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R E P O R T

ON THE

FRUIT AND KITCHEN GARDENS NEAR PARIS,

FROM OBSERVATIONS MADE DURING A VISIT IN
THE SPRING OF 1847.

BY

MR. ROBERT THOMPSON,

SUPERINTENDENT OF THE ORCHARD AND KITCHEN GARDEN.

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FRUIT AND KITCHEN GARDENS, ETC.

THE Garden Committee having considered it desirable that I should proceed to France for the purpose of reporting to the Council what I might observe most worthy of notice in the fruit and kitchen gardens there, it was deemed expedient that I should proceed thither early in the spring, on account of seeing the operations of pruning and training, as well as to embrace the opportunity of availing myself of the important assistance of Mr. Francis Rauch, which might have been lost by delay: the period of his stay at Paris being then uncertain. Having resided four years in and near Paris for the purpose of accurately observing everything connected with horticulture, he was eminently qualified for the task he kindly undertook of conducting me to places most important to be seen in regard to the object of my mission, and likewise for obtaining the best possible information, on all essential points, from the various horticulturists whose establishments we visited.

I accordingly went from London to Southampton by railway, February 27th, and sailed the same evening for Havre, where I arrived next morning. Here there was little to be seen interesting in a horticultural point of view. I observed, in passing through the market, some good specimens of the Easter Beurré Pear, exposed for sale under the names of Bergamotte de la Pentecôte and Doyenné d'Hiver. This, with some Old Colmars, St. Germain, and Catillacs, were the only kinds of Pears worthy of notice. Of Apples they had some good Reinettes du Canada, which they call Reinette du Canada, or Reinette de Bretagne; some Nonpareils, Reinette Grise, Pigeonnet, Reinette Franche, Reinette de Caux, or Belle Reinette de Caux, a very handsome variety, and, from being generally exposed, its cultivation must be rather extensive in this part of Normandy.

There were several varieties of Apples named Reinette Franche ; the one so called at Havre is the same as the Reinette Franche Grauwe of the Dutch, and is an excellent late dessert Apple.

Of vegetables, Salsify and Scorzonera were very plentiful ; so much so that it may be inferred the demand must be much greater than in London. Cabbages and Savoys were rather indifferent, but Brussels Sprouts were good. The excellence of this green is certainly not sufficiently appreciated in England, where it is apt to degenerate in many situations, but in others there is proof of its seeds having been saved for years as genuine as any imported from the neighbourhood of Brussels ; the plants producing abundantly *jets*, or sprouts, as round and compact as they possibly could be.

The weather at Havre was quite as cold as that experienced on the other side of the Channel—clear and frosty, with keen north-east wind. To this the fruit and vegetable market at Havre was much exposed, it being more adapted for coolness in summer than shelter in winter. The women, sitting at their stalls, had small charcoal fires in earthenware pans on their laps. It appeared that, in consequence of the substance of which these open *chaufferettes* were composed being a slow conductor of heat, they could be supported on the clothes without danger of the latter taking fire ; but burning charcoal, placed in such a position, the individuals respiring almost directly over it, must have very pernicious effects. The inhaling of carbonic acid under such circumstances cannot be avoided ; in fact, its profusion was indicated by the frequency of abrupt stifling coughs, and the bad consequences may be considered as more than a counterbalance to the comfort. But the carbonic acid gas from dry beech wood, burned in leaky stoves in rooms, and evolved so pure as to be unseen—but not the less insidious—is a much more dangerous affair ; and the circumstance is of too frequent occurrence in France.

I went from Havre to Rouen by diligence, March 1st. The vast number of apple-trees along the sides of the road, and in single rows between the fields, are, I believe, chiefly cider varieties. Although these trees are at considerable distances from each other, and have consequently plenty of air, yet they are generally covered with moss even to the tips of the branches. The soil does not appear to be wet, and it is cultivated close to the trees. It seems to be in many places a light-coloured clayey loam, but not too stiff ; and frequently it is very calcareous. The subsoil in the latter case must be dry enough, but this circumstance does not appear to prevent the trees from being infested with moss. It has been stated by some in this country, that they have cleared their trees of moss by syringing them with

lime-water, which is a cheap and easily applied remedy, the efficacy of which may be readily ascertained.

The extensive lines of fruit trees, and the disposition of the numerous plantations of trees for fuel, give a peculiar aspect to the part of the country between Havre and Rouen. Wherever there is a farm-house, or patch of houses, such are generally enclosed, on three sides at least, by a plantation of trees, for shelter partly, but chiefly for fuel; and these plantations exhibit so much uniformity, that one is led to suppose their formation and maintenance must be regulated by a special law. An embankment is formed near the habitations on the north side, and usually at right angles with this, on the east and west sides. Some recently formed appeared to be about four feet high, and as many in breadth on the top, which is flat; and on this two rows of trees, chiefly beech, are planted. I observed no sweeps formed by the plantations, probably because such would have interfered more with the ploughing of the adjoining fields. It has doubtless been proved for ages, that in thin soil such embankments favour the growth of trees.

Rouen.—The Botanic Garden at this place, or “Jardin des Plantes de Rouen, et à l’École Normale primaire du Département de la Seine-Inférieure,” is situated on the south side of the town, and so far distant as to be sufficiently out of the reach of smoke. It is on the site formerly occupied by Calvert’s Nursery, and, together with the Arboricultural department, occupies, it is said, upwards of twenty acres. The cultivation of this and the former garden has been for more than forty years under the direction of M. Du Breuil, senior. The Arboricultural, including the Fruit-tree department, is superintended by his son M. A. Du Breuil, Professor of Agriculture and Rural Economy, and of Arboriculture, &c. The arrangement of plants is on a level part of the ground. The plants are disposed in beds five feet wide, and according to a modification of the Jussieuan system. The tallies are supported on iron stems about three feet above the ground.

Lectures are given by Professor Du Breuil on vegetable physiology, the agents of vegetation, soils, &c., budding, grafting, pruning, training, and, in short, everything connected with the management of fruit-trees. There are specimens of trees to illustrate both good and bad practice in these matters. The trees are very neatly pruned and trained, and exhibit almost perfect examples of the various modes of training figured in Professor Du Breuil’s *Cours Élémentaire Théorique et Pratique d’Arboriculture*.

There are some specimens of trees against walls, which are

left to their natural growth. The trees illustrating the Montreuil mode of training the Peach are well managed; but here, as elsewhere, the difficulty of repressing over-luxuriance in the centre, whilst the lower horizontally inclined branches become weak, is apparent.

A Peach-tree was trained with a central upright stem, from which the branches are trained horizontally, with bearing shoots inclined forwards on the upper side only of the horizontals. In another tree the branches likewise proceed from a single upright stem, but are wider apart, so as to admit of bearing shoots being laid in from both the upper and under sides of the branches; the main branches having an elevation of about 20° . This mode admits of the wall being covered sooner than by the preceding. At present the trees are doing very well, but they are apparently not above six years old, scarcely covering the wall, which is about ten feet high. In this Society's Garden, where the soil is much richer, trees of Peaches and Nectarines trained on the above principle, namely, with branches proceeding from a single upright stem, did not succeed; the sap flowed with too great force into the vertical stem, and the horizontally inclined branches had, on the other hand, a great tendency to die off.

In other specimens of training, modifications of the fan method were exhibited. In that called *Eventail à la Dumoutier, ou à la Française*, the stem is made to form two ramifications, and each of these is subdivided into two, within a few inches of their bases. After these have grown to nearly their full extent, two more shoots are allowed to push from near their bases; and, by cutting back, these produce others to furnish the centre of the tree; but this leads to the objectionable necessity of having there two vertical and nearly parallel branches; which, although among the last produced, would, in many cases, be apt to become too strong, from being in the direction of the strongest flow of sap.

The great inconvenience attending the Montreuil mode of training will be readily understood by any one who has observed with what force the sap flows into an upright shoot, compared with one in a horizontal position; all other circumstances being the same. Now, if two lines be drawn like a V, each at an elevation of 45° , representing the two main branches (*branches mères*), and if from either side of each of these other lines are drawn, forming angles of 45° with them, it is evident that those on the under side will have a horizontal position, and those on the upper side will be quite perpendicular. These lines give the relative positions of the branches of a tree trained according to the Montreuil system, with the exception that those produced

on the upper sides of the *branches mères* are inclined forward; but then others from them must be perpendicular, or the greater portion of the space included by the two main branches, or half the wall, must remain void.

Professor Du Breuil has commenced the training of some trees, in which two main branches are laid off according to the Montreuil mode, as are likewise the branches from the under side of these; but the branches for filling the centre are reversed till they are brought to an angle of 45° , thus forming right angles with the main branches from which they spring. By this mode there are no upright branches, and consequently no unequal competition between such and those in a depressed position, requiring the frequent application of the knife to maintain the balance of force in the flow of sap. That mode of training must be good in principle which gives a position to the branches that will ensure an equal distribution of sap with the least possible interference by the knife. In the mode under consideration, the branches occupying the centre have an elevation of 45° , whilst those produced on the under side of the main branches have only 20° ; but the latter are allowed two years' growth before the former are allowed to spring; besides, the branches from the upper side, although they have a greater elevation, yet in them the sap has to turn at an angle of 90° from its direction in the main branches; but from these main branches the lower diverge at an angle of not more than 35° . The sap will accordingly pass more readily into these than into the others where it has to turn at a right angle. The trees under training according to this mode are not so far advanced as to furnish absolute proof of its merits, but it will doubtless answer. The same principles were adopted many years ago, with trees that had proved unmanageable under the Montreuil system, in a rich border in the Society's Garden at Chiswick.

Amongst various other forms for training the Peach some trees were set off with two stems, like the letter U, from the outsides of which branches are trained horizontally. In one of these the two lowest horizontals are continuations of the two main stems; and from the upper side of these, about 18 inches apart, shoots are trained upright and parallel, from which all the other horizontal branches proceed; also, from both sides of these horizontals, bearing-shoots, about 18 inches apart, are trained with an inclination forwards. By this mode it is sometimes difficult to maintain an equal degree of vigour in both sides of the tree.

Another tree is intended to be trained with a wavy central stem. When in the state of a young shoot, this stem is bent first to the left, then to the right; and where it commences to turn from left to right a shoot is encouraged on the outside of

the bend, and trained straight to the left in a direction a little above the horizontal. Where the stem shoot is again turned from right to left, another branch is extended to the right; and so branches are intended to proceed alternately, on either side, from every outward bend of the stem till the wall is covered.

Trees were trained in the Society's Garden with wavy stems, according to the systems of Hitt and of Hayward; the former having strictly horizontal branches from the bends, with perpendicular bearing shoots; the latter with gently curved branches, with the bearing shoots inclined. But each tree, in both systems, had two straight naked stems, elevated at an angle of 45° , and $4\frac{1}{2}$ feet in length, before they took an upright wavy direction. These naked stems invariably became scorched on the sides exposed to the sun, and the upper portions of the bends were also more or less affected in the same way. Professor Du Breuil's mode is unquestionably far preferable to either of the above, inasmuch as the tree has only a single stem, from which the wall is furnished from bottom to top, instead of being unfurnished to the height of 4 feet, above which the naked stems only begin to branch, according to the systems of Hitt and Hayward. In Professor Du Breuil's tree there are no long naked stems exposed to the scorching influence of the sun's rays, and even the bends can be protected by foliage. On the whole this mode is considered highly deserving of trial in Britain.

Another mode of training the Peach seems to have no claim to such recommendation as has been given to the preceding. Two stems are trained horizontally, and from these branches are trained perpendicular at sufficient distances to admit of the bearing wood being laid in between them. The danger is that these horizontal stems being more liable to accident, such as gumming and scorching, than the other parts of the tree, there is constant risk of losing the whole. It is not natural for the Peach to support a number of perpendicular branches on a horizontal stem. The mode here disapproved of is called *Candélabre à branches droites*.

