JOURNAL

OF THE

ROYAL HORTICULTURAL SOCIETY

EDITED BY THE

REV. W. WILKS, M.A.

SECRETARY

AND

MR. JOHN WEATHERS

ASSISTANT-SECRETARY

VOL. XVIII.

LONDON

Printed for the Royal Horticultural Society

BY

SPOTTISWOODE & CO., NEW-STREET SQUARE, E.C.

1895

CONTENTS OF VOL. XVIII.

PART I.

PART II.

JOURNAL

OF THE

ROYAL HORTICULTURAL SOCIETY.

VOL. XVIII. 1895.

PART I.

CONFERENCE ON TREES,

HELD AT CHISWICK GARDENS, SEPTEMBER 25, 1894.

HARDLY ever, if ever, in the history of the Society has such a magnificent and interesting collection of specimens of Hardy Trees and Shrubs been brought together at one time, and hardly ever, if ever, has the weather been so entirely, so absolutely pitiless; it rained unceasingly from morn till night, so that comparatively few Fellows and visitors were able to be present.

The chair was taken at 12 o'clock by W. T. Thiselton Dyer, Esq., C.M.G., and the following papers were communicated:—

THE LARCH CANKER.

By Mr. J. B. CARRUTHERS, F.L.S., the College of Agriculture, Downton.

THE canker which occurs in fruit and timber trees has long been an enemy of no mean importance to the growers of such trees, so that any information which may lead to the exact knowledge of one or other of these diseases will be welcomed by practical men. Professor Marshall Ward (Professor of Forestry at Cooper's Hill College), whose work on the parasitic diseases affecting British timber-trees has been of much value, in one of his

books * devotes a chapter to the description of the canker in Larch, and gives a brief account of the fungus which causes it.

In the following paper it is intended to give an account (as brief as is consistent with clearness) of the life-history of the fungus causing the disease, with the effects it produces; and at the end an attempt will be made to suggest remedies, some of which—since I first suggested them in a paper in the Royal Agricultural Society's *Journal*—have been tried with success. In a paper to be read before a body of men exhibiting both scientific and practical knowledge it is not necessary to note how discouraging it is, after the life-history of a fungus like the Larch canker fungus (*Dasyscypha Willkommii*) has been carefully studied, observed, and described by such men as Professor Willkomm, of Dresden, and Professor Hartig, of Munich, that practical men still refuse to believe that the effects are produced by the fungus, and attribute the canker to climate, soil, bad drainage, poor seeds, and other causes, just as years ago many diseases attacking mankind—the history of which is now fully recognised—were attributed to such causes as climate, position, and that most useful of all attributable causes, "the hand of God." The canker may be found in the Larch under every condition in which the tree is cultivated, and the writer has observed it on high hills and low-lying land, on thin calcareous soils as in Kent, as well as on the clayey loams of the West Riding of Yorkshire, and with all aspects. And, this being the case, it does not point to a solution of the disease—as some would have it—being found in position or climate.

Most foresters and many gardeners, unfortunately, know too well the external appearance which the canker presents when first observed. The deformed, flattened stem or branch is generally blackened, and this blackness, though it occurs almost always, is not due to the canker fungus, but to a smaller fungus (*Antennaria pithyophila*, Nees) which grows on the exuded resin and does no injury to the tree. The flattened side of the tree being kept under observation for a short time, round white pustules will be observed to be studded all over the surface, in size from that of a pin's head to a rape-seed; these are the fruits of the fungus parasite on the tree, and after a day or so they change their round shape and become cup-shaped, having a centre of a

* "Diseases of Timber."

brilliant orange colour. The whole flattened portion of the stem or branch is nearly all the time exuding resin, just as it would from an accidental injury, and if steps are not taken to rid the tree of its unwelcome visitor the deformation increases with more or less rapidity, nearly always ending in the death of the tree, and in every case rendering the timber well-nigh valueless.

The cup-shaped fungus on the bark is the only part of this parasite which can be observed by the naked eye; but though important as the means of reproducing and spreading the disease, it is not the most important part of the fungus. The damage is done by the root portion, or mycelium, of the fungus, which has complete possession of the bark, and reaches to the cambium layer of the tree, abstracting all available nourishment and killing all adjacent cells, causing a darkening of a reddish colour, which can easily be observed if a portion of the bark is cut off and the cambium exposed. As the fungus grows year after year it pushes its borders wider and increases the affected portion—the tree at the same time attempting, by means of a callus, to cover up the wounded portion, and also putting on a larger quantity of wood on the side of the stem opposite to the cankered spot, in order to maintain a vital connection and to afford the necessary mechanical support. Thus we have a swollen condition of the tree on the side of the stem opposite to the cankered area. The fight goes on in some cases for a great number of years, but in most instances the fungus will in the end succeed in "ringing" the tree, though it is possible that the tree might be able to close over the wound and form healthy wood on the outside of the canker, and thus immure it.

The spread of the fungus is naturally a most important point, and in order to understand with what remarkable prolificness the parasite will reproduce itself it is necessary to describe the cup-shaped fruits which produce the spores or seeds of the fungus. Each cup has a rim or margin surrounding the orange-coloured part which contains the spores. The spores (which are oval in shape) are enclosed in sacs or asci, eight in each ascus, some ten to fifteen thousand of which are contained in each cup, so that the number of spores produced in every cup is very great, and if one spore in every ten thousand is successful in innoculating a new tree the spread of the disease is very rapid. It must, however, be borne in mind that this fungus, like most

other parasitic plants, grows only upon its particular host—the Larch tree—and that should the spores light on any other plant they cannot grow and will do no harm.

There is one point about the Larch canker which is of great importance with regard to the cure and prevention of the disease, and that is that—as far as observation has gone—the disease does not attack trees of more than two or three years old, and it appears that when the tree has formed a sufficient layer of bark the germinating spore cannot find an entrance, and, therefore, all young trees of four or five years old which are absolutely free from disease may be considered to have passed the critical stage. It must, however, be remembered that there are always young branches in a healthy tree, and that these, with their soft cortex, are equally liable with the stems of young trees—though in the case of diseased branches pruning can easily be employed without depreciating the value of the timber. It seems, however, that the tree and its branches, having got its coat of bark, can resist the germinating spore if it preserves its cortex unbroken, but should the bark be taken off, even from a small portion, a spore may be washed into the crevice and the disease propagated.

The ordinary forester cannot, perhaps, be expected to study the life-history of such a minute plant as *Dasyscypha Willkommii*, but even with the help of a magnifying glass he should be able to recognise sufficient of the external structure of the parasite to satisfy himself of its true nature, and also to be able at the outset to detect it, and take such steps as he may deem best to circumvent it.

With regard to methods of prevention and cure, much might be written about the former, and much has been written by many eminently practical men on the subject of procuring good seeds, so that the seeding plants should not be already tainted with the disease. Until, however, it is conclusively proved that the seeds contain the spores or mycelium of the fungus, it cannot be positively stated that the seeds contain the disease, or that "unhealthy seedlings" are the cause of its appearance; and as all the trees examined by both German and English workers show in section that they have been attacked after they have grown some little time, to cast the blame upon the seedlings seems hardly fair. There is no doubt that crowded plantations favour to no little extent the rapid spread

of the disease, and that well-managed and well-thinned mixed plantations afford the least chance for the propagation of the canker; but at the same time it should be remembered that as this is a specific disease, if the trees are free from the canker, and no neighbouring trees producing the spores, the chance of infection is reduced to a minimum.

In the case of this fungoidal attack, as in all others of a like nature, when it is observed care should at once be taken to destroy effectually—and the only effectual method is to burn with fire—all portions attacked, so that the spread of the disease is stopped, and it will be found better to sacrifice the life of a few trees rather than to expose the rest of a plantation to the risk of infection.

With regard to the treatment of individual trees, with a view to sparing their lives and saving the timber, the surgical method of excising the diseased parts, and protecting the necessarily exposed surfaces by means of grafting wax or any other innocuous substance, is worthy of the attention of foresters. This method of cutting out the bark and cambium at the diseased spot was recommended in my paper dealing more exactly than I can at the present time do with the life-history of the fungus, published in the Royal Agricultural Society's *Journal*, 1891. Among others who were interested and good enough to give this suggested treatment a trial, Lord Moreton, then President of the Royal Agricultural Society, having some diseased trees, had the diseased portions cut out, taking care to leave none of the discoloured infected cortex or cambium behind, and then the wound so caused was protected by means of grafting wax and covered over with a piece of sacking. Some time after this treatment it was found on removing the bandage that the tree had been able to cover over the wound with new cambium and cortex, and to a great extent recover its original shape, and there is no doubt that if this treatment is effectually carried out it should lead to the cure of the tree. However, the discussion of the disease, with the treatments which practical men may devise to combat it, will no doubt lead to the discovery of methods of a practical, and at the same time effectual, nature of dealing with the disease, and Larch growers all over Britain will have reason to be grateful to the Royal Horticultural Society if they are able through their deliberations to help the forester in fighting this the most deadly enemy of an almost indispensable tree.

THE UTILISATION OF LAND UNSUITABLE FOR AGRICULTURE BY PLANTING WITH FOREST TREES.

By Mr. J. Simpson, Wortley.

The utilisation of land which is unsuited for farming by planting it with forest-trees is a subject which has been dealt with by many writers from various points of view, for foresters differ on the subject of planting waste lands as they do on others connected with their business, a fact which has been attributed by some to the absence of any clearly recognised system of forestry in this country as regards the production of timber. I am careful to use the word "timber," for even expert Continental foresters admit that British gardeners and foresters can grow "trees," but shrug their shoulders when timber is mentioned, which, one of them has said, we "frequently grow within locked enclosures, of which the forester carries the key in his pocket,"* implying, I suppose, that our operations in this direction are rather peculiar and not very extensive. There can be no doubt, however, about the actual present condition of our British woods. Our mature timber is going down at a rate that few suspect, and nothing like an equivalent is being planted. In many districts Larch, probably the most profitable of all British trees, is practically exhausted. Spruce for mining purposes, which can be produced in thirty or forty years, is even scarcer, although the demand is so great. Ash is almost everywhere scarce, and big Oak, for which the demand (referred to further on) is enormous for railway carriages and waggons, will soon be a thing of the past. Hitherto English Oak exclusively has been used for these purposes, but recently American Oak, and even Pitch Pine—both inferior—have been substituted. Other timbers are being used up at a proportionate rate, and woods are either disappearing altogether or getting so thin as hardly to be worth calling woods.

I have divided the subject of my paper under four heads:

* See M. Boppe's paper appended to Report of Select Committee on Forestry.

First, land unsuitable for agricultural purposes, but suitable for the production of timber. Second, choice of situations for planting. Third, kinds of trees to plant, and how to plant and tend such plantations. Fourth, prospects of remuneration from planting poor lands.

I. First, then, land unsuitable for agriculture, but suitable for the production of timber, I take to mean poor, sandy, and gravelly soils, mountain sides, glens and ravines inaccessible to the plough, sand-hills near the coast—perhaps the most worthless of any—poor peaty wastes, and such like. That there are vast tracts of land of this description in the British Isles which would grow timber well there is no question; but still, even such tracts are worth a small rent per acre for some purpose, and to turn them to better account in the production of timber can, I believe, only be done under certain conditions. First of all arises under this head the question, Who are the parties most likely to benefit by the extensive planting of waste lands? The answer is, Those who can afford to plant on the most extensive scale; and the State and the large landed proprietors are the parties who can do that best. It is a fact that the comparatively small extent of our British plantations, and their isolated and patchy distribution everywhere, greatly obstruct their profitable management. The almost universal custom is to sell home-grown timber in the rough, either standing or felled, and in this state it is removed by the middleman or the consumer, but in either case to the loss of the vendor, because the bark (with the exception of peeled oak) and all the waste and refuse have to be removed with it, and its removal paid for, which payment comes out of the price in the wood. The cost of the removal of timber in the rough to the consumer often costs half, or more than half, of the delivered price. Very often it costs from 2*d.* to 4*d.* per cubic foot to haul and remove the timber to the nearest railway station, and perhaps as much again has to be paid for railway transit after that. As 50,000 cubic feet is not an uncommon quantity of timber to sell in one year from one estate, it may, therefore, be reckoned how much is spent in haulage, a large portion of which might be saved by converting, or partly converting, the timber in the wood where it fell, *if the extent of the supply* and its *continuity* made it worth the user's while to bring his appliances to the wood instead of hauling the trees

miles upon miles to the saw-mill, and thus handicapping both producer and consumer, damaging standing timber, and cutting up roads that have afterwards to be repaired. This conversion in the wood is sometimes attempted, but our forestry practice and method of conducting sales is much against the plan. The foreign timber that comes to this country is all sized and sorted, travels in much less bulk, and can be handled far more conveniently than home-grown timber, which after hauling to the railway wharf may have to lie for weeks before the travelling crane can be sent to hoist it on to waggons, or the waggons themselves can be got—always expensive work. Any extensive afforestation scheme would have to contemplate reform in this direction in order to keep down expenses, which in British woods are greater than they might be, and, coupled with the ever-increasing burdens on land, exceed greatly, I believe, those of other countries. It is from greater economy of management, as much as from other sources, that the margin of profit must be sought in the future.

