

Black Hamburgh, Muscat St. Laurent, Chasselas of Fontainebleau, Muscat de Sarbelle, Chasselas Vibert, Black Prince, Chaptal, and White Frontignan.

STRAWBERRIES.—These may be successfully raised in the orchard-house and the fruit obtained nearly one month before it ripens in the open air. Pot good strong runners in July and prepare them in the usual manner for ordinary forcing. On the approach of winter, place the pots in the house and cover them with leaves to prevent freezing; in April uncover and give them a good position near the glass.

The best sorts for pots are Triumph de Gand, Keens' Seedling, and Boston Pine.

GENERAL REMARKS.

Orchard-houses are so useful for many purposes of gardening, that we think they will soon become necessary appendages to every complete garden. In our severe northern climate, where winter holds undisputed sway for nearly six months, it is very pleasant to have some comfortable place of resort, both in the late autumn and early spring months, when the out-door weather is chilly, rough, and disagreeable. The orchard-house, when well constructed and of good proportions, supplies this want. In autumn it may be partially filled with late flowering plants; such as chrysanthemums, roses, &c., thus keeping up a display until severe weather sets in. And in the spring much can be done in bringing forward vegetables and bedding plants, without interfering at all with the main objects of such a structure. When the trees can be wintered in a shed or cellar, a real winter garden may be produced by the introduction of the rare and not wholly hardy evergreens, in pots, which however will not suffer in such a place if the roots are protected with dry leaves; and when the fruit trees are introduced they can be removed to ornament the lawn or flower garden in summer. Viewed in all these aspects the orchard-house cannot fail to be a valuable addition to every garden.

The construction of orchard-houses has taken a wide range. The first efforts of Mr. Rivers were mere hedges on the sides, to break the wind, with glass roofs and boarded ends. This style was soon found to be altogether too *breezy* for the safety and certainty of the crop, and boards were substituted for the hedges. Their dimensions were yet small, and the next advance was to make them larger; this resulted in the introduction of the span roof, and from the original long, low, narrow structures, by gradual steps, the result of experience and sound practical deductions, Mr. Rivers has erected more lofty and commodious houses, 100 feet long and twenty-four feet wide.

Like other houses for artificial culture, there is therefore no rule as regards the dimensions of orchard-houses. They may be small or large, cheap or expensive, according to the wants and means of cultivators. But to secure the best results they should be rather lofty and wide; experience having shown that very low houses, containing only a small volume of air, heat up quickly, but cool down quite as rapidly. Hence, orchard-houses, especially those without fire-heat, should be wide and high, that the temperature may be more equal. The volume of air contained in a large house, warmed by taking advantage of closing it early in the latter part of the day, requiring a longer time to cool down; thus maintaining a night temperature considerably higher than a low and narrow house. It is from the experience acquired by Mr. Rivers in working these structures that he has gradually increased their size, until they have attained the dimensions above named; and his advice is now to build them in something like the following proportions:—For a large house, 100 feet long by 24 feet wide, and 10 or 12 feet high in the centre. For one of moderate dimensions, 50 feet long by 20 feet wide, and 10 feet high in the centre; and smaller, 30 feet long by 16 feet wide, all span roofed.

The interior arrangements may be a level floor, on which the plants are arranged in rows, with two walks, if the house is wide, or the walk may run through the centre, and be sunk one or two feet, the mode in which the orchard-houses erected on the Paxton patent are mostly constructed. The orchard-house of G. G. Hubbard, Esq., of Cambridge, is a lean-to house, about 110 feet long and 16 feet wide; the trees being arranged in a bed, which occupies all the space except a walk three feet wide around it. This has answered well, and the trees have borne good crops.

For the information of all amateurs who would be glad to know the detail of dimensions of the best orchard-houses, we give the views of Mr. Rivers, whose experience is extensive and reliable:—

“My large houses are 20 feet wide, the sides $4\frac{1}{2}$ feet high,

and $9\frac{1}{2}$ feet in height to the ridge; the paths are $2\frac{1}{2}$ feet wide; the back beds at the sides are 4 feet wide and 15 inches high; the central bed 7 feet wide and 18 inches high; these dimensions may of course be varied at the pleasure of the builder. I give mine exactly as they are. The posts to support the side plates are of oak, 6 inches by 4; they are $2\frac{1}{2}$ feet in the ground, and placed 4 feet apart; on these are nailed deal boards, three-quarters of an inch thick, the upper part of which, on one side, one foot in width, is on hinges, to form shutters for ventilation; the rafters are $4\frac{1}{2}$ inches by $1\frac{1}{2}$, and placed twenty inches apart."