Some maiden plants of Peaches have been recently planted, in rather poor soil, $2\frac{1}{2}$ feet apart, and trained, without heading back, at an angle of 45° , on an eastern aspect. The inclination of the whole is accordingly equal; and northward. By this mode the wall is speedily covered, and a modification of it might be advantageously adopted in richer soils; on this principle a wall could be completely covered in a very few years—even before a shoot to form a branch could be safely permitted to grow, lest it should form a gourmand, in the centre of a tree laid off in the V form. Can there be any objection against planting Peach-

trees against a south aspect, at 6 or 8 feet apart; and, as they grow, incline their stems and branches westward or eastward, but not both ways?

Peaches trained *en cordon horizontal*, like the vines at Thomery, may succeed for some time; but the plan is not likely to be at all suitable for the climate of England.

The Thomery method of training the Vine is exhibited here, and, I believe, specimens of every mode of training practised in France, may be seen in a more less advanced state at Rouen. The Pyramid Pear-trees have their branches more thinned out than is generally the case about Paris; and more in accordance with what I should consider necessary for admitting sufficient sun and air in the climate of England.

I observed a cheap construction of wall for fruit-trees, which I have no doubt might be advantageously adopted in cases where the erection of brick or stone walls would not be once thought of. The wall to which I allude has a stone foundation carried up a little way above the surface; the rest is composed of a mixture of clay, straw, and a little chalk. It is about 18 inches thick, and 10 feet high, surmounted by a slate coping, projecting several inches. This wall has been built six or seven years, and is in good condition, with a fair surface, against which I have no doubt fruit-trees will find themselves very comfortably situated.

Horticulturists who may have an opportunity of visiting the garden at Rouen will not be disappointed; and under the scientific superintendence of M. Du Breuil, it will doubtless become more and more interesting. I again availed myself of that gentleman's kind invitation to see the Garden on my return from Paris; and my first impressions of the excellence of its arrangements were fully confirmed. I must add, the great attention bestowed by M. Du Breuil in explaining these arrangements deserves my best acknowledgments.

I left Rouen, March 2nd, by the 11 o'clock train for Paris. The frost still continued, and the ground could only be worked where well exposed to the sun's rays. The vineyards seen from the railroad were not dressed, nor even pruned. The stakes pulled up in autumn were lying in parcels on the ground, in general piled horizontally between two uprights; but in some instances they were placed upright with the end uppermost which had been in the ground the preceding summer.

In some of these vineyards, early Peas are sown between the rows of vines in December, and are usually far advanced by the beginning of March; but this season none were to be seen above ground.

Proceeded, March 3rd, to the *Jardin des Plantes*, and saw the arboretum, the plant-houses, École botanique, and nurseries for ornamental plants; and afterwards the Economical and Fruit-tree departments, which are exceedingly well managed under the superintendence of M. L. P. Cappe.

The pyramidal-trained Pear-trees are from 10 to 15 feet high, or more, having a regularly tapering outline from the base to the top, where they terminate in a single shoot. The young plant is stopped according to its strength, and so as to furnish side branches. These are not in stages at uniform distances along the stem; on the contrary, almost every shoot which breaks out from the stem is allowed to grow; but the laterals produced on these are pinched in summer, and even such of the leading shoots as appear likely to become too strong for the others are stopped. All the cultivators from whom I had an opportunity of obtaining their opinion on the subject, admitted the advantages of summer pinching; whilst some regretted that circumstances prevented them from practising it to the extent they could wish. It is, however, well followed up by M. Cappe. He pinches all the young shoots, not required to form branches, when in a very young state; when they have scarcely pushed a finger's length, they are shortened to about an inch, or from that to an inch and a half. The portion left forms the basis of one or more fruit-buds, bearing fruit in the following season, or a spur on which blossom-buds are formed for bearing in the second season.

The advantages consequent on properly managing fruit-trees with regard to summer pinching, are so important that attention to the subject cannot be too strongly urged. On the whole it occasions little or no loss of time; for the confusion which would otherwise accrue is prevented; and this being the case, it is only doing that in summer which, if neglected, would occasion as much loss of time in winter. I am aware that many have more time to attend to trees in winter than in summer; but let the advantages of summer pinching be experienced, and doubtless, in most cases, due provision will be made for its performance. By the operation, the shoots necessary to be retained have the great advantage of more light and air than would be the case if crowded by a multiplicity of laterals, retained till the time of winter pruning, when they must obviously be cut off, either so close as to leave no bud to push, or shortened to within a few eyes of their bases. In the former case the branch is left naked; in the latter, when the tree is sufficiently vigorous, the eyes left generally push other shoots, to be again cut back in winter; and thus crops of shoots are annually produced, instead

of fruit, for many years, or until the tree approaches the state of old age.

The plan which M. Cappe pursues succeeds admirably in the climate of Paris. The fruit on the pyramid Pear-trees under his management is stated on competent authority to have been last year exceedingly abundant, large, and fine. This season the trees are healthy and vigorous, and well furnished with blossom-buds. It may be said that the generally dry, clear air of Paris is very different from the cloudy and moist climate of many parts of Britain; the one being favourable for the formation of fruit-buds, whilst the other favours the growth of wood and leaves; and therefore, circumstances being different, the same practice may not be equally proper for both. There are, moreover, instances of circumstances differing so widely as to require opposite methods of culture. But this does not hold good as regards summer pinching. In England the drawback is a dull atmosphere; the shoots and foliage want more air and light. Summer pinching affords this, inasmuch as it prevents the crowding and shading of wood and leaves necessary to be retained, by that which is superfluous; and therefore it must be considered of still greater utility in dull climates than in bright, more necessary in England than in France. It is generally admitted that "where nature does most, man does least;" but with regard to the management of fruit-trees an exception must rest till summer pruning receives as much attention in England as it does in the *Jardin des Plantes*, and elsewhere in France.

Supposing the branches of a tree are properly thinned and regulated at the winter pruning, and that so far as they extend, their number is quite sufficient for the space they occupy; presuming, also, that the tree is in good health, a number of laterals are sure to spring. They are, of course, superfluous; and every one of them should be pinched as already mentioned. If the last year's shoot has been shortened at the winter pruning, then, besides the terminal one on the part left, one, two, or three next to it are almost sure to push; and these M. Cappe commences to check by pinching when about three inches in length; but those nearer the base of the shoot he allows to grow till they attain the length of six or eight inches before he shortens them. The terminal bud is of course allowed to go on for the prolongation of the branch. It frequently happens in France, and the liability will be still greater in the climate of England, that after a shoot is pinched back, the newly-formed buds on the part left will push a secondary shoot in the same season. When this is the case with those under the care of M. Cappe, he also pinches these secondary shoots to an inch or an inch and a half from

where they originate. They rarely push again; but if they do, their growths are again reduced as before.

The *winter pruning* of pyramid Pear-trees is almost reduced to a mechanical operation, when the summer management has been properly attended to. Keeping the tapering form in view, it consists in cutting each shoot a little shorter than the one immediately below it, taking care to cut to a bud situated on the side of the shoot towards that direction in which it would be most desirable the prolongation should proceed. Shoots that are too vigorous for the rest are not cut to a bud on the upper side, but to one situated below.

Some trees appeared to be much admired by every one on account of the introduction of another feature of regularity in training, besides that of a merely tapering contour. These had what is called a *tutor*,—that is, a straight perpendicular stake, to which the stem is trained; and from the top of this stake five wires are stretched to as many equidistant points on a hoop near the ground, or in one instance to five short stakes. These wires represent the angles of a five-sided pyramid—a pyramid apparently fifteen feet high on a pentagonal base. Branches are trained directly from the stem to each of the wires. In order to convey some idea of these trees, one may imagine five upright trellises or screens projecting from a central upright, forming the partitions of as many equal recesses, widening outwards. The branches form such partitions with good effect as regards regularity; and when they become ornamented with leaves and fruit the whole must prove an interesting sight. The trees had a fruitful appearance.

Instead of the branches radiating from the stem in five directions, it might be found more convenient to train them out to four points, say east, west, north, and south. It may, however, be observed, that, in the Pear-tree, five buds form a spiral once round the shoot or stem; or, in other words, supposing the leading shoot to be perpendicular, every fifth, tenth, fifteenth, &c., bud will be in the same vertical plane. Therefore, if the number of buds between one branch and that next above it be always a multiple of five, the branches radiating in each of the five directions will originate exactly above each other.

The trees above described had been formerly grown as pyramids in the usual way, with branches extending promiscuously; but M. Cappe is of opinion that by commencing with a young tree, the tutor and wires may be dispensed with. In exposed situations the wires form excellent stays; and where they are employed, a comparatively slender stake will be sufficient.

A curious specimen of trellis-work was standing against the end of one of the sheds adjoining the plant-houses. It had been

formed by crossing and inarching the branches of apple-trees, so as to form rhomboid interstices. The piece had been grown from three stems, and was three or four feet high. The branches were so completely united, that although the bark was partly off, and the wood somewhat fissured by exposure, it was impossible to say with which stem in particular the vegetation of the respective branches had communicated. I am of opinion, that if any one of the stems had been sawed over, the branches it supported would have derived nourishment to keep them alive from the other roots. It appeared to have been removed from the place of its growth many years; but previously it must have formed part of a very strong living espalier.

Several of the hot-houses are very old, and will probably be pulled down as soon as the contemplated additional new ranges are finished. At present there is not half sufficient room for the large collection they contain. The new palm-house is lofty; and in it there are some magnificent specimens.

In some of the hot-houses, heat is derived from large stoves of white stoneware, placed inside. They have apertures at the sides for supplying heated air, somewhat resembling the Polmaise system. They are adapted for burning wood, and appear to have been in use for many years. The state of the weather required them to be hard at work when I had the opportunity of seeing them.

In the *École de Botanique*, the plants are named on different coloured labels: Red, indicating plants used in medicine; Green, alimentary; Blue, those employed in the arts; Yellow, ornamental; and Black, poisonous plants. I may here mention that M. Neumann, who has the superintendence of the plant-houses, was for some time in the Mauritius. He informed us that the *Aërides odoratum* is there used as tea, a very few leaves being sufficient for infusion. I thought it might be employed merely for imparting a flavour to the tea; but he said they used the *Aërides* leaves without employing any other along with them.

Keteleër's Nursery, Boulevard des Gobelins.—In this there is but little space for fruit-trees; but grafting of Pinuses and other ornamental plants is performed very successfully. M. Keteleër finds the *Abies religiosa* does much better grafted upon the *Abies canadensis* than it does upon the *Abies excelsa*. He possesses excellent collections of Conifers, Azaleas, Roses, and Camellias, and amongst the latter a fine new variety called *Camellia Saccoi nova*.

The Nursery of M. Dupuy Jamin, Barrière d'Italie, Route de Fontainebleau, contains extensive assortments of fruit-trees

and Roses. . . Pyramidal-trained Pear-trees were here plentiful. The demand for these must be great, judging from the quantity observed to have been recently planted, more especially in the numerous small gardens. On observing that the branches were not sufficiently thin for the due exposure of the fruit, the reply was that this was certainly the case, yet the nurserymen found that their customers generally preferred having plenty of wood, and they had to suit them accordingly.

Parallel to a long central walk in this nursery, a small zinc pipe was supported by stakes about two feet above the surface of the ground. Such an aqueduct could be formed at a trifling expense, compared with the saving it might be made the means of effecting in a dry season. It is certainly an object of pecuniary importance to supersede the labour of several men by merely turning a cock, and allowing the water to run quietly along to reservoirs at a distance from the source, instead of wheeling it in tubs, and frequently tearing up the walks in the course of the proceeding. It may be said that the pipe might as well be laid in the ground, as the water would rise to a level; but in that case the pipe would only be available in one fixed direction, instead of being easily moved to where it may be requisite. Such pipes might be made at no great expense, in convenient lengths of about ten feet, with flexible India-rubber connexions. The lengths could be tied together in bundles when not wanted; and when required, they could be readily extended in any direction.