As to the timber-producing power of poor or waste soils unsuitable for agriculture a good deal of misconception exists. One may often judge pretty safely from the vegetation and trees in any neighbourhood whether the soil is capable of producing timber, but it is not safe to conclude from a poor surface crop that it is unfit for that purpose. Trees, and especially the broad-leaved species, like the Oak, Beech, and Chestnut for example, respond to good soil and good root-culture as farm crops do, but not to the same extent as the latter. If timber-trees were grown for their crop of seed—the Oak for its acorns, and the Beech for its mast, and so on—it might be different, as it is into the seed or fruit that the principal constituents go in greatest proportion; but it is the *wood* the timber-grower requires, and the principal mineral substances taken from the soil to assist in building up the wood of a tree are very much less in quantity than is required by farm crops. The atmosphere supplies the greatest portion of the food of a timber-tree, hence the reason why very large trees are often found growing in very poor soils, which the casual observer would consider unfit for any crop. When the leaves of trees are analysed together with the wood, the constituents are found to approximate more nearly in quantity to those found in farm crops, but even then the nourishing

elements are in much less proportion. Moreover, the leaves of the trees in a forest are restored to the soil again, and the deposit thus accumulated in the shape of humus is of the greatest benefit to the trees, particularly on thin dry soils, which it protects and enriches from year to year. I have often seen instructive examples of this, and when listening to advocates of excessive thinning of woods, on the plea that a thick crop impoverished the soil, it seemed to me they, in the first place, over-estimated the demands of a tree upon the soil, and, in the second, forgot that it restored nearly as much as it took out of it. As will be shown further on, shelter and warmth and a favourable exposure to the light, while maintaining an unbroken leaf canopy, are of as much, if not more, importance to the healthy development of trees in a wood than the soil in which the roots grow. Given a root-hold in a healthy soil, however poor, a tree will grow and produce a timber trunk of surprising dimensions. Innumerable examples widely apart could be furnished to prove this, a few of which may be given. At Wharncliffe Chase, the scene of the opening chapter of "Ivanhoe" and the reputed haunt of "The Dragon of Wantley" of nursery lore, there still stand a number of the "broad-headed, short-stemmed, wide-branched oaks" referred to by Sir Walter Scott, and, considering the soil and situation in which they grow, their bulk is surprising. Wharncliffe Chase is described in the Doomsday Book as a natural "waste," and in that condition it remains for the most part to this day—the soil being so thin and scant, where there is any, and rocks projecting so above the surface in all directions, as to make it unfit for cultivation. Yet this poor tract, lying about 1,000 feet above the sea-level, was to a large extent once covered by forest, and, if it were not now tenanted by deer and rabbits, it would produce timber again, as its young plantations abundantly testify. The geological formation is the millstone grit lying above the coal-measures, and, according to Prof. McConnell,* usually the basis of one of the poorest and hungriest soils. Where the bulky Oaks referred to grow the surface soil consists of a poor, thin sod, lying on the rock, which forms a deep bed fissured in all directions, and so permitting the roots to descend deeply into it. One of the trees has apparently sprung from an acorn dropped into one of these fissures on the edge of the crags on an

* McConnell's "Agricultural Note-Book."

extremely lofty and exposed spot, and fulfils in every particular the description in Scott's "Lady of the Lake":—

> Moored in the rifted rock,
> Proof to the tempest's shock,
> Firmer he roots him, the ruder it blow.

This gnarled and starved specimen is 12 feet in circumference a little way above the rock, and once contained about 60 cubic feet. Not far from it is another ancient example, where the soil consists of a thin sod through which the rocks project on all sides, which girths 22 feet 5 feet up. Another close by girths 12 feet, and contained, before it lost some of its limbs, about 270 cubic feet of good timber. Another tree on the same poor ground contained 170 cubic feet in the trunk, and about 50 feet in the boughs. Growing under the same conditions are many Birch, Ash, Hollies, Beech, Yews, &c., and throughout Wharncliffe Wood there are numbers of Oaks of various sizes growing on the rock; and these trees, as can be seen, have produced a second and third crop of timber from the same stools. These examples are mentioned to show under what poor conditions as regards soil timber-trees will thrive, for, unless the Wharncliffe trees were there to speak for themselves, I have no doubt that even some practical foresters would hardly believe that they could grow under such conditions. On the same rocks, about 1,000 feet above the sea, on a peaty sod two or three inches deep, we have the Corsican Pine (*Pinus Laricio*) growing beautifully, and beating the Larch and Scotch Fir.

Not less remarkable than the size of the trees produced in poor soils is the variety of poor soils in which the same species will thrive. At Lord Salisbury's, at Hatfield, I was much struck by the great size of the Oaks, Limes, Yews, and the usual forest-trees, when noticing at the same time in the kitchen-garden close by that the pure chalk was turned up everywhere at a spade's depth. Equally striking are both the young and old plantations on the deep poor sandstone in some parts of Nottinghamshire. In Thoresby Park the sandstone is of great depth, and the surface soil is so poor that only high culture keeps it up to the mark. Yet the size and health of both young and old trees there are remarkable, though, according to Professor McConnell, Sherwood Forest, with its great Oak-trees, lies on a member of the Upper New Red Sandstone, where the surface soil

is "a barren gravel." So at Bournemouth, again, there are extensive and thriving tracts of Scotch and other Firs growing, for the most part, on pure sand-banks. Along the flat shores of North Wales and Lancashire, and elsewhere, there are similar extensive reaches of sand-dunes (of the same description as those at Bournemouth), which threaten eventually to submerge the railway in some places, which, if planted, would undoubtedly produce good Fir timber. At present such sand-hill tracts are amongst the most worthless of lands for agricultural purposes, but would not be difficult to plant. In the Highlands of Scotland, again, in many parts, the size of the Larch and Scotch Fir trees, growing in very poor soils, has often excited the surprise of travellers, for in many places the soil consists of poor peat or gravel only. In the part of Yorkshire where I live I daresay travellers have often noticed considerable tracts near collieries covered by deep mounds locally called "pit-hills." These hills, which consist wholly of a poor blue shale brought out of the coal-pits in getting the coal, do not contain a particle of what one would call "soil," and would probably be regarded as the worst rooting medium that could be found. Yet it grows timber-trees. About thirty years ago some of these pit-hills on the Wortley estate were planted with a general mixture of forest-trees, which now form a dense and thriving plantation. In short, the indifference of forest-trees to their rooting medium, so long as the moisture is sufficient, is surprising, and I lay stress on the point to show that, however unfit for farming purposes, and however poor land may be, it will almost certainly grow good timber.

I do not know of any theory that is better sustained by facts than that timber-trees can be grown to good size on soils chemically poor from an agricultural point of view, because they need a much smaller quantity of the usual plant-food derived from the soil than farm and garden crops do. When I first studied analysts' tables on this subject, I confess it was a kind of revelation to me, for it explained much that had before puzzled me—viz. why great trees should grow out of soils in which, according to our gardening and farming ideas of plant culture, they ought to starve. Schlich's conclusions on this subject, from Ebermayer's tables, briefly summarised, are that the substances required by forest-trees are qualitatively the same

as those required by field-crops, but quantitatively so much less that almost any soil can furnish a sufficient quantity of mineral substances for the production of trees, provided the leaf-mould accumulating from the fallen leaves is not removed. And, further, that Conifers require the least amount of such substances of any known plants.

II.—*Situations most suitable for Planting, and kinds of Trees to Plant.*

That there are vast tracts of poor land unsuitable for agriculture but fit to grow timber in the three kingdoms has been admitted, but the plea so often advanced, that we should plant such tracts for profit in the expectation that the foreign supply of timber will at no distant date fail, or fall short, is one I have grave doubts about. Hitherto foreign countries have exercised more foresight in the management of their forests than Britain has done. We have great leeway to make up even to overtake other countries, which are not likely to be more shortsighted in the future than they have been in the past, and in planting extensively in this country I think it would be much the safer plan to indulge in no dreams of reduced competition, but to set to work on a sufficient scale and on business-like principles, and trust to the production of timber of a better quality by better culture, and to getting far more of it to the acre, in order to hold our own. I am sanguine that that much can be accomplished. It is not altogether excessive foreign competition that hurts our home timber trade. We have not always had the timber to offer, otherwise the price, grown as it is grown on the Continent—that is, clean crops and heavy crops—would pay, and the foreigner would not find it worth his while trying to get in.

Neither do I, on the other hand, agree with the advocates of planting remote, and practically inaccessible, solitudes in the Highlands, or in Ireland, or anywhere else. Those who propose to do such things with philanthropic objects, in the expectation of creating new industries where none at present exist, deserve credit, but I never read of such projects without thinking of Miss Edgeworth's Irish landlord and his Scotch agent in her story of "The Absentee." The landlord was always dreaming of some great far-off scheme for his estate, and was as constantly being lectured by his agent for neglecting the first principles of

good management and the work that lay at his hand. So the advocates of planting waste lands, I perceive, generally wish to start somewhere about John o'Groats, or the Land's End, the west coast of Ireland, or the mountain-tops of the Isle of Man, where I understand a start has already been made, and neglect far more suitable and likely tracts of useless land at their doors. If experience of growing timber in such out-of-the-way localities up to the present time be worth anything, it is that when a vendor has any considerable quantity to dispose of he can hardly give it away. The truth, as I have already explained, is that every mile farther you get away from your customer, or from a railway or wharf, you reduce the prospect of profit till a limit is reached where profits disappear altogether. When a man buys timber in the wood or sells it from there, the first thing he deducts is the cost of felling, cleaning, delivery, and all incidental expenses. Whatever these amount to they are deducted from the price expected from the consumer, and the difference, after allowing for the profit to middlemen, if any, is the value the producer receives, which in many cases does not at present pay the rent of the land. As I have pointed out, the conversion of timber on the spot saves much, but in any case the expense is always considerable, and as in the past, so in the future, the income and expenditure in the production and disposal of timber are likely to maintain their present relative balance. There is no limit to the operations of the purchaser of home-grown timber as regards distance, except the cost of delivery. It is that alone that hinders the realisation of those windfalls that periodically occur in Scotland, otherwise I have no doubt but that the Yorkshire saw-mills alone could deal with the whole of the blown-down timber in a short while. I have known one purchaser to send 20,000 cubic feet of Spruce windfalls from Dumfriesshire to the borders of Nottingham to one colliery owner within a month. The middleman cleared just 1*d.* per foot by the transaction, but I doubt if the owner of the trees got as much, and the timber could not have been sold at all if the rail had not been convenient and other facilities afforded.* There ought to be (and I believe there are) large quantities of Fir timber in Scotland now fit for mining

* Since the above was written I have been assured by a Scotch agent in Perthshire that some owners of windfalls *paid* large sums to assist users to remove the timber, which was itself given away.

purposes there; but whether it is that the timber has not been properly grown, or will not pay for delivery, or the two causes put together, I do not know, but it is a fact that the mining branch of the timber trade in Scotland, which is enormous, is almost wholly in the hands of the Norwegians.