This house, as will be seen, has two walks, and *three* beds on which to place the pots; there is no top ventilation, which Mr. Rivers says he has found unnecessary. When there is no fire heat, the rafters are fixed, and the glass 20 inches wide by fifteen long. Yet Mr. Rivers considers this the most economical method of building large span-roofed houses.

The dimensions of another large house he gives as follows: "The sides are brick walls, 2 feet 6 inches high; on these, sashes 2 feet 6 inches by 3 are fixed, with pivots so as to admit a large quantity of air; width twenty feet; length ninety feet; height (in centre) ten feet." This he calls a noble specimen of a nobleman's orchard house.

For all general purposes, however, a simple span-roofed house, with level ground floor, answers every object; the raised brick beds being, in our opinion, in our climate, of no great advantage to the trees, especially if they are to be, as we should advise, removed to the open air to mature their crop. If, however, the pots are to be plunged in the earth, a brick edging would certainly add to the neatness and beauty of the house.

But whether the style be a lean-to or a span-roof, ample ventilation in our climate must be secured. The sides should be provided with shutters or sashes, that may be opened when required, and top ventilation must also be ample. In spring, and during the time the trees are swelling their fruit, side air should rarely be given, as most of the ven-

tilation should come from the top; but in autumn and winter an abundant circulation of air will be necessary, to keep the house at a low and even temperature. The houses should be constructed as light as possible, consistent with proper strength; and whether the rafters be fixed and the glass glazed upon them, or the house is fitted with movable sashes, is immaterial, provided always, that the ventilation is ample. A house on Mr. Rivers's principle, without top ventilation, would certainly be unsuited to our climate, where the hot sun soon raises the temperature to an injurious degree, without air. We, however, much prefer sashes; because they can be readily taken entirely off in summer, and the trees allowed to have the benefit of our bright sun and clear air just where they are grown, if there is no other convenient space to remove them to, such exposure being absolutely necessary to obtain rich and delicious-flavored fruit.

Next to ventilation, drainage should be considered; a dry warm situation is always to be preferred, but if from any cause there is reason to apprehend too much moisture, then underground drains should conduct all the water to a good outlet. Neither trees nor plants should stand in a cold, damp soil, and as this can always be prevented, drainage should be attended to in the construction of the house.

A supply of pure rain water should be secured if possible, as it is far preferable to spring or well water; if good gutters are constructed, and the water conducted into a large tank or cistern, it will not only prevent the water from saturating and cooling the soil in and around the house, but give an abundant supply of water at all times. A manure tank will also prove highly beneficial in the growth of fine fruit; for, although temporary means may be adopted to furnish a small supply, where there are many trees a large and commodious tank will prove a valuable accessory to the orchard-house.

An enthusiastic and industrious cultivator will not, perhaps, need to be reminded of all these hints; but will achieve success without the aid of so many directions. The mass of those, however, who may attempt orchard-house culture, will

find that they will put them upon the right track, and if they fail with the aid of all the necessary details, it will be because they do not understand the practical knowledge which it is almost impossible to acquire from books, but which experience alone teaches, often too dearly, if valuable information is ignored.

Our object is to increase and extend the love of our people for the best fruits, especially when it can be done at so little expense; and we know of no means by which more can be secured than with the aid of a smaller or larger orchard-house, or, as Mr. Rivers has termed the larger class, a Fruit Conservatory.

MONTHLY OPERATIONS

IN THE ORCHARD-HOUSE FOR THE YEAR.

JANUARY. At this season, provided the trees are protected according to the directions for December, it will only be necessary to keep as even a temperature as possible, and guard against very sudden changes and severe frost. In clear sunny weather give an abundance of air during the middle of the day, and if warm, until night. In very severe weather, with the temperature below zero, if the house is provided with shutters, as we think it should be, these may be put on, which will keep out many degrees of frost. Thick straw mats may also be used to guard against intense cold as well as bright sunshine.