The Establishment of M. de Gontier, Barrière d'Enfer, Route d'Orléans, contains many varieties of Pine Apples, among which are a number raised from seeds recently obtained from Guadaloupe; and a very large assortment of Camellias, exceedingly well grown.

The Pine Apples are cultivated as follows:—The suckers are potted in small pots in October; and in March following they are planted out of the pots into peat soil, 12 plants under each light, the lights being each 4 feet by 4 feet 4 inches. In October the plants are taken up, and repotted, with all their roots, in pots 7 inches wide. In March, the finest plants are taken out of these 7-inch pots, and planted in peat in a fruiting-house, where they mature their fruit in the course of the summer and autumn. Those not planted out remain, and are fruited, in the pots. It thus averages about two years from the time the suckers are first potted, till the plants reared from them mature their fruit.

In a small compartment, with top and bottom heat supplied from the same source as that from which the Pine-house is heated, there were two plants of the *Musa Cavendishii*, each

bearing a large fruit cluster, one consisting of 300 fruits, the other 250. They had been planted in March, 1846; and in April, 1847, the fruit was expected to be ripe. The stem of one measured $31\frac{1}{2}$ inches in circumference. They were growing in leaf mould, the extent for each plant being 4 feet by 4 feet 6 inches, and about 15 inches deep. When the fruit is ripe, the plants are taken up, and the places prepared for fresh suckers.

The Strawberries here forcing were the Comte de Paris and the Princesse Royale.

At the *Establishment of M. Cels, Chaussée du Maine*, noted for large collections of Camellias and Cacti, and amongst the latter many thousand seedlings, there is a wall of Peach-trees, planted about six years ago by M. Alexis Le Père, of Montreuil, and has been since managed by him according to his system, a modification of that usually practised at Montreuil. The trees extend about 12 feet each way, two main branches diverging at an angle of 45° of elevation; subsidiary branches are trained from the under sides of these; but no branch has been suffered to grow to any extent on the upper sides of the main branches, a number of fruit-bearing shoots only being there encouraged, consequently a large portion of wall still remains uncovered between the two V formed main branches.

Gardens of the Luxembourg.—We proceeded to these gardens, March 5th, to hear the lecture on pruning, by M. Hardy, at 8 A.M., in the open ground. M. Hardy delivers two lectures every week, free to the public, on pruning, grafting, planting, and in short, every thing connected with the management of fruit-trees, finishing the course in the end of April. He has generally from 300 to 400 hearers, among whom are young men employed in the Luxembourg Gardens, the Jardin des Plantes, and other establishments, by permission of the respective directors. In various instances the young men afterwards make up for the time they are thus absent. But the greater number of those who attend are amateurs. M. Hardy also lectures in the afternoon to gentlemen wishing to obtain a knowledge of the management of fruit-trees. The admittance for each person to any one of these is, however, 3 francs. From fifteen to twenty gentlemen usually attend the afternoon lectures.

In his first lecture, I was informed, M. Hardy explained the physiology of the tree, the action of the sap, the names of the different parts of the tree; the stem, branches, and the technical distinctions of the latter, such as *Rameaux à bois*, *Rameaux à fruit*, *Brindilles*, *Lambourdes*: branches for wood; branches

for fruit; fruit-bearing twigs, and spurs. The term *brindille* requires however a little more explanation:—Pear-trees recently raised from seeds are usually armed with thorns, a provision for the defence of the young plants; but naturally, as the trees get older, and more especially when influenced by cultivation, the thorns are produced less abundantly, and by degrees they disappear. The thorns latterly produced lose their original character. Instead of being naked, one, two, or more very small buds may be observed upon them; but still they are pointed, and this being the case, they yet retain the characteristic of a thorn, and cannot elongate in the following season. Some after productions may however be seen to terminate in a small bud, and the substance throughout is much softer, but still harder than the regular shoots on other parts of the tree. These growths may be then looked upon as thorns modified; they become capable of elongation, and are what the French term *brindilles*. They proceed at right angles from the branches producing them; and are not inclined to grow upright. They sometimes bear fruit before the other branches; but when the trees get into full bearing, these *brindilles* are not required.

M. Hardy concluded by showing how to handle and properly apply the knife.

The second lecture, he took a maiden plant, and explained how it ought to be dealt with according to the modes of training for which it might be intended; then a plant two years old; another three, and so on.

For the third lecture, at which I was present, he had a pear-tree, intended for a pyramid, planted in the centre of a circle, formed by a rope, about 50 feet in diameter, outside of which the people stood to hear the explanations, and see the mode of operation. In the tree selected for illustration, M. Hardy pointed out faults from not pinching the shoots in the previous summer; and some others in consequence of former winter pruning. The reasons for cutting each branch as he did, were successively given, as well as an explanation of the bad effects of cutting otherwise; and ultimately the pruning of the tree was completed in good style. We had an opportunity of closely examining it after the lecture was over.

We then inspected the different quarters planted with pyramid Pear and Apple-trees, and those containing Cherry and Plum-trees. As there is no wall for Peach-trees, these are trained against a trellis, backed with straw mats; and with this assistance the fruit ripens perfectly well.

All the quarters containing fruit-trees are surrounded with borders, planted with Cherry, Plum, and Apricot-trees, as standards; and some with excellent effect are trained in form of

a *Vase*, or *en Gobelet*, dwarf, or with a stem 5 feet or rather more in height. The head is formed hollow, in shape like a goblet, the shoots being annually tied to hoops of wood, adapted to the circumference required to give the desired form. Two hoops are sufficient, the two-year old wood being tied to one; and the equidistant regulation of the one-year old shoots is effected upon the other. As the *vase* or *goblet* widens, of course hoops of greater circuit must be prepared, either of new materials, or by introducing an additional piece. In some instances the hoops were formed of round, apparently $\frac{1}{4}$ inch, iron rods; but wood is preferable to iron, for vegetation in contact with the latter is apt to be injuriously affected by the rapidity with which it heats and cools. Shoots are apt to spring up in the centre of the goblet; but they must be pinched in summer; and so all other irregularities of growth appear likewise to have been. The form is very ornamental; it can be produced at little expense; and the trees were well furnished with fruit buds. Suppose a tree to have 6 shoots, let them be tied at equal distances to a hoop placed horizontally, and then shortened a few inches above it, or so as to leave them a foot or more in length. From each of these, two shoots may be trained to the outside of a somewhat wider hoop in the following season; and thus by annually introducing hoops of a width proportionately corresponding with the respective diameters of the vase intended to be imitated, the desired form will ultimately be produced. The head of the tree will be completely balanced; and the branches will be more nearly equidistant than they could be by any other mode of training as a standard. I should prefer wooden hoops to iron ones. If weak, or if two or more pieces must be employed for the hoop, its circular form may be preserved by two small rods, secured diametrically across it.

Adjoining the Fruit-tree quarters there is a compartment used as the Experimental Garden of the Royal Agricultural Society of Paris. The space, however, is too limited for any extensive experiments being undertaken; and the backwardness of the season had prevented any thing interesting from being commenced.

The Botanic Garden of the École de Médecine lies in a low situation; but this is doubtless an advantage in the hot dry weather. The plants are disposed in straight beds.

In one of the quarters there is a collection of 1800 Vine plants, from all the departments. This was chiefly formed by Chaptal, when Minister of the Interior, in order that their nomenclature might be settled, and their respective merits ascertained. I am not aware that the original intention has been fully carried out; but the vines are still kept in good order.

It may be interesting to mention, that in the Gardens of the Luxembourg, and Jardin des Plantes, the best collection of fruit-trees in France, that of the Chartreux, was preserved; and also that from these gardens the sorts were obtained by the Society when the collection was forming for the Garden at Chiswick. This was the best source whence the identical varieties described by the celebrated Duhamel could be obtained, as appears by a communication from M. Thouin, appended to a list of grafts sent to the Society in 1820, and of which the following is a translation:—

“Various causes having prevented my worthy colleague, M. Bosc, from taking off the grafts requested for the Horticultural Society of London, from the nursery of the Luxembourg, he begged of me to make the collection. This I undertook with the greatest pleasure, as, in obliging my friend, I may also render a useful service to an honourable body to which I am proud to belong.

“The Society may be assured that the names of the grafts precisely correspond with the varieties described by Duhamel (*Traité des Arbres Fruitières*, Paris, 1768). The following are the means which were employed, by which we are able to accomplish so important an object.

“In 1793, when the question was agitated of suppressing the monasteries, and placing their property at the disposal of the State, foreseeing the destruction of the garden of the Chartreux at Paris, and anxious to preserve to horticulture the originals on which Duhamel had established his nomenclature, I begged and obtained permission from the minister Roland to remove whatever trees I pleased from the complete collection which that garden contained. They were labelled according to the Catalogue of the Chartreux, and transplanted in the garden of the Museum, where they were arranged in such a way as to form a school for the instruction of nurserymen, gardeners, country gentlemen, and even botanists and physiologists.

“The garden of the Chartreux was soon after destroyed; there remained no vestige of it; and it was not till ten or twelve years after, that it was re-established in the Luxembourg, by rooted plants or grafts taken from our school of the Museum, in the Jardin des Plantes.

“On the formation of that school I invited Christopher Hervy, gardener to the Chartreux, a man well informed on the subject of fruit-trees, and who supplied Duhamel with a great portion of his nomenclature, to make a general examination at the periods of the flowering and fruiting of the trees, to prove the identity of the names of our varieties. This labour was pursued during the first six years of our plantation in the school, in such

a way as to correct errors which might have crept in. There now, therefore, remains no doubt on this head. But this is not the case with many of the varieties obtained from various parts of France, and more particularly from abroad, since the publication of Duhamel's work. The nomenclature of these is vague; in many cases the sorts have proved synonymous with those already known; and it is necessary to wait till the trees have fruited in order that they may be correctly named."

It thus appears that the collection of the Chartreux, made during a period of 150 years, was preserved by the exertions of M. Thouin; and of that collection the Horticultural Society of London received with the above communication, grafts of 48 varieties of Plums, 99 of Apples, and 145 of Pears. Peach and other kinds of fruit-trees were subsequently forwarded from the same source.

M. Laffay's Nursery, Rue du Bel-air, Montée des Capucins, Bellevue.—From the Luxembourg we proceeded to Meudon, but did not find M. Pelvilain at home. We then called on M. Laffay, Bellevue, well known as a rose cultivator, and who possesses thousands of seedlings of the Perpetual Moss Rose. Here, the aspect being northerly, the ground was still frozen (March 5) to the depth of 6 inches, which is very rarely the case in England so late in the season. M. Laffay had the kindness to give cuttings of various kinds of fruit-trees for the Society, among which were the Belle de Havre Apple; the Muscat Noir Hâtif Grape, although not the very earliest, yet the earliest, he said, of all *Muscat* Grapes; also cuttings of *Malus Sieversianus*, originally from the Caucasus, and named after a Russian general. Mr. Knight's seedling, the Elton Strawberry, succeeds well here, producing large fruit in great abundance, and it affords a late succession.

Sèvres.—Here, on our way to Boulogne-sur-Seine, we passed the King's Flower Garden, whence the supply of bouquets for the palaces is principally derived. It is laid out in straight beds. We then traversed the *Park of St. Cloud*. The elevation where the "*Lanterne*" is situated commands a very fine view of Paris.