A noticeable difference between Scotch and English woods is the predominance of Conifers in the former and broad-leaved trees in the latter. Yet Ash, Sycamore, Elm, Beech, and other broad-leaved trees do well in Scotland, and why so many comparatively worthless Firs have been planted by enterprising Scotch planters is a puzzle. Some of the tallest and finest Ash-trees I have ever seen grow at Dunkeld, and many fine examples are to be found elsewhere. Planting the wrong species, and planting good land when worse would have answered the purpose, has, in my opinion, been one of the worst faults of Scotch forestry. I have been assured by a Scotch nobleman, well known as a great planter, that he has found this out in his own case. English woods yield by far the best returns to their owners, because broad-leaved species have been mostly planted, and Oak timber still holds the field for quantity and value, as it always has done. It is a great mistake to suppose that because Oak is now less used for ships that therefore the demand has fallen off, or is ever likely to do so; it has simply been transferred to the waggon-builder, and the quantity used for such purposes alone threatens to exterminate all the large Oaks in England in a very short time. There probably never was such a demand for Oak as there is at the present time, and the sales advertised week by week show that as much, if not more, Oak is offered than all the other kinds put together. It, however, takes a long time to realise a crop of Oak. We have disposed of from the Wortley estate as much as 20,000 cubic feet of Oak in two years to one coal and iron company, who converted all the largest trees into waggons as fast as they left the wood, and they bought about as much from our neighbours at the same time. There is no time for seasoning nowadays, and when the waggons shrink they are tightened by means of screws. Some railway companies* own over 100,000 goods waggons alone, to provide the principal timbers for which

* At the last half-yearly meeting of the Midland Railway Company the chairman stated that the company owned 78,558 goods waggons and 27,682 coal trucks, not to mention carriages.

the very soundest portions of probably 200,000 fair-sized Oak trees would be required, and thousands of waggons are every year being turned out. The soles and cross-bearers have hitherto been made almost exclusively of English Oak, but latterly American Oak, a much inferior article, has been substituted in second-class cheaper waggons, quoted at £52. 10*s*. per coal waggon. Immense quantities of Oak goes also for colliery and other purposes.*

All circumstances considered, my advice to those about to plant, in the expectation of even moderate profits after, say, forty or fifty years, would be to plant with the most useful species their waste lands as near as possible to railways, canals, and the consumer, and there are such tracts of sufficient extent in England alone (where all the most valuable timbers grow best) to engage the planter for a long time to come. You can hardly travel by any of our main railway lines without seeing ideal tracts of poor land and hill-sides that might be densely wooded for miles, often quite near to some of the largest towns and trade centres. These are the spots I should plant first, leaving all doubtful localities as they are till the last.

The next consideration is aspect and exposure. If I were asked what was the very worst natural obstacle to the production of useful timber in a reasonable time, I should answer "cold," and especially "exposure to cold winds." Those who condemn thick planting at the outset, from the sight, perhaps, of a crowded young plantation just getting established, do so from want of experience. Too thin planting and too severe thinnings afterwards are alone quite sufficient to far more than turn the scale between profit and loss. Foresters recognise the evils of exposure so far as to plant "nurses" for the protection of the permanent crop, but the nurses are usually a dead loss in themselves, and take room which could be far more profitably occupied by trees of more value planted thicker. On the Wortley estate, which is high and inland, we have miles of belts planted for shelter, and the behaviour of the trees in these exposed belts affords, as similar belts do everywhere else, a lesson to foresters. However narrow the belt may be, the trees on the exposed side

* Quite recently a well-known Midland iron company have supplied waggons with light wrought-iron soles in place of oak. If these answer much less oak will be sold in future.

are always the most stunted and least bulky in the trunk. Looked at in the mass the tops of the trees rise up in a gently rounded slope from the exposed side to the sheltered side, and when you come to examine the trees critically the difference is only the more apparent. Here are examples of the relative dimensions of trees growing in an exposed narrow belt about 750 feet above the sea, consisting of Beech, Sycamore, Oak, Elm, Chestnut, and Larch :—

TABLE showing the Effects of Exposure and Shelter on the Growth of Forest Trees in Mill-Moor Plantation Belt on the Wortley Estate.

Kind	Height of trees on the most exposed side of belt	Height of trees in the middle of belt where less exposed	Height of trees on the inner and most sheltered side of belt
Beech	31 feet	37 feet	43 feet
Sycamore ...	28 ,,	36 ,,	45 ,,
Ash	26 ,,	35 ,,	44 ,,
Oak	21 ,,	36 ,,	40 ,,

The bulk of timber is in proportion to the height. Age of plantation about 60 years.

The trees in this plantation are growing under precisely the same conditions, except only as regards *exposure*, and the table will show at a glance the immense difference that that would make in an acre as regards the quantity of timber obtained and its value. The practical conclusions to be drawn from data of this kind are that in deciding to plant poor land the warmest and least exposed situations should be chosen first, and these, in high-lying, hilly districts, are the situations that face south, west, or east, or any point between these, and the lower slopes of hills in preference to their tops. The tallest trees and greatest bulk of timber are produced much sooner at the bottom of the hill than higher up. The late Mr. John MacGregor, forester to the Duke of Atholl, told me (and also stated in his evidence before the Select Committee on Forestry) that his plantations of Larch in a certain wood were worth "perhaps nearly £100" per acre at the *bottom of the hill*, and higher up, at an altitude of 1,000 feet, "not worth more than £20 *per acre*" —a vast difference, due mainly to altitude and exposure. In Wharncliffe Wood, which runs for about four miles along the valley of the Don, ascending regularly its whole length to the top of Wharncliffe Crags, the same decrease in value is plainly

observable, the height and bulk of the trees becoming steadily less as the hill is ascended. In the foregoing table the heights of the Elms, Chestnuts, and Larch are about the same as the others. The trees were carefully measured with rods, and the heights given are interesting as showing also what an even top-canopy different species preserve when mixed in a plantation—a fact doubted by some who would multiply the difficulties of forestry practice by treating every species separately. So far as I have observed this plantation habit of trees is constant. In our locality the Common Hawthorn in the open is more a bush than a tree, but we have had examples in crowded parts of Wharncliffe Wood where they were perfectly straight, and reached a height of nearly 50 feet—drawn up by the taller Oaks growing around them. Under such circumstances the trees do not, of course, increase in *girth* at the same rate, but vary greatly, as will be shown.

The general conclusions to be drawn from these facts are, that in planting poor lands advantage should be taken of shelter wherever possible, by planting on the lee side of sheltering objects, such as hills, and by planting thickly on open and exposed plains, especially at the margins of the wood. The most severe struggle with a plantation occurs when it is first planted, and the struggle continues till the trees meet and cover the ground, which covering protects the roots and stems from cold and drought, and preserves a uniform temperature about the roots, the effects of which are soon noticeable in better growth, which continues as long as the conditions are maintained.

III.—*Trees to Plant, and Tending, &c.*

Species to plant.—This is the first question that arises under this head, and is an important one, because the returns from the sale of timber depend very much on the kind produced. Timber dealers find it best to have always a bit of everything on hand in some proportion, and planters should proceed on the same principle, keeping an eye to the demand and the value. The following table, drawn from experience at timber sales over a wide area, and from inquiries frequently addressed to me by consumers of timber, gives a fairly approximate idea of the demand for the different kinds of timber for a long period past.

1. Oak, from 1 cubic foot dimension and upwards.
2. Ash, ditto ditto
3. Larch, from 3 inches quarter girth and upwards.
4. Sycamore of large size.
5. Scotch Fir and Spruce of large size, and poles for pit props.
6. Birch and Alder.
7. Beech and English Elm, trees and poles.
8. Poplar, Lime, and Firs, other than Scotch and Spruce.

The demand, of course, varies in different parts of the country, but the above gives a pretty good general idea of the comparative demand for the kinds named in the order given.

The next table following is intended to show what I believe might be accomplished on one acre of poor land in a given time, supposing the acre to be *pure* forest—that is all of one sort of tree. The average from a general mixture may also be reckoned approximately from the same table.

TABLE showing the relative Bulk of different kinds of Timber Trees and possible Number of Trees per Acre in a plantation about 60 years of age on poor land situated about 1,000 feet above the sea in Yorkshire.

Kind	Average cubic feet in each tree	Possible number of trees to the acre
Beech	13	350
Spanish Chestnut	11½	350
Scotch Fir	9⅖	537
Larch	10	537
Sycamore	11	350
Oak	6	603
Birch	5	680

What I want to show here is the *relative* bulk of each kind of tree under equal conditions on the same ground, and the sizes given will be found to be pretty fairly constant everywhere. The money value of an acre of timber depends in the first instance upon the weight of the timber per acre, which may be reckoned by the number of cubic feet; and next upon the price per foot that can be got for the trees *as they stand in the wood*; and, as has been already explained, this price depends upon situation and circumstances. It will be seen from the table that the

biggest trees hardly exceed "pole" size, and the price would be pole price—always much below the price of big trees. The plantation from which the table is compiled would be easy to sell at from about 5*d*. to 9*d*. per foot, standing, in our neighbourhood, and at a reasonable profit, because it is close to the railway and a good market; but there are many situations even in our neighbourhood, let alone remote districts, where the cheap kinds of timber, like Scotch Fir and Birch and small poles of any kind, would not pay for removal, and where Beech, Sycamore, and Larch would leave but a narrow margin after paying carriage, felling, and all incidental expenses. It is of no use trying to give the precise value of a crop of timber to the producer without knowing everything, as hardly two cases are alike. The number of trees to the acre given in the table is what it would perhaps be difficult to find on any estate in this country. The number given is based upon the numbers said to be produced in well-managed forests in Germany, and upon calculations made by myself as regards the greatest head-space required by forest-trees to produce a trunk of a given size. I believe my estimate is not far from the mark, and may be accepted as a guide; but it contemplates a careful regulation of the trees and general good management. Of course, where the supply was extensive, converting the timber in the wood would save much expense, and the older and bigger the trees the greater would be the value; but the expense and time would also be greater. Nothing is allowed for thinnings previous to sixty years, as they would hardly pay expenses in these days on such land. I might have given the actual value per acre of the wood from which the table is taken, but the wood had been over-thinned at an early period, and damaged by game and deer, and hence such a valuation would be misleading. I prefer to give what I believe might be accomplished by ordinary good culture and management in the time on land worth 7*s*. 6*d*. per acre in our locality, but which would be worth less in less populous centres.

It will be seen from the table that the Beech is a tree that puts on timber faster than most others, and this is true of it almost everywhere; and I know of no tree that stands and grows so well in bleak, exposed situations and on poor soils. It is a remarkable tree in these respects, and is only approached by the Spanish Chestnut and Sycamore. In our high-lying dis-

trict the Spanish Chestnut rarely ripens its seeds, and the Beech produces a very scant crop, but both trees grow into large-sized sound timber-trees sooner than others. The Chestnut makes a fine clean trunk in a plantation, and is almost as good to sell as Oak of a certain size. The Beech is one of the best shade-bearers, but it smothers everything else when it is allowed to become the dominant tree. These two trees and the Oak, Ash, Elm, Lime, Sycamore, Birch, Alder, Wild Cherry, Scotch Fir, Larch, Corsican and Austrian Pines (*Pinus Laricio* and *P. austriaca*) all grow well up to at least 1,000 feet above the sea *under plantation culture*—that is in pretty thick plantations. In the high inland districts of South Yorkshire the Douglas Fir (*Pseudotsuga Douglasi*) and the common Spruce are failures, except in sheltered valleys and ravines. In planting waste lands I do not advise any further expense to be incurred in preparation except draining (where necessary), fencing, and protection from game. The venture will not stand anything but the most economical meal sures. Nor in planting the trees are big pits or holes necessary. Provided the young trees are got up with good roots and quickly transferred from the nursery to the plantation, they may be planted with a dibble or a narrow planting spade, letting the roots straight down and wedging them up tight in the natural soil as it is. I have had some of the worst and most exposed ground in England to deal with, and I am also confident that if all kinds of Conifers are planted between the middle of September and the middle of November, or, failing that period, then in March, April, and May, there will be very few losses anywhere. The notch system of planting is bad. A young tree's roots soon spread out on all sides, and all that is needed in planting is to fix the roots in their natural position as quickly as possible. Planted at the seasons named, and in the way described, the Corsican Pine—perhaps the very worst transplanter known—will do just as well as the hardy Scotch Fir. Plant the same tree at midwinter, from a strange nursery, in any way you think best, and the probability is that at least 50 per cent. will die the first year.