FEBRUARY. The same directions will apply to this month, which is often the coldest of the year.

MARCH. This is the trying season, as the sun has now reached such an altitude it will soon warm up the house in fine weather. It will now be safe to leave the house open from morning till night, until the middle of the month, when the trees will begin to show signs of growing. When

this is perceived, the house should be closed earlier in the afternoon. It will now be time to remove the covering from the pots, that the earth may receive the benefit of warmer air. Commence now to prune the trees, as already directed (page 91); after this is done, scrape away the surface soil with a sharp-pointed stick or iron down to the fresh lively roots, and top dress with a good compost of leaf-mould, old decayed manure, and sound loam. If the weather is favorable, give a good watering, through a fine rose water-pot to settle the soil. Air now abundantly from 9 o'clock till 4 o'clock, covering with the shutters at night if any danger of frost.

APRIL. Early in the month the trees will be in flower, and attention will now be required that the trees receive no check. Ventilate freely during the day, closing early if frosty, to retain the day heat, and put on the shutters if cold, as it occasionally is, up to the middle of the month. But with ordinary care there is not much danger of injury to the blossoms. As soon as the fruit is well set and beginning to swell, syringing may be commenced and continued in fine weather. Always use water of the temperature of the house, and syringe only in the morning until the nights are warm, when it may be repeated at evening. Give the trees proper waterings at the root, and the fruit will soon show the advantage of good treatment. If the green fly appears, as it generally does, the house must have a good fumigation with tobacco.

MAY. Continue the same treatment as in April, but give more attention to ventilation; as the season advances the heat will increase, and an abundance of air should be admitted. Be careful, however, not to open the front ventilators in dry windy days, and at no time during this month only for an hour or two in still warm weather, otherwise mildew will be likely to result. The trees will now require a greater abundance of water and a free use of the syringe, to keep away the red spider. If the green fly is again troublesome fumigate once more.

JUNE. If all has gone on well, the trees will have swollen their fruit to a good size, and a portion or the whole of the trees may be removed to a sheltered place in the open air about the 10th of the month. By removing only half of the trees there will be a better circulation of air around those remaining, and both the fruit and foliage will receive much benefit. Besides a much greater number of trees may be put into the house if it is the intention to remove a portion to the open air in June. Up to this time the young shoots will not have advanced sufficiently to require the space they must have later in the season.

Select a sheltered spot and remove the trees, placing them at 5 or 6 feet apart, half plunging them in the soil. Now cover the earth in the pots with half-decayed cow or horse manure, and water freely every evening and in very dry weather, morning and evening. Syringe well every night.

Commence now to thin out the fruit, and begin the pinching of the shoots, as directed on a preceding page, whether upon the old system or the new one of M. Dubreuil. Upon this summer pinching will depend the future shape and character of the tree.

If any red spiders make their appearance, they should at once be looked after. The readiest way we have found to get rid of them is to syringe the trees lightly, tipping them on one side so that the under side of the leaves may be wet. Then take sulphur and thoroughly dust every leaf; allow the sulphur to remain three or four days, when a complete syringing will wash it all off and with it the red spiders.

JULY. All the trees, both in and out of the house, will need plenty of water, and occasionally liquid manure, until the fruit is nearly grown. Then the syringing should be dispensed with, and the waterings less frequent. By the last of the month the early sorts will begin to color. Attend to the pinching of all vigorous shoots.

AUGUST. As the fruit begins to ripen it is sometimes attacked by bees; when this is the case a thin gauze netting will keep them off. Ventilate the house freely night and

day. By the middle of the month the Early York will be ripe, succeeded by George IV. and Early Crawford. Continue the pinching to the end of the month.

SEPTEMBER. Every tree, as soon as the fruit is gathered, should be removed to the open air, to ensure the ripening of the wood. Late kinds of peaches or pears may be retained until the fruit is ripe. Give proper waterings, but not in such liberal quantities as last month.