At *Boulogne-sur-Seine*, the seat of Baron James Rothschild, there is extensive forcing of fruits, flowers, and vegetables, under the direction of M. Bergmann, a native of Holland; and he seems to prefer the usual practice adopted in his country of forcing under low structures. The fruits being forced were Pine-apples, Grapes, Peaches and Nectarines, Apricots, Cherries,

Plums, Melons, Raspberries, and Strawberries. All these had a very promising appearance. The forcing houses are mostly wooden structures, about 11 feet high, and 8 feet wide; they are heated by hot water in copper pipes. The pits for Melons, Cucumbers, French Beans, &c., are heated by hot water, aided by dung linings. The boilers as well as the pipes for this purpose are made of copper. This substance appears to be generally preferred to iron for the hot water mode of heating about Paris, even by market gardeners. On the score of economy, they say, that although it is somewhat dearer than iron in the first instance, yet it is ultimately cheaper, inasmuch as it wastes but little, and it is always saleable. As regards adaptation, they can obtain heat much quicker from it than from iron. This property is more especially an advantage in such a climate as that of Paris, where the general clearness of the air admits of a large amount of sun-heat being suddenly accumulated; and consequently, the quicker the heating apparatus parts with its heat the better. On the other hand, in proportion nearly as the clearness of the air favours a sudden rise of temperature by sun-heat, so does it facilitate the rapid escape of heat by radiation, as soon as the sun's influence is withdrawn; and hence a promptly heating apparatus is again the most eligible.

Parallel to a range of forcing-houses, on the opposite side of the walk in front, there are two rows of vines about 4 or 5 feet apart; outside of these, over half the length of the rows, a moveable frame is placed, with sashes inclined so as to rest below the edges of a board at the top, and high enough to admit of a person walking along between the rows of vines, trained upwards on both sides. When the vines have been grown one year under this structure, it is removed and placed over the other half of the plantation. By this arrangement the vines are grown, one year under glass, and the next in the open air, and so on alternately. Finer grapes are thus obtained than by constantly keeping the vines under glass. This fact deserves further consideration.

Supposing a vine is planted in a rich border, and that it is introduced into a house where it is successively forced with abundance of heat and moisture, but with some deficiency of light and air; the foliage may be ample and the shoots gross, but it does not follow that this luxuriant growth is a substantial one, although, under the circumstances, the best system has been pursued. The growth may have progressed steadily under a gradual increase of temperature, like that of the natural climate of the vine. So far as heat and moisture are concerned, the vine under glass need be no sufferer; but, as regards light, it must suffer to a greater or less extent. That this is unquestionably

the case will appear evident from an inspection of Bouguer's table of rays reflected from glass. According to this, the average amount of rays reflected from glass at various angles of incidence from 1° to $87\frac{1}{2}^{\circ}$, or, we may say, from morning to night, is upwards of 22 per cent. This calculation is on the supposition that the roof is all good glass. But an additional privation of the rays of light must be taken into account, in consequence of their total obstruction by the rafters, &c.; and sooty laps have no small share in producing obscurity. Altogether we may reckon that, in the course of the day, vines under a glazed roof are deprived of more than 30 per cent. of the rays of light which they would enjoy if growing in the open air. This privation must weaken the constitution of the plants, especially when they are year after year subjected to it.

I do not suppose any one ever saw grapes badly coloured on the open wall, provided they at all approached the state of ripening. When yet sour, they may be seen as black as sloes; and whether the border is rich or poor, or the fruit exposed or partially shaded by the leaves, still the colouring is good, if the climate is only sufficient to bring the fruit to the stage of growth in which the colouring process is effected, and although too cold for perfect ripening. The superiority, as regards colour, of grapes on the open wall, may therefore be fairly ascribed to the free action of light on the foliage.

The influence of light, however, goes much farther than the mere colouring of the fruit. By it the constitution of the whole plant is affected, from the foliage to the very extremities of the roots; the latter, in fact, cannot long continue to be produced unless the leaves effectually elaborate sap, and this they cannot do without free light and air. Even in this country vines growing in the open air maintain their roots in any soil that is not excessively bad; but with all appliances, how generally do they fail in borders when their tops are kept under glass! There the heat may be well regulated, greater perhaps than out of doors, but not greater than where the vine lives for centuries, and a due supply of moisture may be afforded; but the natural constitution of the plant becomes impaired for want of sufficient light; and sometimes to such an extent that, with a little mismanagement in other respects, the vine is scarcely able to bear fruit at all.

From the above remarks it may be inferred that M. Bergmann's plan of alternately forcing and exposing his vines is highly advantageous. Were it not so, he would not likely be at the trouble to move his glazed structure annually. I have endeavoured to explain the principles on which, as it appears to me, the merit of the plan rests; that is, the beneficial influence of

unobstructed light on the foliage. The renovating effects of this for a whole season must undoubtedly enable the vines to produce a superior crop to any that could otherwise be obtained. The principle will hold good in England, or anywhere else, provided the heat of the climate is sufficient to ripen the wood without artificial heat and covering. This indeed must limit the full adoption of the method; but the latter may, notwithstanding, be usefully borne in mind, and the principle may be acted upon wherever circumstances will permit. For example, I believe it will not be denied that better grapes have generally been produced in old vineries with sliding sashes, than in those with fixed roofs, and ventilating holes in the front, and back walls for admitting sufficient draught of air. Sliding sashes not only admit air, but likewise the free light to a considerable quantity of the foliage, during portions of the brightest days; and thus, to some extent, the advantages of M. Bergmann's method are ensured. Fixed roofs, on the contrary, entirely preclude the admission of light except through the medium of the glass, and it may be concluded they are not the best construction for the vine.

A number of men were employed trenching a large extent of lawn. The grass, when laid down after the soil has been trenched and manured, keeps longer green when the heat and drought become excessive, than would otherwise be the case. This process, repeated in the course of several years, is an expensive mode of maintaining verdure; but it is doubtless the best. In kitchen-garden cropping it is well known that they who trench in winter save much time as regards watering in summer, and if plenty of manure can likewise be afforded, most crops will require but little watering, even in very dry seasons. They are also better than where the ground, from not being so prepared, requires daily large supplies of water during a long period of drought, and hence occasioning perhaps much more expense than would have been incurred by previous trenching.

Trees and shrubs appeared to thrive well, but more evergreens might be introduced with good effect, together with additional species of ornamental trees. I observed, as worthy of particular notice, a remarkably fine specimen of the *Juniperus virginiana*, var. *pendula*.

Nursery of Messrs. Jamin et Durand, Rue de Buffon.—M. Jamin's nursery here is but small, and may be considered chiefly as a dépôt for trees to supply his orders. Along the sides of the walks some fine tall specimens of pyramid Pear-trees were remaining; but the greater part had been just removed to his new nursery-grounds, of considerable extent, at *Bourg la*

Reine, route d'Orléans, about four miles from the Barrière. Here we found them about to be planted in good soil, duly prepared for their reception. Many of them were well formed, to the height of sixteen feet in six years; some were on pear-stocks, others on quince; M. Jamin is rather partial to the former.

The trees were planted deeper than is considered advisable in England; but this was said to be necessary in order that the roots might not suffer during the very hot weather. The holes for the trees were made as they ought to be, not like a basin, or half sphere, but with the sides perpendicular, and the bottom convex, a slight mound of prepared soil being there formed, over which the roots were spread.

M. Jamin does not shorten the shoots of trees worked on the pear stock so much as he does those on the quince; and none of them were so much thinned as he would recommend and practise, were it not for the preference which his customers give to those trees that are furnished with plenty of wood. He generally commences pinching the young side-shoots in the end of April.

In another part of his new ground a number of the hardiest varieties are planted as standards; those that are less hardy he prefers growing as pyramids. On each side of a long central walk he has commenced planting a collection of the different varieties of Pears and Apples, in the order of their ripening. The Society obtained from him, several years ago, a number of varieties reputed the best at the time; and in going round he again supplied grafts for the Society of such as he considered the finest new kinds in his collection, such as the Suzette de Bavay, Baronne de Millot, Fondante Millot, Beurré Starkmann, and Arbre courbé Pears; the latter is so called from its pendulous habit of growth. Altogether, 20 varieties were at this time received from him.

Fruit and Kitchen Gardens of the Palace of Versailles.—We proceeded to Versailles, March 8th, with the intention of confining ourselves to the inspection of the fruit and kitchen gardens only on that day. These, with the buildings appertaining to them, occupy about 30 acres. They were originally laid out, as regarded their internal arrangements, by Jean de la Quintinye, in the time of Louis XIV. They are said to have been much neglected during the revolutionary period, and until the restoration of the monarchy. They are now, however, under good cultivation. The forcing department is under the immediate superintendence of M. Grison; the fruit trees on walls, espaliers, &c., are managed by M. Puteaux.

The forcing of fruits and vegetables in houses, pits, and frames

is extensive; this department occupies nearly two acres. In a long range of houses, 10 feet high at back, and between 6 and 7 feet wide, Peaches are trained horizontally against the back wall, and sometimes the extremity of one branch is inarched to some part of a branch of the adjoining tree, thus forming a continuity. Along the front, Peaches, Nectarines, Plums, and Cherries were being forced in pots. The fruits on these were just set. The varieties of Cherries in forcing were the May Duke, and another said to be a new variety, called the Reine Hortense. The Plums were in 13-inch pots, and their shoots are pinched in summer, so that little winter or autumn pruning is required.

Many of the forcing-houses have evidently been constructed on economical principles, but independently of this, small houses appear to be still preferred; for a new house, on which expense in well fitting up has not been spared, is only 8 feet high at back, 4 in front, and 10 feet wide; the length, 20 lights, about 80 feet. Peaches are planted against the back wall, and trained to horizontal iron wires, 8 inches apart, running through eyed holdfasts. From iron uprights, by the side of the footpath at the back, very neat wire trellises extend across towards the front; against these Peach-trees are trained and kept to their limited space by pinching, the trellises being only about 4 feet high even at the footpath, and the distance from one trellis to the other is only 4 feet; the trees, one at each trellis, are planted almost close to the footpath, and their branches are trained horizontally towards the front.

In an older house, Figs were trained in the same way against trellises similar to those above described. They were planted close to the south side of the footpath at the back, and had all their branches trained horizontally towards the front. They had a very promising appearance for fruit. The young shoots are pinched early.

A number of Fig plants were observed that had been raised by layering from plants in the open ground. They were layered in small pots in May, 1846, and in October last they were removed, shifted into 12-inch pots, and taken into the house for forcing. They were studded with a profusion of young fruit.

In the Peach-house, the horizontal mode of training along the back wall has been generally adopted, the bearing wood being encouraged on the upper side. The Apricot-trees in houses were also trained in this way. In one of the houses a Peach-tree has been budded on the apricot as a stock, and is yet thriving very well.

Some of the fruiting Pine-houses appear not to have been originally constructed for that purpose. They are more than 10 feet high. The back wall is perpendicular to the height of

about 6 feet, and then curves gradually forward over the foot-path. The back was formed to a considerable height of arches, the openings of which are closed in with sheet iron, in order to transmit heat the more readily from dung linings when necessary. But the heating is now generally effected by means of hot water in flat copper conduits, 10 inches deep, and 2 centimètres, scarcely an inch, wide. They consequently occupy but little space in the width of the house, or horizontally. Copper, either as round pipes or in the flat form, is here preferred, chiefly on account of its being a more rapid conductor of heat. In some cases open troughs, for a supply of moisture, are formed on the tops of the copper conduits.

In one pine-house, consisting of Queens, the fruit was nearly ripe, and a fair size. The plants were grown in small pots in sandy peat, and in shifting the plants were not disrooted. In another house the plants were growing, not in pots, but planted in a bed of peat soil, laid on stable litter, well beaten, for bottom heat. They had a vigorous appearance, and will be two years old when they mature their fruit in the ensuing summer. The Cayennes, and other large sorts, were those so planted out. Some were planted out of pots into peat soil in January last, after their fruits were formed; the plants were thriving, and the fruits were swelling exceedingly well. The number of Pine Apples annually fruited in these gardens must be immense. The houses we had already passed through were extensive, when we came to four more fruiting ranges, each 100 feet in length, 6 feet wide, and 7 feet high at the back.

A seedling Pine Apple was shown to us by M. Grison. It was a monstrosity, preserved in spirits, with a cockscombed crown, a line following the wave of which was no less than 6 feet in length; another fruit, diverging from the same stalk, was of the usual form.