The kinds of timber-trees most suitable for planting for profit consist of those just named, and their probable ultimate value to the grower in any locality should determine the proportion of each to be planted, and the foregoing tables may be of

assistance in that respect. Thick planting should be the rule, especially on cold exposed situations, where 18 inches or 2 feet asunder would not be too close, while 3 feet should not be exceeded. Where the natural herbage is poor, consisting of poor grasses and heather, the trees may be small. The younger they are the cheaper they are; they are also more easily planted, and they grow better. The only tending required after the trees are established consists in keeping the fences and drains in order and in regulating the trees so as to let every tree have its top fully exposed to the light, and in preventing destructive crowding in any part. But on no account should the ground between the trees be exposed. Indeed the plantation may be left almost undisturbed for fifteen or twenty years, and after that thinning should be sparingly practised till the trees have reached a size at which they can be profitably disposed of as timber.

IV.—*Prospects of Profit from the Planting of Poor Lands.*

It has been shown that nearly all kinds of timber-trees will grow to a large size on very poor soils, and on a great variety of poor soils, and that the value of the crop depends mainly on the species of trees grown, the quality of the timber, the quantity that can be grown to the acre, and reasonable proximity to the market. The most important factor, however, is a good heavy crop, for whether the price be high or low the number of cubic feet will determine the value. The produce in this respect will depend upon the system adopted and the degree of intelligence with which it is carried out from beginning to end. I have no doubt whatever that in the past incalculable losses have been sustained by neglect and mistakes on these points. The difference between the value of a crop of some cheap kind of timber and timber of considerable value may amount easily to from 50 to 70 per cent. The rent and expenses are the same, and a crop of some valuable kind of timber may be produced as easily as a crop of some cheap kind. As regards quantity to the acre, the severe and frequent thinnings to which plantations in this country have been subjected in the past have often converted what might have been a profitable crop into a dead loss, and every one who has sold much timber also knows well that

the difference in value between roughly-grown and clean-grown timber of the same kind is so great as to at any time turn the scale either way. And this difference is one entirely under the control of the forester. The cost of producing a crop of timber under any given conditions could, I believe, be very nearly reckoned, and the value of the crop under an exact and clearly defined system of culture could also be estimated fairly well beforehand, for the number of trees to the acre, their kind, their bulk, and value at a given period are problems not difficult to work out where the wants of the locality are known. While railways exist, Yorkshire and Lancashire mills continue to run, mines to be worked, agricultural implements and appliances to be used, houses to be built and furnished, and all the multifarious needs of the community to be supplied, the demand for home-grown timber, such as Oak, Ash, Sycamore, Beech, Larch and other Firs, Elm, Birch, &c., will continue to be great, and the prices fairly remunerative—that is to say, if past experience goes for anything. There has never been any difficulty about selling good timber whenever it has been reasonably accessible to the purchaser. The Government returns are silent about the quantity of home-grown timber that goes down annually, although it would be easy enough to get such returns; but there is no doubt about the quantity being enormous, and greatly in excess of the replanting done. You may sometimes notice advertised in the trade journals lots of timber at one sale on single estates, comprising from 7,000 to over 10,000 trees (*trees*, remember, not feet), and you may notice that such sales are repeated year after year. Multiply the trees by 20 to roughly find the feet; then reckon approximately the number of sales that take place all over England all the year round, and you will have some idea of what is going on in the home timber trade now, and realise what is possible when I state that the turnover could be immensely increased if we had a greater variety of timber to sell and more of it. What profit might be expected from crops of timber on poor lands must always depend upon situation and circumstances and the cost of production, but that the margin might generally reach 3 per cent., and considerably more for good crops of certain kinds, I have little doubt—that is, under the maximum number of trees to the acre according to age and dimensions. I should fear bad management far more

than insect pests and tree diseases (except in the case of the Larch disease), for the damage from these causes is not so great in this country as some seem to think. When you see, what may often be seen, fewer trees planted to the acre at the outset than should be on the ground at the end of fifteen or twenty years, when a half or third of these consist of useless "nurses" which are never expected to pay the cost of removal, when pruning and thinning are frequent and severe, when needless draining is done, and expensive live fences maintained, and rabbits preserved, you may bid farewell to any prospect of profit, and expect loss about as surely as anything can be expected. But all these can be avoided, and when they are avoided I have no doubt whatever that good crops of timber can be produced more easily and more certainly than a great many garden and farm crops, making allowance, of course, for the difference of time required.

The wants of forest-trees are few and simple, and the operations of practical forestry are also so easy that any intelligent labourer may carry them out with no more training or instruction than can be given him by a competent head forester from time to time. Hitherto it has not been the humble working woodman that has been to blame, but his master and employer. In this connection I may mention an extremely interesting example. I have on hand for sale, at this time, twenty acres of Larch, situated about 1,200 feet above the sea, on one of the poorest sites and soils imaginable, heather land before it was planted over sixty years ago. This land was owned by a small farmer, who planted it with Larch, and whose grandson is now offering the timber for sale because he can get more for the land for grouse, and because the trees have ceased growing. Still the Larch, though small, owing to the situation, could have been sold more than once for about £1,400 or more, standing, being near consumers, which represents a rent for the land greatly in excess of anything that could have been got for such land for any other purpose during the sixty years. The twenty acres contain a little under 7,000 trees and poles, or over 300 trees to the acre, averaging about $6\frac{1}{2}$ feet cubic each. The interesting fact about this wood is that it has never been looked after by a forester, and all the thinning it has been subjected to has been the occasional removal of a few of the worst trees for

fencing purposes by the owner. It is the nearest approach to a natural forest, and one of the few examples of remunerative forestry I have seen that one could be sure about. Larch, however, is an exceptional crop, and there can be no doubt that old planters were not so far out in their expectations concerning Larch-planting. Timber buyers well know large estates in Yorkshire where the annual Larch fall has for many years been a source of considerable income to the proprietor.

A chief obstacle to planting nowadays is that owners of estates are very reluctant to engage to any extent in planting as an investment. This is due to the fact that their past experience in that direction has been far from encouraging, and that, taking all contingencies into consideration, the length of time that must elapse before a crop of timber can be realised, the risk, and, at the best, the small ultimate profit to be expected, they do not consider it worth while to plant. They can do better with their money. I have always felt that no amount of persuasion would ever get over such considerations as these on private estates. It may be granted, however, that past forestry in this country is hardly a safe criterion to go by for the future. Owners of estates have certainly, and with the best intentions, spent their money freely in planting, without any certain prospect of even a small profit ever being realised, but they have also sacrificed much to game, and by careless management, and want of foresight in growing the wrong species of trees. Examples enough could be found of all the three. The value of the timber on many an estate might have been much higher if the timber had been of a different kind. Hitherto there has been far too much of the landscape gardener, the nurseryman, and the gamekeeper in British woods, and too little of the timber merchant, who in the end becomes the valuer. The whole British home timber trade rests upon about as many species of trees as could be counted on the fingers of both hands, or fewer, and the uses and value of these have been perfectly well known for generations; but instead of making the most of these, in far too many instances effort has been wasted on doubtful exotics, principally Conifers, and these have not been tested in the way to prove their value as timber-trees—a thing which can be done by plantation culture alone, under which many trees will thrive that would hardly exist as isolated specimens in the arboretum, which is no place to test

timber-trees. Examples without end could be found of Conifers growing freely in the inside of plantations where there is shelter from wind, that absolutely refuse to live at the exposed margins, and on dry eastern aspects the common Spruce is a well-known example.

In conclusion, I would add that I say nothing about probable effects, beneficial or otherwise, to climate by the extensive afforestation of waste lands, although "amelioration of climate" is a stock argument on the subject. Planting belts for the shelter of crops and farm stock would probably not affect our climate greatly, and such belts need not be reckoned upon for the production of timber, and hence should not be mixed up with the latter subject at all; but that extensive forest areas are likely to improve a climate cool enough and moist enough already, is, I think, hardly likely if meteorological record stands for anything.

Discussion.

Professor Marshall Ward, Instructor at the Cooper's Hill School of Forestry, said he was very pleased to hear one truth driven home, to the effect that we in this country had long been in the habit of under-estimating the capabilities of the soil in forestry operations. We had for many years been in the proud position of being authorities on the subject of soil; but Mr. Simpson's paper rightly emphasised the fact that our notions of the value of the soil had been taken only from the point of view of the farmer and horticulturist, and that it was really a very difficult matter indeed to get it even considered from the point of view of forestry. One thing he would like to say, viz. that if anyone contemplated launching into forestry, he must make up his mind not to be deterred at the outset if the results did not come up to expectation, which had been based upon analyses of the chemistry of farm crops and fruit. That was a point in danger of being overlooked, and Mr. Simpson had done quite right in laying stress upon it.

A gentleman in the audience, whose name did not transpire, but who resides in Cornwall, said that he had had considerable experience in forestry, and had been most successful. He said that in the plantations in which he had been interested he had

followed Nature's order as closely as he could. His plan had been to ventilate the woods by making roads, and cutting away the undergrowth where the trees wanted air. He had always thinned in May or June, and he never did the whole plantation at once. He had taken away two out of every ten trees, or one-fifth. After about twenty-five years other clearings were made parallel to the roads, leaving twelve trees and taking three. By that time the first cuts had nearly grown together, so that the side branches were being filled in as they would be in an ordinary plantation. Since then he had only taken out dead and suppressed trees. By proceeding in this method, he believed a leaf canopy could be sufficiently preserved.

The CHAIRMAN (Mr. W. T. Thiselton-Dyer) said that when a body like the Royal Horticultural Society initiated a discussion like this, it undoubtedly assumed a certain responsibility. It was, of course, desirable to make use of every occasion to ventilate a subject, but they must be careful, as a body with an established reputation, that they did not lead the public to believe that they had any very decided views upon the subject, because it was one fraught with enormous difficulty. He must say that he was much struck with the fact that Mr. Simpson really answered, with almost destructive criticism, many of the suggestions raised in his own paper. There seemed to be some confusion in the matter. A landowner with an attractive estate planted trees for various purposes—for shelter, or to a very large extent from considerations of landscape effect. Of course, in so doing, he had his reward in the pleasure he derived. Such actions ought not to be regarded from a commercial point of view. There was, in point of fact, very little in this country of what could be called forestry. That arose from various considerations, and he would not then trouble them with details. On the Continent, however, forests to a large extent belonged to permanent bodies, such as the communes in Switzerland, and other great corporate bodies. Therefore such bodies could, if they liked, project the expenditure and the expected profit into the next century. That was impossible for the private landowner in this country, therefore he did not himself see how they could ever seriously tell the private landowner that planting in the present state of things could be regarded as a profitable, or even a possibly profitable, investment. This matter was very carefully discussed some time ago before a

Committee of the House of Commons. He among others gave evidence, and he heard one landowner, who had been himself engaged in forest management in India, state that there was a time when he could use his own timber for purposes of his estate, but that there came a time when he found that Norwegian timber could be delivered cut at his own door at a cheaper rate than he could supply it from his own woods. When they heard that, it seemed perfectly useless to try and impress people with the statement that it would be a good thing to invest money in this particular industry. He had heard it said that the timber supply of the world would give out before that of the coal. In that case the condition of things would be very much changed, and timber would be of greater value than at present; but as long as there were inexhaustive tracts of soft woods, especially in the northern hemisphere of the New World, he did not see how it was possible in this country to produce timber which would compete with that brought to our shores. At the same time, the discussion of the subject could not fail to be of use, although he did not think any very definite or decided general principles could be laid down as regards wood cultivation in this country; yet astute persons in different localities might, even under present conditions, get good results. For example, Elm wood—and he could speak from experience—was practically unsaleable in the neighbourhood of London, but in Gloucestershire it commanded a good price, because locally Elm wood was found to make the best boxes for packing South Wales tin-plates. It was the only wood which did not deteriorate the polish of the tin-plates. He could mention other instances of local industries which were still profitable. It was difficult, however, to see what inducement could be held out to get a man to plant for posterity as a duty incumbent upon him. The Dean and Chapter of Durham were planting some of their own estates, but they were a landowning body, and not subject to the vicissitudes of the private owner. Anyhow, instructive experiments might be made, and a discussion of a paper so ably and impartially written could not fail to be of use.