OCTOBER. If any trees remain in the house, ventilate freely in all good weather; and as soon as the fruit is gathered the sashes may remain open night and day, except in rainy weather. Towards the last of the month, if the nights are frosty, the trees removed to the open air may be brought in, and by placing them close together there will be abundant room.

NOVEMBER. Sudden changes often occur this month, and though ventilation should be abundant, when there is danger of cool frosty nights the sashes should be closed early, to retain the sun-heat. Water very sparingly, just sufficient to keep the earth moist.

DECEMBER. All should now be got ready for winter. In our climate this is quite unlike the winter treatment as detailed by Mr. Brehaut. Our zero weather is unknown in the island of Jersey. Place the trees as near together as possible, filling in the spaces between the pots with dry leaves. Then cover the whole with leaves or hay to the depth of six or more inches, so as to keep out all frost. Thus prepared they will stand until the return of fine weather in March. Keep the house open in fine weather, but close up when rainy, snowy, or very cold.

If these directions are attended to, the trees can be kept without injury in the house; but where there is a dry warm shed, or cool dry cellar, they may be quite as safely wintered without the trouble and care of ventilating for three months of the winter.

REPOTTING ORCHARD-HOUSE TREES.

Since a portion of the preceding remarks were written, there has been considerable discussion in regard to orchard-house culture in the English periodicals; some being greatly in favor of the method, and others opposed to it, each giving their views for and against it; but the predominant feeling has been that it is a sure and certain plan of raising many of the finest fruits.

This general discussion has also been followed by detailed methods of treatment, and the failure of some cultivators has induced others who have been successful to make known the process by which they have accomplished such results. One of the most interesting of these has been the remarks on repotting. We have not ourselves recommended but one shift from 13 to 18-inch pots, for a course of five years, though some orchard-house cultivators recommend it annually; but we do not think it advisable, and we quote the remarks of an experienced man, who has been highly successful, as showing that frequent repotting is rather injurious than beneficial:

“Having had ten years’ practice in the management and cultivation of orchard-house trees in pots, I tender my experience in reference thereto. In 1854 I commenced the cultivation of fruit trees in pots, more especially that of peaches and nectarines, and my labor has been crowned with success. I have scarcely, during the whole period, repotted a tree of those with which I first started, unless I have observed the drainage defective; in that case I have shaken the stagnant soil from the roots, and returned the tree to the original or a pot of the same size. I allow the pots to stand on a bed of soil, into which the roots are allowed to descend; the pots are not moved until the fruit is ripe. During the time the fruit is swelling, the trees receive liquid manure occasionally, and after the wood is pretty well ripened they are placed out of doors until the approach of winter; the old soil is then gently stirred on the surface and a little fresh applied. I

have exhibited peach and nectarine trees in pots at Brighton for several seasons, and have always been a successful competitor. Many of my trees are in as fine health as can be desired, and none are in a bad condition."

INSECTS.

A few words in regard to insects and our remarks are brought to a close. Mr. Brehaut has alluded to the green-fly, and more particularly the red-spider, as the pests of the orchard-house cultivator, and tobacco is the old remedy for the first, and a sure one if used in season.

The red-spider is often very troublesome, and often hard to destroy; but if the right means are used their ravages can be soon checked. The oil soap mixture will do it, if the trees are well syringed, but as objections are made to its odor, sulphur will be equally effectual. Our plan has been to fumigate with sulphur, being very careful not to let it melt and burn, as it is then sure to take off the foliage. Another safe method is to thoroughly syringe the trees on the under side of the leaves, by turning each pot on its side; then, while wet, they should be thoroughly dusted with sulphur. The house should then be kept as warm as possible without danger, for a day or two, when another good syringing with clean water will take off all the sulphur and red spiders too. This mode is safe, and thorough if well done, and in the hands of inexperienced amateurs will not lead to any loss of the crop.

The other insect most troublesome is the peach borer; these should be looked after attentively, and if this is done there is little chance of their doing much damage. Every few days the trunk should be looked over, and if washed with whale-oil soap it will be all the better for the tree. If they do attack any of the specimens, which can soon be observed, they should be killed by inserting a wire in the hole, or cutting them out carefully.

Eternal vigilance is the price of success, and the cultivator who does not start with this motto will be likely to fail.