In a house heated by a flow and return copper conduit, there was a *Musa Cavendishii* in fruit. It was not quite a year old, and was planted in leaf mould, resting on a bed of stable litter and leaves.

Vines were being forced in wooden pits, surrounded with dung linings. These pits were certainly of a very cheap construction, merely some posts and boards nailed together, and only 3½ feet wide; but the quantity of grapes produced in that limited width was astonishing. The vines were trained horizontally along the back, which was apparently not more than 3 feet high. A 3-inch earthenware pipe was laid along the front for hot water, supplied by means of a small boiler placed at the end of the range. The variety in forcing was the Chasselas de Fontainebleau, or Royal Muscadine, as it is generally called in England. The

crop was excellent, and would most probably be ripe about the third week in April. M. Grison does not force the same vines successively; he only forces them every other year.

In such pits, similarly heated, Peaches were also growing well, and the fruit was further advanced than any in the houses.

Extensive ranges of pits were occupied with the forcing of vegetables, such as French Beans, Peas, Carrots, and Lettuces; of the latter a variety called the *Laitue George* was preferred. The Peas in the pits were not in pots. The pits for French Beans were furnished with copper pipes for supplying heat, in addition to that derived from the dung linings. The variety of Melon then forcing was the *Cantaloup Petit*. Eight ranges of pits were chiefly occupied with the *Alpine Strawberry*, that being the sort preferred at the royal table. M. Grison found that seedling plants of this sort, when forced, ran much to leaf, but did not fruit so well as plants from runners. He accordingly sows every year, and instead of employing the seedling plants themselves, he pots, in August, the plants from the runners which the seedlings produce.

Vines on the open wall are managed according to the *Thomery* system; but they make much stronger growths, the soil being richer than at *Thomery*, and also rather damp below. M. Puteaux informed us he had pruned the vines on those walls for forty years. They were planted 6 feet from the wall, and the shoots laid towards it at the depth of 15 inches. By the *Thomery* method, each plant has only one stem, branching into two arms, extending horizontally right and left. The shoots from buds along these horizontals are trained upright; they bear the fruit, and in the winter they are cut back to the *lowest eyes*. M. Puteaux cuts them back to one eye if weak, sometimes to two if strong. In pruning he always studies next year's wood and fruit more than the present. He hesitates not to sacrifice a fruitful but misplaced shoot, in order to obtain one more eligibly situated in the following season; acting according to the spirit of a line in *Rapin*:—

“Nor spare the boughs, for sparing spoils the tree.”

He spares no shoot, however promising for fruit, if it interferes with the principles of the system he has adopted. So promptly has he uniformly dealt with all such, that it was not an easy matter to find a perverse shoot for exemplifying in such a case his mode of proceeding. The principle is, to cut back all the upright shoots to the lowest eyes that can be observed; and although the lower of two adjoining shoots be the weaker, yet, because the eyes at its base are the nearest to the main branch, they are preferred, whilst the upper shoot, although the most

promising, is entirely cut back. The whole wall was furnished with fine bearing wood, the pruning of which had been but recently commenced.

Fruit-trees in some of the quarters and peach-trees on walls suffer from the dampness of the soil, or more especially the sub-soil. The site is low and flat. Probably, the ground had been dug out to raise the terraces of the palace. Peach-trees against the walls do not long continue to thrive; but the mode of training them, somewhat like the Thomery vines, is not conducive to the health of the peach-tree. There are some good pyramid pear-trees in the quarters, and some have their branches curved downwards, like those in the Society's garden. M. Puteaux ties the pears on the branches of these pyramid trees, to prevent them from being prematurely blown down.

The quarters are surrounded by espaliers six feet high. Wooden posts are driven into the ground as supports for the trellising, and the whole has a neat appearance. By the side of the central walk in this part of the gardens the espalier is partly constructed of iron, strong bars forming arches from post to post, surmounted by an iron top-rail. This contrasts strangely with the simple upright and horizontal lines which the adjoining espaliers exhibit.

In some of the quarters inside these six-foot high espaliers there are very dwarf ones, about sixteen feet apart, the spaces between them being cropped with vegetables. These dwarf espaliers are scarcely four feet high; they are formed by posts driven into the ground, and to these four small wooden rails are fixed horizontally. Pear and apple-trees were trained against them. Some of the trees appeared to be fifteen or twenty years old.

What is done at Versailles as regards espalier-training might be very advantageously imitated in other large gardens, and for small gardens no mode is so proper. If the trees be well managed, they will almost support themselves by the time the first, and not expensive, woodwork decays. They occupy comparatively little space; some crops can be grown almost close to them; and their appearance, loaded as they ought to be with fruit, cannot certainly be deemed unsightly.

We observed some pear-trees trained on espaliers, horizontally it may be said, but with an important peculiarity. On remarking them we were informed that their branches were originally trained from the stem at an angle of 45° of elevation; but that they were afterwards brought to a horizontal position, excepting the parts near the stem, which still retained almost the original position. Although lowering the branches was, I believe, an after-thought as regards these trees, yet I believe a

better principle than that of allowing the branches to ascend at the above angle for a little way from the stem, could not be adopted.

The orange-trees are magnificent. Their winter-quarters are below the terrace of the Palace; consequently, they have only light in front, which, of course, is lofty, otherwise trees thirty feet in height could not be admitted. The number of orange-trees is 1500. Some are 300 years old, with stems thirty-nine inches in circumference. One has the inscription "*Semé en 1421.*" Its age must, therefore, be 426 years, and it is probably the oldest exotic in existence. The trees are planted in boxes made of oak; and these boxes are said to last from fifteen to twenty years.

Market Garden Establishment of M. Truffaut, Rue des Chantiers, Versailles.—This we visited after leaving the Royal Gardens, March 8th. Forcing, particularly of pine-apples, is here carried on extensively. The pine-suckers in autumn are put in three-inch pots. In the following April they are turned out of these pots into a bed, where they remain till the end of October. They are then taken up, *disrooted*, potted into seven-inch pots, and then placed in the fruiting pit till March or April, when they show for fruit. They are then turned out of the pots into a bed of sandy peat soil, newly prepared for their reception. This bed is heated underneath by hot water in open copper troughs, six inches wide and only two inches deep. The chamber in which these troughs are placed is eighteen inches deep. Over this chamber the soil in which the plants grow is supported by wood and tiles. The boiler is copper.

In two compartments, where bottom heat for the pine-apples is supplied by means of hot water, top heat is obtained from a six-inch cast-iron pipe, serving as a flue from the same fire which heats the water for bottom heat. From the fire at one end it *uniformly ascends* along the front, till it terminates in a brick chimney at the farther end of the compartment. The joints of the cast-iron pipe are merely cemented with clay. There is a fire at each of the opposite ends of the two compartments; and the chimney where the pipes terminate is in the middle, at the front. Hot water was previously employed for top heat; but the tubular cast-iron flue was found to be more effective, with less fuel, than was required for the hot water. This mode certainly deserves to be made the subject of experiment in order to ascertain exactly its advantages, so as to be able to state them in numerical terms. In the first place, it will be necessary to take into consideration the expense of *one* cast-iron pipe of six inches diameter, compared with *two* four-inch pipes, flow and

return, for hot water. The circumference of the six-inch pipe is to the sum of the circumferences of the four-inch pipes as 18·857 to 25·142, or within a fraction of 15 to 20. It therefore appears that about one-fourth less metal is required for the flue than for the pipes; and if it were possible to get the larger casting at the same rate per lb. as the smaller, the cast-iron flue would be, in the first instance, a saving of 25% per cent. This alone is an important object; and when the saving of fuel and more effective heating are stated to be the results, certainly no more arguments need be adduced in favour of the plan. It is necessary, however, to make a few remarks with reference to the position of the cast-iron flue. It was stated above that it uniformly ascends along the front. This being the case, the heated air also ascends naturally towards the farther end, thereby causing a less pressure in that part of the pipe next the fire. This part would become excessively hot if the pipe were level, and would even give out a greater excess of heat next the fire than the old flues, iron being a more rapid conductor than the materials of which they were composed. Probably one foot in twenty would be a sufficient gradient; those observed appeared to rise more than this.

M. Truffaut prefers the Queen Pine-apple, because that variety best suits the market, grown to the weight of 2 lbs. He sells the whole to a fruiterer a little before the fruit is ripe for twelve or fourteen francs each.

He forces vines in wooden pits or frames 4 feet wide, 3 feet 6 inches high at back, and 1 foot 6 inches in front. Heat is obtained from copper pipes and dung linings. The vines in these wooden frames are forced *every second year*. In such frames strawberries are forced; ten ranges, each sixty or seventy feet in length, for vines and strawberries cost about ninepence each range per day for fuel, which is wood. The boilers are copper. The varieties of Strawberries forcing were Keen's Seedling, British Queen, and Elton. The latter, although a late variety, is employed with advantage, because it is a great and certain bearer, and answers well for coming in after the other forced sorts, and before those in the open ground. The ranges for forcing French beans are extensive, the variety being the Nain hâtif de Hollande.

Potatoes, the Marjolin, considered the same as the Ash-leaved kidney, had an exceedingly healthy appearance, growing in frames. Those which M. Truffaut forced last season had no disease; but those he grew in the open ground were much diseased.

M. Truffaut expressed himself as having been much gratified with his visit to England some years ago, when he had an oppor-

tunity of seeing the Society's garden; and he most kindly afforded us every information he possibly could.

We next called at the *Establishment of M. Souchet, Versailles*. It occupies exactly an acre; and this is nearly covered with glass, chiefly for the cultivation of Camellias. In growing these the different kinds are arranged together, and the whole establishment is conducted with great attention to order. About 1000 large bell-glasses are employed for the purpose of propagation.

Royal Gardens at Meudon.—We proceeded, March 9th, to Meudon, chiefly for the purpose of seeing the Pine-apple culture, in which M. Gabriel Pelvilain surpasses all competitors of the present day; and, judging from the vigorous and healthy appearance of the plants, they certainly bid fair to maintain the celebrity which he has already acquired. We saw at various establishments very healthy plants; but none equalled in luxuriance those at Meudon. We obtained the following details respecting the mode of culture:—

The suckers are potted in four-inch pots in August or September, the earliest period after the fruit is cut being preferred, and in these four-inch pots they remain till spring.

In March or April following a bed is prepared, half dung and half leaves, and covered with ten inches of peat soil, and into this the rooted suckers, turned out of the four-inch pots, are all planted for the summer.

In October the plants are carefully taken up with a little soil at their roots, which are not at all cut, and potted into seven-inch pots, in which they remain during the winter.

In the following spring, about March, when the plants show fruit, a number of the strongest are selected for the purpose of being turned out of the seven-inch pots, and finally planted, free, in a bed of peat soil, in houses, where they remain to ripen their fruit in the course of the season.

The remainder, not so planted out, are fruited without being shifted out of the seven-inch pots. Beds of half dung and half leaves are prepared about March, and when the heat has been properly regulated the plants are plunged, and there in the seven-inch pots they are fruited.

It thus appears that the plants are always in pots in winter. The suckers are in small pots the *first winter*. The plants are turned out into peat soil, free, during the *first summer*. All are repotted into seven-inch pots, and so kept during the *second winter*. In the *second summer* the strongest are planted out of the pots into peat soil for fruiting, and the remainder are

fruited in the seven-inch pots, plunged in beds of dung and leaves.

There is certainly no great mystery as regards this simple mode of procedure. But the extraordinary size of the fruits of those planted out in peat soil, as mentioned in the 'Gardeners' Chronicle,' vol. for 1846, and likewise the present luxuriant and remarkably dark green foliage of the plants, do not appear to be sufficiently accounted for by anything very peculiar in the routine, although perhaps a better could not be adopted. The effect must be produced by some powerful agencies which we have not yet traced out. It will, therefore, be necessary to enter minutely into details respecting the position of the plants, and to direct attention to circumstances likely to influence their growth.