The Conference at this stage adjourned for luncheon. At 3 P.M. the Conference re-assembled in the Great Vinery.

Sir Alexander J. Arbuthnot, K.C.S.I., presided.

FOREST-TREES FOR COMMERCIAL PURPOSES.

Treated with Reference to Soil, &c.

By Mr. Edmund J. Baillie, F.L.S.

In a conference of this character the time allotted for each paper must necessarily be brief, and when there is such a wide subject to be put into a thus needfully confined space, there must obviously be many things left unsaid, whilst nothing can be said as fully, perhaps, as the importance of the theme, or of the section of the theme, should warrant.

I conceive, then, that the proper method of treatment will be to let my paper be of a suggestive character upon many points, rather than of an exhaustive character over a narrowed area, and the discussion that is invited after the delivery of the paper will doubtless serve the purpose which was intended.

There is a word that should be said also to explain what must appear as a very obvious omission. The title speaks of "Forest-Trees for Commercial Purposes," but the paper does not touch the subject of Conifers. We are simply dealing with the Hard-woods. At first sight this must immediately appear as an inexplicable omission, but it will be remembered that the Conifers had an entire conference * to themselves quite recently, so that whilst a paper dealing with forest-trees could not be complete without including such trees as Larch, Scotch Fir, Austrian Pine, Corsican Pine, Spruce, and others, still we have to assume, on this occasion, that they have had due attention in the separate treatment to which they have been subjected so recently, and to which I have just referred.

Then there is a further aspect of the question which needs a passing word. A number of the hardwood trees may hardly be considered as coming within the scope of our purpose. But they should be mentioned, if only as a catalogue, for there are occasions when, for one reason or another, some one or other of these are brought in. We would, therefore, group the hard-woods somewhat as follows: Oak, Ash, Elm, Sycamore, Beech, Birch in the first group. Spanish Chestnut, Horse Chestnut, Poplar, Hornbeam, Alder in the second. Lime, Plane, Service,

* *See* Conifer Conference Report, R.H.S. Journal, Vol. XIV., 1892.

Willow, Maple (Acer), Walnut, Wild Pear, Cherry, Crab, Acacia, Laburnum, Mountain Ash in the next.

Before dealing with the trees themselves, it will be well for us to take a survey, generally, of the subject before us in its wider aspect.

It is first needful for us to bear in mind that woodcraft, as a science, has not admittedly received in this country that attention which the importance of the subject demands and deserves. This is probably mainly due to the fact that woods have hitherto been regarded chiefly in connection with their ornamental character—as a necessary feature of the demesne, rather than as a source of profit to the estate. The arboricultural value, so to speak, of a plantation is one thing; its sylvicultural value, or otherwise, quite another. Woods have, therefore, been planted and cultivated with a view to their being a feature of beauty in the landscape, as well as an item of cost and revenue in the estate accounts. This, it would seem, is now to be rectified in great measure, as there has recently been a very general awakening upon questions affecting woods and forests. It is well that it should be so.

Whatever may have been urged against our climate in the past in connection with the production of fruit, as a British industry, there is no room for any such expression of opinion in connection with woodcraft, for the British Isles are specially adapted for the growing of trees. It is difficult to understand why such a comparatively small area is under forest, seeing, on the one hand, that the timber crop offers an avenue for safe extension, and, on the other, that there are thousands upon thousands of acres that stand naked and are awaiting the turnover of the planter's spade. In these days of quick returns, when the national attitude and habit is one of expectancy for immediate return, it is, perhaps, hardly to be wondered at that those crops force themselves to the front for first claim upon the land which yield a more frequent turnover than timber. Yet it is admitted, without much controversy, that even as woods are worked now—that is to say, from some other than an immediately purely profit-making point of view—there could be no better investment than forest-tree planting for certain wide tracts of land which the agriculturist neglects and Nature farms herself in her own prodigal fashion when left alone.

As I have already intimated, the time present seems time opportune for the study and discussion of this question. The re-afforesting of large tracts of land in the Principality formed the subject of some of the later discussions in Parliament. Professor Fisher has been considering how best to put a green cloak upon the Black Country. Dr. Nisbet has been giving his Oxford lectures, excellent in every way, putting facts and figures before us in a very convincing fashion, and dealing with the subject in a masterly manner and with a complete hold upon the different features he brought under review; whilst Professor Balfour made "Forestry in Britain" the subject of his excellent paper delivered last month before the British Association in the Biological Section of this important scientific gathering; and I have mentioned only some of the more prominent of the numerous features bearing directly upon the subject.

We may now proceed to review, briefly, the trees we have enumerated as worthy of consideration as representing the hard-wooded section of so-called British trees. It will be more convenient to reverse the order, taking the third group first, and in thus referring to them it is as well to point out that it is merely that we may by this means insure a more complete view than would otherwise be possible:—

Lime.	Maple (Acer).	Crab.
Plane.	Walnut.	Acacia.
Service Tree.	Wild Pear.	Laburnum.
Willow.	Cherry.	Mountain Ash.

The list might readily be extended. Though very frequently some or other of the above trees are included in the list of trees and plants sent on to the nurseryman when the character of the planting is woodland, yet none of them can rightly come within the title of hard-wooded forest-trees. The fact that they are so frequently found included in written lists corroborates what I tried to make clear at the commencement, namely, that much of our woodland planting is carried out with, at any rate, some attention to its decorative character and ornamental effect. The fringe of the wood is to present a pleasant appearance, and this is to be secured by the variation as to character and foliage effects secured by the intermixing of some effective hardy tree which will by contrast give a desired diversity, and add to the

broken outline the variation of form and colour upon which the eye will rest when taking its survey.

The next group includes :—

Spanish Chestnut.	Poplar.	Alder.
Horse Chestnut.	Hornbeam.	

These trees may again not come exactly within the limit of the list proper; they are, nevertheless, more essentially timber-trees. It is, of course, apparent that I am not dealing with native British trees alone, but with British trees in the widely accepted sense as covering those also now acclimatised, but which were originally introduced. This botanical analysis does not come within the scope of my paper, or it would be necessary to speak of a number of the trees named which are not native in the sense in which we regard, say, the Oak as a native British tree; but when dealing with the trees under the classification already explained, we take the occupants of the soil as we find them, without examining their passports and credentials.

It is hardly worth while mentioning the Horse Chestnut as a forest-tree. It is seldom grown as such, for its timber is practically worthless, whilst the character and habit of the tree mark it out for avenue-planting, or to be grown in groups or as single specimens for parks and other places where some shelter is afforded. It should have a deep sandy loam to enable it to attain its best, though it will thrive in almost any tolerably heavy soils.

The Spanish Chestnut is also a tree for park-planting rather than the plantation, though in some parts of the country Spanish Chestnuts are largely grown for profit. It grows rapidly. Its timber is, in the earlier stages of its growth, most durable, but it is often ring-shaken after it has attained its mature growth. The Spanish Chestnut, too, should have a deep sandy loam and shelter.

Poplars will do anywhere, and should be planted more frequently than has been the case generally, as on account of their rapid growth, and the fact that the timber has a particular value for certain uses owing to its elasticity giving it the power to remedy any indentation by contact, there are plenty of uses in estate economy for its timber. The sides of a cart or of a barrow made of Poplar wood seldom show signs of bruises as do those of harder woods. Poplar timber might very readily and profitably be in greater demand than is at present the case.

Hornbeam is almost entirely used as a hedge-plant or an ornamental tree, and need not, therefore, come under further review, though as a tree for planting in the open pastures for shelter it stands, perhaps, unrivalled.

Alder thrives best in damp places, and will thrive where very few other hardwoods will grow. Moisture is as indispensable to the Alder as light and air. There is a fair demand for the timber of the Alder, and marshy, swampy places might be planted almost entirely with this particular tree.

To come now to the half-dozen trees upon which our hardwood plantations, in the main, depend, we will do well to take them somewhat in the order in which they may be placed according to relative value :—

Oak.	Elm.	Beech.
Ash.	Sycamore.	Birch.

Oak.—We give the Oak the foremost place, and rightly. For the attainment of perfection it needs good soil and a temperate climate. Like most other trees, it will thrive in a deep sandy loam or in an ordinary vegetable soil, but for the attainment of its full size, and to bring its timber to the point of perfection, it must be more or less alluvial in character or a rich deep loam. The Oak is not found of the larger sizes at a great elevation above the level of the sea, nor does it get up to its full majesty where the climate is very severe in spring ; in fact, the Oak, considering its robust constitution and its hardiness and hardness generally, is particularly susceptible to damage by spring frosts. This has been evident enough during the present season. The early growth of young Oaks was this spring abundant ; it was burned and browned by the severe frost of the later weeks of spring, and old sturdy trees over all parts of the country were singed and spoiled on the outer sides by the frost of May 21.

I was through the Crown lands in Delamere Forest and through woodlands in Kent and Surrey about this time, and in every place the marks of damage of the frost were everywhere apparent. A judicious knifesman amongst young Oaks in the earlier stages of growth will do good work in the plantation, as the tree requires careful handling during the earlier stages to put it on the best foundation for future growth.

Ash is one of the most valuable of our timber-trees. The

period during which it carries its leafage is shorter than that of most other trees, for it is the last to flower in the spring and generally among the first to shed its leaves in the autumn. The wood of the Ash is tough and pliant, though, as is well known, the extremities of the branches and branchlets are brittle and snap like sealing-wax. The character of its root-growth is peculiar, and must be kept in mind. It throws out numerous fibrous roots, which run along close to the surface of the soil, and so do not exhaust it. It grows best in good, somewhat calcareous soil, and is none the worse for tolerable nearness to adjoining water, provided the soil is not in any way boggy or rendered marsh-like in character. Ash in the earlier stages of its existence is of exceptionally rapid growth—straight without lateral branchings—and when, as in this year, severe frost follows an early forcing spring, the destruction is correspondingly great, but with a judicious use of the pruning-knife, cutting back the blackened, deadened top to its first uninjured eye, the second growth is so rapid and so abundant that the frost scars cannot be traced, and the wound of the knife is not even seen.

Elms.—Elms may be classified under the two species, *Ulmus campestris* (commonly called the English Elm, though it is doubtful what claim it really has to this title) and *Ulmus montana* (the Wych or Scotch Elm). The former is more largely planted for ornamental purposes, the latter is generally acknowledged as best for forest-tree planting. The Elm will thrive upon almost any soil. The growth of the Elm may be very rapid in certain situations, but its wood, under these conditions, lacks the hardness and stability of that grown on heavier land and more slowly.

Sycamore.—In common with the Acers generally, the Sycamore prefers a situation sheltered rather than exposed—a deep loamy soil, rich rather than sterile, though it will do well in light soil, not too dry, and not more than moderately damp. Its growth is very rapid compared to most others of the Acers, particularly when in a deep, free, rich soil and in a mild climate. It does well also near the sea, and in this connection I ought to mention the Norway Maple also. It is an excellent tree for such a situation, and should be planted more extensively than is the case at present.

Beech.—On dry, chalky soils the Beech may well be planted

as a timber-tree. It seems to be one of those trees which may be said decidedly to succeed best in plantations by itself. In what may be called its wild state, it is observable that it grows without admixture almost—Beeches, and Beeches alone.

The particular value of the tree, from our present point of view, is due to the fact that it will grow on dry soils, and on even sandy gravel or chalky soils, more freely than any other tree of like value. The Beech grows best in sandy calcareous loam, or in fresh sandy loam, on clay or rock. It is a shallow-rooted tree, and does not therefore go deeply into the earth, but its roots extend to a considerable distance close under the surface of the soil.

Birch.—The Birch is one of our most graceful timber-trees, and is most accommodating as to soil. It will grow as well on a mountain-side as on a bleak moor or a marshy swamp. It is, perhaps, more ornamental than useful from a forester's point of view, but it has a value higher than is apparently generally recognised, as it thrives well in any situation, and its timber can be put profitably to a variety of uses.

Thus hastily and briefly we have reviewed the main features of the principal trees in our woodlands, in our forest scenery, and in park landscape. It may be well first to make mention of some further facts connected with our subject which should find record here to suggest direction for after-discussion.

It should be remembered that the whole of the woodland area of Great Britain is extremely limited when compared with that of other countries; yet it has been computed that we have nearly 500 square miles of woods and forests.

Mixed plantations are the rule throughout the kingdom. Hardwood trees in mixed variety, planted with due regard to order, and at sufficient distance apart to permit of their standing permanently for timber, with Larch and other Firs for nurses, to be taken out from time to time as the permanent timber-trees demand and require. Of late several authorities upon planting seem to be advocating the planting up of woodlands on the *pure* plantation principle; that is to say, with groups of particular trees over a wide area, and not a mixed wood.

This may not be the occasion to do more than make the statement—it is not the time to state reasons or conclusions or

advance ideas—but I think the present system of mixed plantations the best, so far as arrangement is concerned.

The more important questions really come in when considering the formation and after-management of plantations. Hitherto the so-many-feet apart arrangement has held good, thinning out the trees with such frequency and regularity, or irregularity, as would permit free access of light and air, the ready growth of lateral branches, without any reference to the over-foliage, or "canopy" as Dr. Nisbet very aptly calls this all-important condition of over-leafage, as a necessary factor in a successful plantation.

It is now being urged that trees grown for profit should be so treated as to prevent undue development of lateral branches by planting so closely as to insure straightness of the tree-trunk with the minimum branchings until the head is reached, and with due balance and closeness of overhead cover to keep the ground in sufficient moist and clean condition as to insure maximum timber growth with minimum evaporation of earth moisture or waste of soil products in under-scrub.

To preserve the balance rightly as between the soil constituents and the growth upon it, as between the commercially valuable part of the tree itself and those parts of it which are conducive to its health, safe development, and growth—these are the problems that are seeking solution. These are the difficulties which conferences of this character are asked to help to solve.

THE MANAGEMENT OF PLANTATIONS.

By Mr. A. C. Forbes.

Before going into any technical details regarding this subject, it will not be amiss to take a retrospective glance at the conditions under which woods and plantations have been planted and managed during the last half-century in Great Britain. While desiring to avoid the introduction of all irrelevant matter as much as possible, the consideration of certain points which have affected, and at present affect, British forestry are desirable in order to show what factors are responsible for the present condition and system of managing our woods.

During the last half-century, more or less, we may say that the planting of woods on estates has been done for one or other of the following reasons: Utilisation of waste land, such as heath or moorland; the improvement of the landscape; providing shelter for game, live-stock, and dwelling-houses; gratification of the proprietor's tastes and wishes; the production of poles, timber, &c. The depressed condition of agriculture has also resulted in some of the poorer and less favourably situated soils going out of cultivation altogether, and portions of these have in many cases been planted.

If it were possible to ascertain the ideas of estate-owners who have planted land during this period, regarding the probable return they would realise from the work, we have no hesitation in predicting that not one in a hundred have given the question of personal and direct profit a moment's serious thought. This prediction, of course, is not based on any pretence of knowing the motives which induce proprietors to plant, but simply on the strength of the fact that an average man's lifetime must elapse between the planting and reaping of a crop of timber, even under the most favourable conditions. From the little at present known of human nature, therefore, it may be assumed that nothing less than a supernatural interest in the future value of the estate would induce a proprietor to plant solely with a view to ultimate returns. In other words, we may, I think, safely assume that plantations in this country have not been formed on economic lines alone, but owe their existence quite as much to the attractions they possess whilst growing, and their favourable influence upon game preservation, as to the probable returns they may ultimately yield when mature. The result of this is, that we find the production of good timber sacrificed for the sake of present appearances, or slight present pecuniary gains in the form of over-drafts upon the immature crop, or in the saving of expenditure in the management. To illustrate these facts, we may mention some of the weak points of the average estate plantation, both in regard to its formation and management. In the first place, we usually find the crop planted to consist of a miscellaneous collection of trees and shrubs, which are arranged with mathematical precision, but without the slightest regard to the habits and rates of growth of the respective species. Fast-growing Conifers and slow-growing

hardwoods, shade-bearers and light-demanders, are mixed up in the most indiscriminate manner, as if the planter had mistaken a nurseryman's price-list for a planter's guide. The plants are often put in at too great a distance apart, and as deaths are sure to occur and increase that distance, the cleaning of the stems by suppression of side branches does not begin until the latter are large and strong. In thinning, again, we often see plantations treated as if crown formation or the growth of branches were the chief aim in view, instead of these being necessary evils in the sight of the economic forester. In cutting the timber little regard is paid to maturity, or the culmination of its financial value, upon which it will yield the highest rate of interest upon the initial and other outlays. The determination of this period is a difficult matter, I admit, but there is no reason why plantations should not be cut upon principles which are applied to every farm or garden crop, although clear fellings may not be desirable in all situations.

Such are a few of what may be termed defects in British wood-management of the past. We do not say that all of them have existed in any one plantation, but one or the other has left its mark upon every wood we have seen in this country, exceptions only proving the rule. What is true of the past is also, to a great extent, true of the present, and the various practices have gradually developed into a system, and find many supporters and followers even now. During the last few years, however, doubts have been expressed as to the soundness of our system of growing timber, and sufficient attention was given to the matter in Parliament to secure the appointment of a Select Committee to look into the question. The recommendations made by this Committee received little attention from the then or subsequent Governments, but a move has been made in respect to the teaching of scientific forestry which will doubtless bear fruit in good season. For in at least two centres—Edinburgh and Newcastle-on-Tyne—the principles of scientific forestry (as taught in Germany and elsewhere) are being imparted to practical foresters who may be able to attend the classes, and this in itself is bound to have some effect upon the future management of our woodlands. But we must not lose sight of the fact that Great Britain possesses an individuality of her own, and however successful and advantageous certain methods

and systems have proved themselves to be in other countries, considerable difficulties may lie in the way of their adoption in these Isles. In all countries, for instance, which have made any great progress in forestry we find that the State owns a considerable portion of the forest area, and this alone means a continuity of systematic management which is of the highest importance in good forestry, but is difficult to secure on private estates with changing proprietors. Timber production, again, forms the primary object in view in the working of State forests, while game and other accompanying features are only of secondary importance, whereas, as we have seen, the reverse is the case with us. Another distinguishing feature is the large and unbroken areas which Continental forests cover, in contrast to the small woods and thickets which, together with hedgerow timber, constitute the characteristic charm of an English landscape. As arboriculturists we are, if anything, in advance of our neighbours in Europe, but as regards forestry we can never hope to see ourselves so proficient in the practice, and so well versed in the science of the craft, as our professional comrades in France or Germany.

Of course, from a forester's point of view, the scientific management of woods presents no great difficulties. All that is necessary is to plant the proper species, treat the crop in the proper way, cut at the right time, and keep down ground-game. But it is only natural that a proprietor who regards his woods as a feature which constitutes the character and adds to the amenity of his estate should desire to have some say in regard to their management. It is all very well to show that a certain system will insure a return of so many shillings per acre annually, if only followed up for the next hundred years or so. The owner probably thanks you for the information, but intimates that as he doesn't expect to be in the neighbourhood about that time, he would much prefer a trifling return in some shape or other during the next few years. This may involve methods of planting, thinning, and felling which are not in harmony with your system ; and, although recognising the truth of what you say, usually embodies his ideas in the formation and management of his plantations, whether you approve of them or not.

I fear that I have taken up too much time over this pre-

amble, but I think it necessary to look at things as they are before discussing things as they should be. No one, probably, denies the need of improved methods of rearing plantations, but many are apt to lose sight of the fact that lack of knowledge is not the only cause of the bad condition of many English woods. So long as proprietors prefer game to good timber, so long will the gamekeeper exert a greater influence upon wood management (or mismanagement) than the forester. Some, I know, are sanguine enough to predict that forestry has a future before it in this country, but it is as well to remember that permanent changes are usually gradual ones, and that past methods cannot be discarded instantaneously. Bearing this, then, in mind, we will proceed with the subject proper.

I think it quite unnecessary to go into the details involved in fencing, draining, and other preliminaries connected with the formation of a plantation, as they vary in every locality, and all that could be said concerning them has been repeated over and over again by various writers. Assuming, then, that these have been attended to, the first thing we have to deal with is

The Selection of the Species.

In selecting the most suitable species for any given piece of ground, an amount of knowledge is required that few are happy enough to possess. If properly selected, the species will show a healthy and normal growth at all stages of life; will be able to withstand the climatic changes and vicissitudes common to the locality, such as winter, spring, and autumn frosts, wind, rainfall, and summer drought; will produce timber of good specific quality; in short, will yield by good management the largest financial return that the soil is capable of producing when under timber. The naming of a species which will fulfil all these conditions is attended with as much uncertainty as the preparation of a weather forecast for next month, and this fact being recognised by planters, has led to the mixed plantation being so popular. While no objection can be made to a proper mixture of two or three species, with due regard to their habit and rate of growth, the disadvantages of a miscellaneous mixture are manifold, and will be referred to later on. I believe, however, that the species which is found to be most suitable for

extensive planting in any given locality usually turns out to be an indigenous one, and it is not difficult to see why this should be the case. In the first place, all risks incidental to climatic variations are reduced to a minimum, thus favouring the growth of a sound and healthy crop of timber. In the second place, all industries which regulate the demand for home-grown timber confine themselves almost exclusively to the timber of native trees, and therefore the market value of a crop composed of the latter is usually higher than one consisting of introduced species, although there are exceptions to this rule. In any case, we think the planting of our native trees has been, and is, too much neglected in England. Larch is still our most profitable coniferous tree where it thrives well, and a sound and healthy crop of it doubtless gives a better return, time considered, than one of Oak or Beech. But how many stunted and diseased plantations of Larch do we see standing on sites eminently adapted for one or both of the others in the lowlands, or for Scotch Pine in hilly districts. Even where Larch does succeed, however, it is doubtful if its value as a timber-tree exceeds that of the Ash, which grows almost as rapidly and fetches a higher price at any age than Larch does. The craze for novelties in the shape of introduced coniferous trees, which have little but a rapid growth to recommend them to the *economic* planter, has proceeded at such a rate that it is quite a rare sight to see a young plantation of indigenous hardwoods, although hundreds of coniferous ones have been planted during the last few years. The result is that our future supply of home-grown timber consists of species which the buyer will probably reject or view with suspicion, while our woods are crowded with exotic Conifers which may possess many attractions when in a healthy condition and grown singly or in characteristic masses, but when mixed indiscriminately present too confused an appearance to please the eye of good taste, and render the production of good timber impossible. Both from æsthetic and economical points of view, therefore, we advocate the choice of indigenous or European trees for forming the backbone of our plantations, confining recent introductions to groups in those sites which our limited experience points out as being most suitable for them.

Of course the particular species decided upon for a plantation must depend upon soil and situation, and as these often vary in

an area of any size, the species should vary with them. In extensive forests the species is usually determined by the general character of the soil, and differences of an acre or so in extent are usually ignored. In the smaller woods and plantations of this country, however, good forestry should recognise the nature of every half-acre which differs from the rest, and select a species adapted to it. This not only results in a healthier and more profitable crop, but lends true variety to the plantation, and is a very different style of mixing to that of planting so many different species at regular distances apart. A plantation formed on the former plan is thus made up of one or more (as the case may be) groups of pure or unmixed wood, and each can be treated according to the sylvicultural requirements of the species composing it, and the group cut when mature without interfering with other parts of the wood. It is scarcely necessary to enumerate the respective species which are adapted to different classes of soils, as those at all conversant with arboriculture will have these things at their finger-ends. Soils, however, should always be considered in relation to climate and rainfall, as the latter exert quite as much influence upon the growth of trees as the former, and it is only when both are favourable that the best results can be obtained.