The plants, as already stated, are planted out in the fruiting-houses in a bed of peat soil. The depth of the soil is about fourteen inches, placed on a wooden flooring, consisting of boards laid side by side, and supported by iron bars.

The arrangement of the fruiting-houses will be best understood by a plan and sections, which I have the satisfaction of being enabled not only to refer to as published in the 'Gardeners' Chronicle,' 1846, p. 820, but to introduce.

There are four fruiting-houses, which are heated with hot water and stable litter combined; the stable litter for bottom-heat, and the hot water for surface-heat.

No. 1, with 11 lights, each light 4 feet 4 inches wide, is the largest, of which fig. 1 is the ground plan, and figs. 2, 3, and 4 different sections of it.

Nos. 2 and 3, with 15 lights. They are in one line, and the middle light is occupied by the furnace, &c.

No. 4, with 10 lights. The whole are constructed upon the same plan.

Fig. 1.

Fig. 1. Ground Plan of fruiting-house, No. 1; figs. 2, 3, and 4, sections of it. In fig. 3 is shown the manner in which access is had to the hot-bed. Fig. 4 shows the entrance and the furnace, with a side view of the house.

a, furnace; b, hot-water pipes; c, chimney; d, concealed pit to get at the hot-bed; e, hot-bed; f, door, which is shut up after the stable litter has been removed; g, air-holes, furnished with a cover to regulate the bottom heat; h, bed filled with peat soil, in which the pine-apples are planted; i, iron bar covered with boards to hold the peat soil; k, foot-path; l, door; m, water cistern; n, shelf for strawberries; o, ground line; p, iron railings for hanging the straw mattings upon, which serve to cover the houses.

Fig. 2.

Fig. 3.

Fig. 4.

Air is given to all the pits when required by lifting up the lights.

The following analysis of the Meudon peat, *Bruyère de Meudon*, is stated to have been made with great care by M. Payen:—

Fine sand	62•
Roots and vegetable remains	20•
Humus	16•
Carbonate of lime	0•8
Matter soluble in cold water	1•2
	<hr/>
	100•0

The above can only be called good sandy peat with a mere trace of lime in the form of carbonate. The water employed is spring water. These substances *apparently* constitute the only source whence the plants derive their luxuriance; but in this respect they so far exceed others in similar soil, that it is evident they must have an additional large supply of nourishment to that afforded by peat soil and water nearly pure.

The large stone-built vault below the beds happened to be empty when we were at Meudon, and we had an opportunity of satisfactorily examining it. The boarding over-head was, of course, somewhat decayed, from the action of the gases arising from the dung; and in various places the old roots of the pine-plants were hanging where they had insinuated themselves between the boards. When this vault is filled, or nearly so, with fermenting dung, an immense quantity of ammoniacal and carbonic acid gases must be constantly generated; and they must as constantly find means of escaping, not readily by the stone walls, but very easily by the boarding under the soil. Ammoniacal gas passes through the pores of wood much quicker than common air or other gases do. Liebig states, 'Organic Chemistry,' p. 86, that ammonia, "When in a volatile state, is in a great measure lost before it can be imbibed. When fixed, in the state of salts, its volatility is overcome, and not the smallest portion of the ammonia is lost to the plants, for it is all dissolved by water and imbibed by the roots." From the quantity of carbonic acid gas evolved with ammonia during the continued fermentation of the materials, carbonate of ammonia must be abundantly formed. This smelling salt every person knows is very volatile; but it will be in great measure absorbed by the moisture of the soil as it ascends into the latter. It has been proved that water is capable of absorbing 780 times its bulk of ammoniacal gas.

It was stated that the water employed was spring water, *nearly* pure. Unless distilled, no water is perhaps absolutely pure, since it always dissolves more or less of the substances with which it comes in contact. The water near Paris owes its hardness to the presence of gypsum. This circumstance may be of some importance as regards the Pine-growing at Meudon. "Gypsum (sulphate of lime) and other sulphates convert the carbonate of ammonia into the more fixed sulphate, which re-

mains in the soil till absorbed by the roots" (Turner's 'Chemistry,' p. 1256). It is impossible to say how much water the beds of peat soil may have received in the course of the summer, neither is the proportion of sulphate of lime which it holds in solution accurately known. For an approximate calculation it may, however, be assumed that the quantity supplied would not be less than that of rain which would fall on an equal surface out of doors, say two inches in depth per month, or six inches in three months: this, during the latter period, would give 9350 lbs. for a bed 50 feet by 6 feet. If we, then, estimate the proportion of sulphate in the water to be only one two-thousandth part, we shall have in the above quantity of water upwards of four pounds and a half, which would fix double the quantity of ammonia applied to wheat crops in the garden of the Society, and which produced the remarkably dark green, luxuriant foliage which many will recollect having there seen in successive seasons for some years past. Ammonia, however, in any form, in solution with water, produces luxuriant dark green foliage.

From what has been stated it appears evident that the large Meudon pines feed chiefly on the products of decomposition, supplied by fermenting materials in a capacious vault below the peat soil, in which they are planted.

The Peach-trees at Meudon are trained on the same principle as the Vines at Thomery, the shoots being trained upright from the upper sides only of the horizontal branches. Each tree has two such branches, extending, one right, the other left. The distance of the tiers formed by the horizontal branches of the different trees is about $2\frac{1}{2}$ feet. The young shoots, trained upright in summer, are shortened to less than a foot in length at the winter pruning; and whilst they bear fruit in the following summer, a shoot for succession is trained from the base of each; or, if a shoot spring still closer to the horizontal, it is preferred. The trees are planted 4 feet apart; and are furnished with excellent bearing wood.

From Meudon we went to the Palace of Versailles, having only seen the Fruit and Kitchen Gardens there on the previous day.

The *Nurseries of the Petit Trianon*, under the management of M. Briot, are chiefly occupied by American plants, and other ornamental trees and shrubs. Grafts of an apple called the *Reinette de Trianon* were obtained for the Society. Some young Apricots were observed which had been budded on the *Myrobalan*, on which stock, it is said, the Apricot-tree is not apt to gum.

There are here a number of *Arbor-vitæ* hedges, chiefly the *Thuja orientalis*. The *T. occidentalis* can be kept thinner than the other; but its roots are found to extend more into the soil

of the beds. These hedges are about 12 feet apart, and 9 feet high, cut perpendicularly. They afford shade as well as shelter, and American plants thrive very well between them.

The severity of the winter had served to test the hardiness of a number of seedling Rhododendrons, hybrids between the *R. arboreum* and *catawbiense*. Some, having taken much of the character of the *arboreum*, were injured; but many, partaking of the hardiness of the *catawbiense*, were, under the same circumstances, not affected.

Montreuil.—Snow and sleet rendered the 10th of March unfavourable for horticultural excursions. At night it appears the thermometer in the Society's Garden at Chiswick was 25° Fahrenheit below the freezing point, or within 7° of zero. What the degree was at the same time at Paris, I had not the means of ascertaining; and I believe they have not registering thermometers in the Jardin des Plantes. The windows, however, were richly foliated with frost; and when we went to Montreuil, on March 11, the thermometer there indicated as low as 20° Fahrenheit in the morning. Towards noon, the difference between the extremes of a keen frosty wind experienced on the north side of the walls, and a hot sun beaming through a very clear sky, reflected also from white walls with a southern exposure, was remarkable.

Montreuil is situated about 5 miles east from Paris; but the road to it from the Barrière de Montreuil lies in a north-east direction. Between 1400 and 1500 acres of the Commune are occupied by walled enclosures, chiefly for the growth of Peaches. It appears a walled country, without houses or tall trees to interrupt the view, apart from the village, which lies lower than where the gardens extend. The gardens are generally parallelograms, with cross walls, the latter about 30 feet apart, and from 8 to 10 feet in height. The walls are 40 centimètres, about 15½ inches thick at bottom, and 30 centimètres, or 11½ inches at top. Three mètres, about 9 feet 10 inches, is now considered a suitable height; but in England, particularly in the northern parts, the walls cannot be too high; for the higher the wall, the better the peaches will ripen. The walls at Montreuil are generally plastered on both sides, rather more than an inch thick. Instead of tying the shoots to wooden trellising, the Montreuillois now prefer training to the naked wall, driving the nails into the plaster. The walls covered with this substance afford one peculiar advantage; they can be kept free from insects by frequent whitewashings without being thereby disfigured. They have permanent copings, projecting from 5 to 10 inches, according to the height of the walls, or the fancy of the proprietor. For the

Peach, the south-east aspect is considered at Montreuil the most favourable.

The soil appears a poor yellowish-brown calcareous sandy loam, such as would be unfit for wheat or other corn crops. In the Peach culture it gets occasionally some Paris street-manure.

We called on *M. Alexis Lepère, Cultivateur de Pêchers, Rue Cuve-du-Four, 40, à Montreuil-sous-bois*, who has published a very good work on the pruning and management of the Peach-tree. We found him at his grounds, where on certain days he gives practical instruction, each person attending paying three francs. To make sure of meeting him, we went on one of those days.

Before describing his mode of training, considered the latest improvement of the Montreuil system, it may be proper briefly to explain what that system was. Its principle originally consisted in checking the perpendicular flow of the sap by diverting it into two channels, right and left. This was effected by means of the two main branches, laid off like a V. But branches taken from the under sides of these invariably became too weak, whilst those allowed to grow at the same time from their upper sides soon exceeded the original main branches in point of vigour. The under branches frequently died, or became useless from weakness, and those above them had to be lowered in their places. This was the case for two centuries at Montreuil.

Butret published a *traité* entitled *Taille Raisonnée des Arbres Fruitières*, which was considered the *vade mecum* of the cultivators. In it the physiological details connected with the management of the Peach-tree are excellent, and led to the mode of allowing the branches on the under side of the main branches to be a year in advance of those on the upper. This was considered the best system of Montreuil training when the Garden of the Society was formed, and accordingly it was there adopted. But it was found not to answer; for although the under branches had the advantage of being started a year before those springing from the upper side, yet in two years the latter not only exceeded those secondary branches, but likewise, in most cases, the main branches themselves. It was therefore found impossible to follow the system with advantage, and consequently its adoption was never recommended by the Society. The Montreuillois now condemn that mode themselves on the same grounds.

In order to remedy the evil as much as possible, instead of starting the under branches one year in advance of the upper, they give them several years' advantage, as will be understood from *Fig. 1*, which represents the number and direction of the principal branches forming the *charpente* or frame-work of a

Fig. 1.

tree trained *à la Montreuil*, as now practised. The figures represent the years in which the respective branches were originated, reckoning from the plantation of the tree. From this it will be seen that no branches are permitted to grow on the upper side of the two main branches (*branches mères*), marked No. 1, till the fourth year; and then the branch No. 4 is allowed to push; in the fifth year No. 5 is originated; and finally, in the sixth year No. 6. It must be observed that Nos. 5 and 6 will still be apt to appropriate more sap than Nos. 2, 3, 3, although these have been three or four years longer established. Aware of this, M. Lepère has acted on the principle of allowing the under branches a still longer period to establish themselves before any are encouraged on the upper side. He has the east aspect of one wall covered with trees managed according to his *Pratique Raisonnée de la Taille du Pêcher en Espalier carré*. The trees were 16 years old: one of them extended 40 feet, others 30 feet, on the wall, which is $8\frac{1}{2}$ feet high.

Fig. 2.

Fig. 2 represents the branches of one of his trees, trained *en Espalier carré*, so named from the branches terminating in points, lines drawn through which would form an oblong square. The marks indicate the places where the leading shoots were shortened, and the figures indicate the years from the plantation of the tree, in which the cuts on the respective branches were made.

Suppose the tree planted and headed back to two eligible buds for producing the two main branches (*branches mères*) A A, then at the end of the

First year, the branch A is cut at 1, at the winter pruning; and the branch B is originated.

Second year—The branches A and B are cut at 2; and the branch C is originated.

Third year—The branches A and B are cut at the marks beyond 2; the branch C is cut for the first time at 3; and the branch D is originated. The tree has now all its lower branches established.

Fourth year—The branches A B C D have their leaders shortened, as indicated; but no more branches are encouraged for this season.

Fifth year—The leaders are shortened, as usual; and the three branches, E E E, on the upper side of the branch A, are allowed to push.

Sixth year—All the branches, with the exception of F, which is not yet in existence, are shortened, as indicated by the marks 6.

Seventh year—Shortened, but no more branches originated.

Eighth year—Same process as in the preceding year; and a fruit-bearing shoot is selected for the commencement of the branch F.

Ninth year—All the branches for constituting the frame-work of the tree have now been originated; and, this being the case, no shoots are afterwards allowed to assume the character of branches. At each winter-pruning shoots of the preceding summer's growth only are left. In the following summer these bear fruit; whilst the lowest shoots which push at their bases are trained for succession.

Fig. 3.

Fig. 3 represents a portion of a branch of one of M. Lepère's trees, not pruned.

Fig. 4.

Fig. 4—Another portion, on which the operation of winter-pruning has been performed.

It will be observed that he prunes the bearing-shoots very short; and unless this be done the Peach-tree will not long continue to thrive. In consequence of leaving the fruit-bearing shoots too long, or in some cases not shortening them at all, very many Peach-trees in this country become worn out, even in their youth, and that too in richer soil than is to be found at Montreuil. M. Lepère, it will be seen, has plenty of fruit-bearing shoots: he shortens them to 6 inches; is satisfied with one or two fruits on each; and so from each of his trees he obtains on an average 40 dozen of fine large peaches. This certainly ought to induce people to shorten sufficiently the bearing-shoots, whatever the mode of training may be.

It is necessary to remark that, on the main stems, A A, of Lepère's trees, the spaces between the origin of one secondary branch and that of another are not naked. On the contrary, they are all along furnished with bearing wood, on the upper as well as the under sides. Shoots produced in one season bear fruit the next, and then, at the winter-pruning, they are cut back close to the base of the successional shoot. A large quantity of fruit is thus obtained along these main branches; but there is another advantage, as regards the health and duration of the tree. When branches are naked to any great extent, they are liable to become sunburnt, as was found to be the case with those of a tree trained according to Seymour's mode, in the Society's Garden. The bearing-shoots on this were from 12 to 15 inches apart, and on the upper sides only of the branches. When furnished with shoots at closer intervals, to draw sap, and better shaded by foliage, scorching is not apt to occur.

From what has been stated, and by referring to *Figs. 1* and *2*, it will be perceived that M. Lepère's method differs essentially from the Montreuil, as regards the greater length of time which elapses before any branches are permitted to grow on the upper sides of the two main branches. That the principle is good, there can be no question. A great objection to its adoption in this country would doubtless be, the large space of wall between A A and the centre of the tree remaining so long

uncovered. At the end of six or seven years after planting the tree, there is still a large void ; were it not for this, M. Lepère's system would be perfection. He has a thorough practical knowledge of all the operations connected with the culture of the Peach-tree, and his treatise *Pratique Raisonnée de la Taille du Pêcher*, I consider the best that has ever been published on the subject. He has other modes of training in progress ; and it would be well if any were found to equal in principle the above, which he greatly prefers at present, and at the same time afford the means of filling up the centre.

Fig. 5.

On a west aspect wall, a tree is trained as represented by Fig. 5. The mode is termed *Chandelier* training—*Taille en Candélabre*. It extends 40 feet along the wall. The two branches, A B, from which the uprights spring, were first laid off like a V, and were annually lowered till, by degrees, they acquired their nearly horizontal position. In the second year after the tree was planted, the two branches, C D, were commenced. At the end of the sixth year, the uprights were all started. Previously to this, however, fruit-bearing shoots were encouraged along the four horizontal portions. The uprights are nearly 3 feet apart, and the bearing-shoots are trained between them at an angle of 45° elevation. The tree was a good example of what may be done with the Peach-tree in regard to maintaining the equilibrium of both sides, when in such hands as M. Lepère's. Those possessing less skill would find some difficulty in managing such a form. I remarked that his admired tree, *en Candélabre*, would probably soon die, some slight symptoms of gumming on the horizontals being discernible. That such would be the case I suspect M. Lepère himself had some forebodings ; however, he declared, if it should die, he would then nail it to the wall.

On the same west aspect, a number of fine Pear-trees had been much cut by a hail-storm in June, 1845. By keeping the wounds covered, fresh bark had closed over many of them ; but some branches were still in bad condition.

In shortening a leading branch, he cuts to a bud situated *next* the wall. The consequence is, that the branch goes on straight, and the section, although exposed, soon heals over, so that it

becomes almost impossible to tell where the shortening was effected. This is contrary to the rule usually laid down and followed in this country, which is to cut behind the bud. A bend is the consequence. But the thickest layers of wood are formed in front of the branch: the wound is in fact longer in healing over where this depends on the convergence of thin layers, than where they are thick; consequently, a wound in front is sooner healed over than one at the back.

For pruning wood under two years of age, the instrument called a *Sécateur* is chiefly employed; and this I saw plied with great dexterity. For summer-pruning, and shortening one-year-old shoots, it is far preferable to the knife, particularly in the case of the Peach-tree, where the part left is, at the next pruning, entirely cut away. In cutting close to the main branch, it is necessary to use the knife. If *sécateurs* could be obtained as well made as those I saw in use, I am certain they would be much more employed in this country.

The borders for the Peach-trees are prepared to the distance of 5 or 6 feet from the wall by trenching 2 feet deep, mixing the soil well with manure. The trees are planted 6 inches from the wall. In many of the enclosures the rest of the ground is occupied with vines. In summer, the labour of watering must be very great. The Almond is much employed as stocks for the trees.

Although the soil is not rich, yet the trees are vigorous enough, with the little manure that is occasionally forked into the borders when the trees come to bear heavy crops. The cultivators attend well in summer to the equal distribution of the sap; and they adopt means to prevent it being wasted by over-luxuriant shoots, or *gourmands*. To this, and to the shortening of the bearing-shoots to 6 or 8 inches, is to be attributed the success which attends the cultivation of the Peach at Montreuil. To M. Lepère we were much indebted for the full details which he obligingly furnished of all particulars connected with the different modes of cultivation.

Fontainebleau and Thomery.—We reached Fontainebleau March 12, about noon. The inhabitants say its name is a corruption, by contraction of *Fontaine-belle-eau*—there being fine springs of exceedingly pure water at this place and its vicinity; doubtless from being filtered through fine sand, which is said to be valuable for making flint-glass. Snow commenced falling thickly in broad flakes, so that we only saw the water in a comparatively turbid state, from the influx of the former.

Notwithstanding the unfavourable state of the weather, M. Souchet, of the Royal Gardens at the Palace of Fontainebleau, had the kindness to conduct us to the vine-walls, which

are under the management of M. Brassis, *jardinier en chef du Parc et de la Treille du Roi*, at Fontainebleau. Part of the wall has an eastern aspect, and is about 20 feet high, forming the wall of barracks. More recently built, a long extent, with a south-east aspect, is 12 feet high. The whole length is 1400 mètres, or 1531 yards—nearly 7 furlongs.

Part of the wall, where highest, is occupied with vines planted $2\frac{1}{2}$ feet apart; but this was said to be too close. These were trained with a single upright stem, with the bearing shoots diverging from both sides—*en palmette*, as the mode is termed—or like the leaf of a palm. The leafstalk and leaflets of the *Cycas revoluta* afford an example of the manner in which the bearing shoots are trained from the upright main stem; or the same may be represented by fish-bones. The bearing shoots were not strong, but firm and well matured; they were about 2 feet in length; and at the winter pruning they are cut close to the lowest eyes. The upright leading shoot is cut to three eyes when the plants are young, but as they get older it is cut to only two.

Where the principle of the Thomery system, *en cordon*, has been adopted, the plants are here 3 feet apart. Each plant, as at Thomery, has only one horizontal branch to the right and another to the left, forming the cordon; but at Fontainebleau each of these extends 6 feet; at Thomery only 4 feet. The cordons formed by the horizontal branches are about 2 feet apart. With regard to the comparative merits of these two modes of training, there was no decided opinion. The first, with the bearing shoots diverging from an upright stem, is the more easily managed; but, in this country, it is questionable whether the eyes on the lower part of the stem would push sufficiently well; for in vineries it is sometimes necessary to bend down the upper part of vines trained upright, in order to ensure the pushing of the lower eyes.

The soil where the vines have an eastern aspect is naturally unfavourable, and rather wet; in fact, it was so bad that it had to be dug out to the depth of 2 or 3 feet, and replaced with better soil, mixed with some leaf-mould. Manure occasionally afforded, consists of a compost, of equal portions of horse-dung and cow-dung, and turf-parings, in alternate layers, turned several times over before being applied. Dung alone has been tried, but the compost was found preferable—the quality of the vines manured with it being much better than where dung only was employed. Along the portion of wall facing the south-east the soil is of a more favourable nature.

The vines are tied to wooden trellis-work. The wall is furnished with coping, projecting about a foot. Both here and at

Thomery, projecting copings are considered of great importance: in England they would doubtless prove equally beneficial. Under glass, projecting like a coping, it has been proved that grapes ripen, colour, and retain their bloom, much better than they otherwise do on the open wall.

M. Souchet having ascertained that there was an intelligent *propriétaire cultivateur*, M. Larpenteur, from Thomery, in Fontainebleau, he intimated our object to him. M. Larpenteur accordingly undertook, very obligingly, to conduct us by the nearest route through the forest to Thomery.

On reaching the outskirts of the forest we found ourselves considerably elevated above the Seine, and had then a good view of the village of Thomery, stretching along the side of the river and the base of the slope; and of 600 acres of walled enclosures for the cultivation of the vine. Such an assemblage of walls is perhaps nowhere to be seen, if we except Montrenil. It appeared as if the walling-in system was proceeding upwards to the precincts of the forest. Plantations of vines, in the open vineyard mode of culture, were seen verging close upon it, almost in proximity with the common heath, which grows abundantly in the forest.

From this locality Paris is largely supplied with grapes. We were informed by M. Larpenteur that the quantity forwarded to Paris, by barges down the Seine, from Thomery is not less than 30,000 lbs. daily, during the grape season; and the quality of the Thomery grapes is well known to be excellent for the table. This it may be readily supposed is owing to the steep slope on which the vines are planted. "Bacchus amat colles" is a quotation frequently introduced by writers on the vine; and the south sides of hills are recommended. But what is remarkable in the case of the Thomery vines, they are not grown on the south side of the declivity, nor does it face the east or west: the ground actually slopes to the north and north-east. I inquired the reason why the acclivity, equally steep in appearance on the opposite side of the Seine, and facing the south, had not been preferred? The answer was, it was found to be too hot and dry. Probably, the circumstance of the ground sloping as it does first induced the inhabitants to commence building walls, in order to counteract the effects of their northern exposure. At all events, we were informed that the walls were first built with the view of affording the vines an aspect directly south; but this was found too hot. They then tried the south-east, which proved the best point, as regarded the perfection of the fruit. But now, in order to suit the market, or, in other words, their own interest, the cultivators wish to have the walls still farther to the east, or even to face due east. They say there are now so many grapes brought early in the season to Paris from the south

of France that it is more profitable for the cultivators of Thomery to retard theirs till the glut of the others is over.