A few words may now be said regarding

Sylvicultural Mixtures

and their advantages. To some extent the practice of mixing different species of trees may be considered analogous to that of growing farm crops in rotation. As the requirements of different species with regard to plant-food vary, so the demand made upon the soil for any particular ingredient of plant-food is less in the case of a mixed than in that of a pure wood. This advantage alone may be practically insignificant, but the composition of the humus layer in a mixed wood is usually of a better character, and this increases the temporary fertility of the soil. Insect and fungoid pests are less troublesome, and cannot make such rapid headway where individual trees of the affected species are separated by those of another which enjoys complete immunity from attack. A judicious mixture of light-demanders and shade-bearers also enables a heavier crop of timber to be grown on the same area, and thus increases the productive power of the soil.

The main conditions to be observed in forming such mixtures are: First, that the most valuable species shall dominate or grow most rapidly, and the other, or others, be subservient to it, so that the latter shall at no period of growth interfere injuriously with the former; or, second, that the different species shall be of the same rate of growth and possess similar habits and requirements as regards light, heat, moisture, &c. In the former case certain species are introduced for the benefit of the main crop; in the latter all are on an equal footing, or practically so. Examples of such mixtures are found in growing Beech with Scotch Pine, Larch, or other fast-growing Conifers, in which the latter form the dominant species, and the Beech is kept at a lower level by reason of its slower growth. Oak with Spanish Chestnut, or Beech with Hornbeam, furnish examples of mixtures in which both species are pretty evenly matched. Another form of mixed plantation is that wherein the main crop remains unmixed at first, but a shade-bearing species is introduced after a few years' time, so that the wood becomes what is technically known as a "two-storied-high forest." A mixture of this kind is especially suited for light-demanding trees, which require a long period to mature, such as Oak, and is also advantageously adopted with Scotch Pine and Larch, Beech being the favourite tree for the second or lower story.

We now come to

Planting.

So long as a plant is able to re-establish itself in its new habitat without having its growth seriously checked, or its stability in after-life impaired, one system of planting is as good as another, if the aim of the planter is simply to leave a certain number of trees which shall at some future period occupy more or less completely the whole area planted. Such an object the arboriculturist might have in view, and, as arboriculture has been long practised in this country, it is not surprising to find our woods planted on more or less arboricultural principles. But timber-growing and tree-growing are two different things, and the methods which would be suitably employed in the case of the one need not necessarily be so in the case of the other. Now good timber is produced not only by laws of growth peculiar to each genus and species, but by natural laws which are common to

both the vegetable and animal kingdom. One of the most prominent of these is known as the "survival of the fittest." Before it comes into play, however, the struggle for existence, which is terminated by it, must proceed, and it is in this struggle that all weak and sickly individuals perish, and none but the strong and healthy survive. Now a young tree, or any other plant or animal which is surrounded by every condition essential to health and growth, is not affected by this law until the proximity of another individual threatens to rob it of one or more of these essentials. This it may do by depriving it of what it already possesses, or by appropriating to itself the whole of an element which is required by both. A young tree, therefore, which is planted, say, four feet distant from its neighbour is not interrupted by the latter until eight or ten years after planting, according to soil and climate, and the size of the tree when planted. By this time it will be fairly well clothed with branches, and when it is obliged to contend with its nearest neighbour for space, will be able to inflict great injury upon the latter before it finally succumbs, or is correspondingly injured should it prove the stronger. In other words, the struggle for existence becomes more severe and protracted the longer it is delayed and the older the plants which enter into it. This not only tends to weaken the survivors, but the size to which the branches have attained before being suppressed causes the timber of the lower part of the stem to be knotty and coarse. This at least is the result where the plantation has been left alone after planting, but where, as naturally happens, artificial thinning intervenes, the vitality of the tree is prevented from being weakened by overcrowding, but the rough and knotty character of the timber is increased. In either case, therefore, objections may be made to the methods employed, and we must seek one which obviates overcrowding on the one hand and prevents rough timber on the other. Suppose, then, we are planting a piece of old pasture or arable land which allows us to work a plough with comparative ease. The first thing we should do would be to turn back shallow double-furrow slices across the ground, leaving a distance of two to three feet between them. This will leave bare strips for the reception of the seed or plants, and the work may be done with an ordinary moulding-plough, or with a forest-plough specially designed for the purpose.

After ploughing, the furrows should be subsoil-ploughed if possible, and the soil stirred to a fair depth, but the necessity for the work depends upon the nature of the subsoil. We should then choose a suitable spell of weather for planting, and proceed as follows: By means of the planting-iron seedlings would be put in one to two feet apart along the bottom of the furrows, using 10,000 to 20,000 plants per acre, according to the species and size of the seedlings. In good soil, and with fast-growing species, the smaller number would be amply sufficient, but where the conditions are reversed the larger number would be none too many, if expense be left out of account. In ordinary cases, however, 10,000 to 12,000 would be about the thing. Allowing 10*s.* per acre for ploughing, £1 for planting, and £2 for plants, would bring the total cost per acre to between £3 and £4. For the first year or two after planting weeds and rubbish must be kept down until the plants are out of danger, after which we may leave them alone for a time.

When ploughing is out of the question, as on rocky ground, or in replanting old woodland, small patches may be cleared of weeds with the spade, the soil loosened up, and three or four plants put in each patch, the latter being about a yard from the next one. Weeds, &c., must be kept down as before.

For either of the above methods to be successful, it is necessary that ground-game should be almost, if not quite, absent; but the same may be said of all planting operations. It is also necessary that the seedlings should be planted so that their taproots are left in a natural position, and that they are not weakened, or practically killed, by long exposure. We do not assert that these methods are applicable in all cases, but we merely give them as suggestions which can be modified to suit each particular case. What we desire most to emphasise is the necessity for close planting, thus following more closely in the footsteps of Nature, and rearing timber by natural instead of artificial methods.

It may be asked, "Why incur the expense of planting so many hundred trees which can never hope to reach maturity?" The answer may be best given by considering what takes place in the struggle for existence. We have said that this struggle terminates in the survival of the fittest. What are the fittest? In sylviculture they are those trees which Nature has endowed

with certain advantages over their fellows, by which they are enabled to thrive where others merely exist, and to exist where others perish. These advantages are of many kinds, such as exceptional vigour of growth, adaptability to the soil and situation, hardiness of constitution, &c., according as they may be exposed to one or the other of the dangers which tend to bring out the capabilities of the tree in these respects. Now in a certain number of seeds, say 10,000, it is possible that 10 per cent. are thus endowed with one or the other of these advantages; consequently we may fairly assume that the greater the number of seeds or plants we have on a given area, the greater the number of individuals are present which find a congenial home on that area, and therefore the chances of a good crop are improved. This is why mixed plantations are not so well able to produce timber of large size and good quality as pure ones. In the first place, the number of individuals of any one species must be reduced in proportion to the number of species represented; secondly, the struggle for existence in a mixed wood results in the survival of the fittest species, instead of the fittest individuals of any one species. At first sight, this latter fact may not appear to be of any disadvantage, but rather the reverse; but we will look into this later on.

Let us now watch the gradual development of this struggle for existence in the growth of the plantation we left a few moments ago, which we will suppose to consist of one species only. The first thing we shall notice is the pushing ahead of a certain number of trees above the heads of their neighbours, and each successive year makes this difference in growth more apparent. In like manner, the trees next in point of size and vigour to the leading or dominant ones get ahead of those weaker than themselves, so that we can divide the trees into three classes according to their size. As we have already seen, all have an equal chance of existing until their side branches come in contact with one another and the struggle begins. So long as the leading shoots are not interfered with, the existence of the trees is not in any great danger, but the loss of side branches checks the absolute growth of all classes as soon as close order is obtained. The effect of this check upon the dominant trees is at first very slight and scarcely perceptible. It is more apparent upon the second class, but in both

classes tends to increase height-growth and to diminish the relative size of the crown. On the third class its effects are most felt, and in a few years not only is their side-growth entirely checked, but the crowns of the larger trees gradually overtop the leading shoots, and they become what is known as "suppressed," and henceforth take no part in the struggle. Their place, however, in the composition of the plantation is taken by the smaller trees of the second class, and these in turn become suppressed, and are replaced by the next in size. A constant process of weeding-out is thus continually going on so long as the height-growth of the trees is rapid, and by the time the latter culminates and begins to slacken, the majority of the trees will be long, clean poles with small crowns, the latter having been continually moved up the stem as growth proceeded. A certain proportion of the trees, however, will be stouter and longer in stem and wider and deeper in crown than the rest, being those which have proved themselves the "fittest," and it is to these we must look as constituting the quality and value of the crop. It must not be supposed, however, that the whole of those trees which gave early promise of becoming dominant ones have fulfilled that expectation. Gales and other dangers to which the crop is exposed will constantly be doing some damage or other, and the dominant tree of one period may not be so of another, although the majority will probably retain their lead to the end.

The culmination of height-growth marks an important stage in the growth of a plantation, for after it has been reached the composition of the crop is usually fixed or rendered permanent for the remainder of its life, and the further development of the trees (as timber) is principally confined to the thickening of the stems, and (as vegetables or plants) to the widening of the crowns.

As we have brought our plantation to this stage without artificial aid, we may examine it a little more closely from the sylvicultural standpoint, and see wherein it differs from the ideal.

To obtain a full crop of good-sized timber it is necessary that the dominant trees at the culmination of height-growth shall be sufficiently numerous, and so regularly distributed over the ground, that their crowns may, after development, form a perfect

leaf canopy over the whole area covered by the crop. This may be termed the ideal crop, and, it is needless to say, is scarcely ever realised in practice. For, on looking through the plantation, we shall find that the dominant trees stand thicker in one part than in another. Differences of soil and situation will cause the struggle for existence to be short and sharp in one quarter and slow and protracted in another. In the latter case the trees will probably be weakened and drawn, and possess slender stems and small crowns. In other places, again, we may find one or two dominant trees which have met with little or no opposition from their neighbours, and are, in consequence, in possession of heavier crowns than is desirable. Such irregularities may not be universal, but are sure to occur more or less in plantations left entirely to themselves. It is to remedy these defects that artificial thinning is necessary, and, although greater differences of opinion exist on this branch of forestry than on any other, we cannot pass it by altogether. The aim of thinning, in my opinion, should be the provision of a certain number of dominant trees in those parts where, as we have seen, they do not already exist in sufficient numbers, and thus bring the crop nearer its ideal condition. This is not a rule-of-thumb operation, such as the removal of every other tree, or leaving the distance between the trees equal to one-third of their height. These ancient rules have simplicity in their favour, it is true, but they ignore the fact that trees differ as much in their habit and rate of growth as any other class of animal or vegetable, and should be treated accordingly. Thinning, therefore, with the already mentioned object in view, should consist in giving the necessary number of trees an advantage over their neighbours, and this can only be done by removing or weakening the latter. The trees selected for becoming part of the main crop should, of course, be perfectly healthy, with straight stems, and sufficiently vigorous to enable them to continue the normal growth which the overcrowding threatens to interfere with. The exact mode of operating should depend upon circumstances. We are accustomed to regard thinning as cutting so many trees out of a wood, but in reality a plantation may be thinned without cutting a single tree. For we must remember that it is the crowns of the trees which alone necessitate thinning, and if we can give our selected trees the necessary space by cutting back the branches of, or beheading

their neighbours, we not only copy Nature's method in the closest possible manner, but also gain the advantage of allowing the encroaching trees to add to their bulk before they are finally removed. Of course, where the crowns of the latter are so weak and small that further increase would be improbable, no advantage would be gained in retaining, and no harm done in removing them altogether. But in taking out a tree with a crown sufficiently large to leave a gap behind it, we favour an irregular growth of crown in the surrounding trees, and this means rough timber. The entrance of sun and wind also has bad effects, and should be guarded against as much as possible. For these reasons, therefore, we advocate the first thinning or cutting back of branches to be done (where required) about the tenth or twelfth year after planting, according to the species and growth. For this purpose an intelligent man should go through the plantation, and with a light hedge-bill knock off the heads of the least promising trees in all places where the crop has too even and uniform an appearance. This will not prevent them from forming a new leader; but by the time they have done so the others will have gained a lead they are not likely to lose, and that is all that is required. The next thinning may be carried out on similar principles about the twentieth year, and any dead or suppressed trees may also be removed. These two thinnings should suffice until height-growth culminates, beyond which our imaginary plantation has not advanced.