The different properties form long slips, separated by walls. Interiorly each is subdivided by cross walls, about 30 feet apart. Formerly the walls were composed of clay, plastered over; but they now build them of stone. They are about 8 feet high, furnished with a coping of flat tiles, projecting about 8 inches, and worked up to a ridge-top, in order to throw off the wet. The projecting coping is considered of great importance by the cultivators, on account of its keeping the fruit dry, and preserving the bloom. Wooden trellises are affixed to the wall, and to these the vines are trained in the following manner:—

Formerly the vines were planted 4 feet from the wall, and layered till they reached it. This mode is not now strictly adopted. The plants are 16 inches apart. The plant *A* having reached the first horizontal bar of the trellis, which is 6 inches above the surface of the ground, it is there cut at the winter pruning; and shoots are trained from it to form the cordon, right and left. The distance between the cordons is 18 inches; and when the vine *B* has extended so far above the cordon formed by *A*, it is likewise cut, for the second cordon. In this manner the vines *C*, *D*, *E*, are treated at the winter pruning, after they have attained the respective heights. At *F* is represented the mode of introducing a vine, to form a cordon, from the other side of the wall.

It will be seen that each vine has two arms, extended in opposite directions; and that their utmost extent horizontally is only 8 feet; whilst the bearing shoots are not allowed to pass the next cordon: consequently, each vine is limited to 8 feet by $1\frac{1}{2}$ of trellis, or 12 square feet. We had the opportunity of seeing the vines at Thomery winter-pruned, as in the lower cordon of the above figure; and not pruned as in the four other cordons. At the winter-pruning the upright shoots which have borne the fruit are cut close to the small eyes situated at their bases; and from these eyes, only two shoots are allowed to grow up to bear fruit, to be stopped in summer below the next cordon, cut back, like their predecessors, at the next winter-pruning; and so on for perhaps half a century. We saw some old knotted subjects occupying no more space than that above mentioned, that had been planted by the grandfather of the present proprietor, fifty years ago. Their space indeed seemed ample enough for their apparent vigour. They would certainly form the greatest contrast imaginable with the vines described by travellers in the East, having stems $1\frac{1}{2}$ foot in diameter, with branches, supported to form a canopy 50 feet in length and breadth, covering 2500 square feet. Yet, on such a portion of wall as is represented by the figure, being only 8 feet in length and as much in height, it is calculated that not fewer than 320 bunches would be produced.

The soil is not rich, nor does it get much manure; only a little when the shoots become very weak, once in three or four years. It is a poor light brown sandy soil, such as would not be supposed capable of supporting anything like a crop of grapes. We obtained some of it, which has been analyzed by Professor Solly, and gave the following result.

Analysis of Thomery Soil.

Silica	81.0
Alumina	7.0
Oxide of iron	3.0
Lime	1.5
Magnesia	0.5
Saline matters	0.5
Organic matters	3.5
Water	3.0
	<hr/>
	100.0

It may prove interesting to contrast the above with an analysis of the soil in the Society's Garden at Chiswick, by the same eminent chemist, and which was published in the 'Transactions of the Horticultural Society,' Second Series, vol. iii. p. 36:—

Analysis of Soil in the Garden of the Horticultural Society.

Silica	78.730
Alumina	5.182
Oxide of iron	8.250
Lime	0.640
Magnesia	0.107
Potash and soda	0.047
Chlorine	0.004
Sulphuric acid	0.007
Phosphoric acid	0.018
Organic matters	7.000
Loss	0.015
	<hr/>
	100.000

It appears from these analyses, that the Thomery soil contains a greater proportion of silica, alumina, lime, and magnesia, than the soil in the Society's Garden; but nearly one-third less oxide of iron, and only one-half the quantity of organic matters. The latter circumstance proves that the soil is not highly manured. The manure preferred consists of equal portions of horse-dung and cow-dung mixed. The dry soil is easily moistened throughout.

Vines are also trained, *en cordon*, against low espaliers in the ground forming the central plot of the respective enclosures. In some seasons the fruit from these is said to be excellent in quality; but wind and rain often render it unsaleable, except as inferior produce. Some of the espalier vines were 60 years old, and were even partially overrun with moss. Against a wall 16 feet high, vines were trained *en palmette*, as at Fontainebleau.

Outside the walled enclosures, in the open ground approaching the forest, vines were observed cultivated according to the vine-

yard system. The shoots are trained to stakes in summer; and at the winter-pruning *all* the shoots are cut down to two eyes. The plant then resembles a stumped willow-stool. The stakes here employed measured 4 feet 3 inches in length.

The variety of grape cultivated almost exclusively at Thomery on walls, espaliers, and in the open ground, is the Chasselas de Fontainebleau, which is the same as the Royal Muscadine. The cultivators are particular in propagating only from such vines as are the most healthy, and which produce the finest fruit. They do not say that such are varieties absolutely distinct from the Chasselas de Fontainebleau; but they do maintain that there is decidedly a constitutional difference amongst the plants. M. Larpenteur had the kindness to cut some shoots for the Society from vines recently planted against a wall, and which had been propagated from vines producing the finest fruit growing at Thomery.

We tasted some of last year's crop of grapes, still fresh. They keep them on broad stages, occupying the middle of an upper story, leaving a passage all round between the stage and the walls. A board along the edges gives the stages the form of a shallow box, in the bottom of which is placed a layer of well-dried fern, upon which the bunches are laid. M. Larpenteur was of opinion that very dry straw would answer as well as the fern.

Having seen the mode of training the vine at Thomery, and received, through the kindness of M. Larpenteur, full information respecting its cultivation, we retraced our steps through the forest, and reached Fontainebleau at dusk.

Corbeil.—From Fontainebleau we proceeded by diligence to the rail-road station at Corbeil. Near this some Pear-trees have been managed in a peculiar way by M. Fourké. In order to see these trees, and get back in time for the train, there was not a second to be lost, for the probability was very doubtful. However, we did see them with astonishment, without which, I think, no gardener in England could. They were fine trees, covering a wall, and trained horizontally. But they were not planted when young, and trained progressively in order to produce this regularity. On the contrary, they were planted when large and irregularly grown, having in some places a redundancy, in others a deficiency, of branches. Various means are frequently resorted to with the view of supplying branches where wanting; such as notching, budding, or side-grafting the stem; but here the desiderata were obtained by in-arching the *growing extremities* of adjoining shoots to the parts of the stem whence the horizontals should proceed.

Supposing the branches of a tree are trained horizontally a foot

apart, with the exception of some where the buds intended to produce branches did not break, as is often the case; then a shoot, *a*, is trained up, and, when growing in summer, a small slice is taken off near its extremity, and a corresponding extent of surface immediately below the inner bark of the stem is exposed; the two are joined together, and the point of the shoot *a* is inclined in the direction to form the branch *c*.

The most remarkable feature in the trees at Corbeil was the uniformity of vigour in the respective branches. It appeared as if the supplied branches, *c c c*, had been allowed to grow in connection both with the stem at *b b*, and the branch from which they originated at *a a a*, till their length and thickness corresponded sufficiently with that of the branches above and below them. This is a great advantage which the mode possesses over budding or side-grafting. At the distance of a foot apart for the horizontal branches, it takes as many years to cover the wall as the latter is feet in height; for although the leading shoot may grow three or four feet in length in a season, yet by shortening it to two feet, although the branches *d d* would be produced, the buds at *b b*, to furnish the intermediate stage, most probably would not. In fact, the attempt to form two tiers of horizontals in one season is generally followed by more or less disappointment. The intermediate stage might, however, be readily supplied by the method above detailed; and a wall twelve feet high might be covered as well in six years as it otherwise would be in twelve.

We had not time to ascertain the name of the place where these Pear-trees are growing, nor that of the gentleman who owns the property. He is said to be enterprising, and carries on some manufactory closely adjoining. The place is situated some distance south from Corbeil. Thither, in all haste, we re-

turned, hearing by the way the time-bell of the station, to us a very unmusical sound. However, we got into the train for Ris.

Parc du Fromont, à Ris.—This was laid out by M. Soulange Bodin in the English style; and, although not kept up as formerly, one could scarcely divest himself of the idea that the scenery was not in France. We observed some Cedars of Lebanon which had thicker stems, and were considerably taller, than the *Abies excelsa*, planted at the same time, upwards of 30 years ago. The soil of the garden is rich. The coping of the walls projects a foot; and vines are trained upon the Thomery system, with the exception of being planted $4\frac{1}{2}$ feet apart. One of the plant-houses sloping considerably from one end to the other was heated by a cast-iron flue, about 8 inches in diameter, the fire being at the lower end of the house.

Market-Garden Forcing Establishment of M. Josseaume, Rue de Reuilly, Faubourg St. Antoine.—The articles in forcing here, March 16, consisted of Asparagus, Lettuces, Carrots, and Cauliflowers. Asparagus was then selling for 15 francs, about 12s. per bundle of 80 *sticks* or shoots. We measured some of these shoots 3 inches in circumference, and nearly 18 inches in length. They were grown in beds the soil of which appeared to be chiefly composed of decayed dung. The beds, $3\frac{1}{2}$ feet wide, were covered with frames, the sashes of which were almost flat. The spaces between the beds were 2 feet wide, and $2\frac{1}{2}$ feet deep, filled with fermenting dung. M. Josseaume commenced cutting Asparagus in November. It is forced for ten or twelve years; but the beds forced early one year are later forced the next. Cauliflowers, Cabbage-lettuces, the *Laitue noir*, and Carrots, were grown also in frames. A number of large bell-glasses were employed. Under these, Cabbage-lettuces were planted next the outside, and one *Cos*-lettuce in the centre. Between the Lettuce plants in frames, some litter is put on the surface of the beds during severe weather.

Forcing Establishment of M. Dulac, Rue de Picpus, Faubourg St. Antoine.—Melons, Cucumbers, Lettuces, Cauliflowers, Carrots, Radishes, &c., were here forced. The Cantaloup Melon and White Cucumber were the sorts employed. The *Laitue Romaine verte* is grown under bell-glasses on beds, with trenches between the latter 15 inches wide, filled with dung. The *Laitue Crêpe*, a small early Cabbage-lettuce, sells, when forced, at about a penny each. The *Laitue rouge* is planted out for the earliest crop in the open ground. After the forced Cauliflowers, Let-

tuces, Carrots, &c., are over, the beds are stirred up a little, and some soil, chiefly decayed manure, is put on; and Melons are then planted. They ripen without glass. The soil of the enclosure here appeared to be composed chiefly of decayed dung, in which Melons grow planted out in summer. The soil, open and light in substance, but dark coloured, is readily heated by the sun's rays. Two young men were planting Cos-lettuces in a border in front of a wall with a south-east aspect; and one of them was experiencing the immediate warmth of the soil, without either shoes or sabots. On the preceding day, when we were in the Jardin des Plantes, I remarked that the frost was then but just out of the walk on the north side of the mound.

Establishment of M. Coccomier, fils, Avenue de Bel Air, Faubourg St. Antoine.—The establishment of M. Josseume is noted for what is termed *Asperges blanches*; but M. Coccomier produces on an extensive scale another description, the *Asperges vertes*, the shoots being green. He purchases roots annually to the amount of 20,000 francs—about 800*l*. He prefers plants of 3 years old; those of four years are generally once cut, and then they do not answer so well for forcing. The plants are packed close on the beds, and the roots covered with light decayed dung, the buds of the crowns being scarcely covered. With a brisk bottom heat, kept up by linings, the shoots are soon fit to cut, green and tender.

Establishment of M. Moreau, Rue de Charonne.—The forcing here consisted chiefly of Lettuces, on dung-beds, as at some of the places already noticed, some being covered with frames, and others with bell-glasses. The number of these glasses was nearly 4000. Each glass covered five Lettuce plants, consisting of four Cabbage-lettuces, and one Cos-lettuce in the centre.

I left Paris, March 18, by railway to Rouen. Proceeded next day, by diligence, through Normandy and Picardy to Boulogne, and arrived in London on the evening of March 20.

In concluding this account, I have to acknowledge the kindness I experienced in France from every one engaged in horticulture to whom we had occasion to apply for information. I found all intelligent and obliging, anxious to avail themselves of improvements in horticulture, and willing to communicate a knowledge of their modes of cultivation to others.

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