We have now to look at the conditions under which the further development of the trees and the thickening of the stems takes place. For a few years the gradual suppression of the second and third class trees will still be carried on by the dominant ones, but more slowly than heretofore, as, being larger, they are not so easily disposed of, and the growth of all classes proceeds less rapidly. The crowns of the trees will also begin to lose their conical, and assume a more or less semi-spherical, outline. This will increase the leaf area, and lateral branches will push out and fill up any open space within their reach. By the time height-growth has practically terminated the dominant trees will be left in undisturbed possession, and their whole energies will be devoted to crown formation. The larger the latter the better will the stem be nourished, but the actual increase of the clear bole in volume will depend upon its length and crown

combined. As the production of the greatest number of well-formed boles is the aim in view, we must see that these have sufficient head room necessary for crown formation, otherwise the breadth of the wood-ring and the resulting increment of timber will decrease. This may necessitate the removal of a certain number of the smallest and least promising trees, for at this, as at all previous stages, variations in the size of the trees will occur. Now it has been proved by careful measurements that thinning after height-growth has terminated does not increase the total yield of timber at the final cutting, but affects the size and quality of individual trees only. Therefore, if the greatest number of cubic feet per acre is the main object, independent of quality and size of timber, it makes little difference whether we thin at this stage or not, as, although the trees will be smaller, there will be a greater number of them to the acre, and the balance will thus be restored. But in most cases we shall find that the additional value possessed by the thinned crop over that of the unthinned will make it worth our while to produce the former. And another advantage in thinning lies in the fact that we are able to realise a portion of the crop earlier than by waiting until the whole is ripe. Under these circumstances, therefore, we should advise a judicious and moderate thinning, to begin as soon as it becomes evident that the larger trees no longer add appreciably to their height, as this is a sign that permanent crown formation is ready to begin. This thinning should be so regulated as to prevent sun and wind from affecting the stems of the trees, or drying up and hardening the soil surface, and should merely keep pace with the growth and requirements of the trees until it is no longer required. It should not, on the other hand, be delayed until the growth of the trees has been checked, as when this has occurred they do not in all cases recover when the cause has been removed.

The effect of this thinning upon the remaining trees will be to maintain the annual wood-ring at its proper breadth, instead of allowing it to decrease too rapidly, as is usually the case where the trees stand thickly together. This matter is still engaging the attention of Prussian foresters, by whom investigations on the growth of various forest-trees under sylvicultural treatment have been carried on for more than twenty years. The principal conclusions arrived at with regard to those species already

reported upon are: first, that late thinning does not appreciably affect the total volume of the crop; second, that the stimulus to growth given by it is chiefly confined to the larger and more vigorous trees; third, that the quality of the timber, and consequently the financial value of the crop, is improved; and fourth, that the increase in volume due to it is not maintained for a long period, but culminates in four or five years, according to soil and situation. The better the soil and situation the longer are the effects of thinning noticeable, and *vice versâ*. With regard to the first of these conclusions, it may be explained that the removal of trees in thinning of course decreases the volume of the standing crop at the time, but that the increased growth later on makes up to some extent for this deficiency, so far as it affects the increase in volume which would take place *between the time of late thinning and the cutting of the crop*. The advantage of thinning is, therefore, represented by the interest on the realised thinnings, plus the increase in value due to greater bulk and quality at the final cutting. These are, of course, general statements, and will not be verified in every case. It must also be remembered that the resulting benefits are greatly dependent upon the condition of the soil and crop previous to thinning. Where a rich store of humus is present, and the crop vigorous and healthy enough to make use of it, an increase of air and light cannot fail to stimulate the functional activity of the leaves, resulting in the better nourishment of the cambium and a broader wood-ring.

As a general rule, the necessity for thinning at any stage depends upon the soil and situation. When the latter are good, the trees quickly settle the question of predominance, and are also able to endure a greater amount of shade without succumbing. On the other hand, poverty of soil and unfavourable situation only support a relatively slow growth, and the aid of the forester is required in order to decide which are to remain for the final crop and which to go.

Such are the main points which require attention in growing a crop of unmixed timber-trees which is desired to yield the greatest bulk per acre, combined with the best quality. The principles involved are applicable to all species and to all climates, and although there are other systems of growing woods which are recognised by scientific foresters, yet the one I

have sketched in outline, viz. the "*even-aged high forest*" system, is the only one capable of yielding the best possible return. I am not asserting that this method of raising woods is practicable in this country at the present day. The varied functions which woods perform in Great Britain, and the influence of individual interests and tastes, have already been mentioned, but as these vary on every estate, it would be perfectly useless to consider them when dealing with general principles, which is all I have attempted to do in this paper. I might also explain that by "unmixed" wood I do not mean that a plantation need consist of one species only, but that the different species which compose it should be grown in "unmixed" groups, or if mixed, mixed on the principles previously explained.

Perhaps, however, the advantages of growing pure groups instead of the usual mixtures have not been made sufficiently clear to satisfy all minds. Let me briefly run over the growth and development of a typical mixed plantation, and note wherein it differs from our example. We will select one which is intended to produce a crop of hardwoods, Beech, Oak, and Ash. These are planted twelve feet apart, and the space between filled up with Larch and Pines, leaving the whole standing four feet apart. At the time of planting the trees are two to four feet high, according to species, and as the roots are too strong and spreading to be placed perpendicularly into the ground, they are laid at the bottom of a shallow pit in a more or less horizontal position. This need not affect their growth to any great extent, but affects their stability, and in windy weather they get blown about if at all top-heavy, and require putting right again. This is disadvantage the first. Then it will take about eight or ten years for the branches of neighbouring trees to meet and form a perfect leaf canopy, and by that time the side branches will be strong and vigorous, and when choked off by the shade will leave dead knots and ugly blemishes in the timber. The stems of the hardwoods will be comparatively crooked and the heads bushy, especially if ground-game has nibbled them or the leading shoot been destroyed in any way. This means that a certain proportion of them have little chance of becoming good timber-trees, and the prospect of a good crop is lessened: disadvantage the second. During the next few

years, after the trees have closed up the struggle for existence begins, but in place of the strongest individuals, we see the strongest species brought to the front. In the case we are supposing these will probably be Larch and Ash. In order to keep the other hardwoods alive, therefore, thinning must begin, and in so doing gaps are made, which weaken the leaf canopy and give many of the trees too much side-light. This encourages the growth of strong branches and crooked stems, and disadvantage the second is repeated. The faster growing species will also meet with too little opposition to keep their stems sufficiently clean, and rough timber is encouraged in both ways.

But suppose it has been decided to ignore the suppressed or slower-growing species and allow the dominant ones to have their own way. What happens then? Ash and Larch are the principal survivors, and the thickness of the crop of dominant trees, and the quality of the timber, depend a good deal upon the way these two species are distributed. If regularly distributed, and sufficiently close together to keep the stem-cleaning process in motion, fairly clean timber will result, for both being light-demanders and rapid growers (we are assuming that the soil and situation are favourable to both), they will constitute what we have termed a sylvicultural mixture. If, on the other hand, they are evenly distributed, but too far apart to counteract each other's side-growth, wide-spreading crowns will prevail and rough timber result. With regard to these two species, however, the existence of large crowns is not such an evil as it would be with many, but in all cases it means that the proportion of timber to branches is too small, and the crop therefore possesses a lower selling value.

Probably many of the commoner species of Conifers owe their existence in mixed plantations to the idea that they act as "nurses" to the more desirable kinds, and thus enable the plantation to be formed without using so large a number of the latter. Where the raising or purchase of the main-crop species is an expensive matter the plan is worth considering, but so far as the nursing business goes there is little in it. The best nurses or stem-cleaners for any particular species are individuals of that same species, and the reason for this has already been made clear in describing the struggle for existence. It may be, however, that a species may serve as a nurse and also be of more

value at its *removal stage* than the main-crop species of the same size and age. Larch might be mentioned as an instance of this, but it is necessary that those principles should be observed when using it, or any other species for this purpose, which were laid down in dealing with sylvicultural mixtures.

Such are the chief points for and against the formation of the ordinary mixed plantation. It will, doubtless, long retain its popularity for several reasons. In the first place, it presents a better appearance during the first few years than a pure wood of the same age; and, in the second, it can be depended upon to grow something or other—whether of any value as timber or not does not much matter to the planter, nor does he consider after effect to any great extent.

The last point I have to consider in connection with our subject is the

Age at which a Plantation is most profitably felled.

Local demands and circumstances affect this question to a great extent, and, as these vary on every estate, no fixed rule can be laid down. But I believe that a rotation based on the period of the greatest technical value of the crop is the most suitable one for woods and plantations in this country. Such a rotation may not satisfy the requirements of strictly economic forestry, which looks only at the net return, but is quite exact enough for adoption in this country. The period of the greatest technical value of a crop of timber (in the sense in which we use that term) is that period in the life of a plantation at which its size and quality best meet the local or existing demand for that particular species. For instance, in high-lying districts a crop of Larch poles fit for fencing purposes may be worth more per *cubic foot* at thirty years of age than the same crop at fifty or sixty years of age. This does not necessarily mean that the absolute value of the younger crop is greater than it would be if left until the latter age, but that its relative value probably is so, and therefore it may pay the proprietor to cut early and grow two young crops to one older one. Where a species is most in demand when of large size, such as Beech or Sycamore, the period of the greatest technical value will coincide with that of the greatest average increase in volume, and it will pay to allow the crop to

stand till a fairly advanced age. Oak, again, is sought after with as much heartwood as possible, and maturity of timber should regulate its cutting. In mixed plantations the technical maturity of the most valuable species should determine the period of cutting, but if the immature species can be left without loss so much the better. In ordinary practice the British forester is never called upon to calculate the exact financial condition of a crop of timber, but he may sometimes have to decide whether it may be more profitable to cut a crop at the present time, or five or ten years hence. All that is necessary for accomplishing this task is to ascertain, first, the present value of the crop; second, its annual increase in volume and value; and, third, the rate of interest chargeable upon it. If the money value of the annual increase in timber exceeds the interest on the gross money value of the present crop, he may assume that the plantation is still paying its way. When, on the other hand, the increase falls short of, or only equals the interest, then it will probably pay him to cut at once. For instance, the present gross value of a plantation, valued at 1*s*. per cubic foot, is £300, and its increase in volume during the last season reckoned to be 250 cubic feet, or £12. 10*s*. per acre respectively. The interest on £300 at 3 per cent. would be £9, thus showing a balance of £3. 10*s*. in favour of the growing crop. In making such calculations, however, it is necessary to take into account the health of the trees, the present density of the crop, and the state of the soil, for, as we have already seen, these conditions affect the probable increase in volume to a great extent, while market fluctuations may upset the most careful calculation.

The actual money value of a plantation to the proprietor would, of course, be its *net* value, or the sum remaining after all costs of production, harvesting, ground-rent, rates, taxes, &c., during the whole rotation had been deducted from the gross amount realisable; but as the necessary records and data are scarcely ever forthcoming, the owner is spared the pain or pleasure of knowing exactly how much he has lost or gained on a crop of timber. The question as to whether wood-growing does pay or not in this country is therefore usually unanswerable, although statements have been published which were intended to prove that particular plantations have returned 200 or 300 per cent. on the outlay. Some may probably pay well, but I

doubt if such statements will bear strict investigation. For in most cases we find that a number of invariable and inevitable items of expenditure have been omitted, and merely the cost of planting and other initial charges deducted from the gross returns. That woods do pay when properly managed has been conclusively proved in many countries, and I may cite a few returns gathered from official sources in various parts of the German Empire in support of this statement. For instance, the average net return per acre from the State forests in the following States was as follows :—

	1890	1891	1892
	s.	*s.*	*s.*
Grand Duchy of Anhalt . . .	11	8	—
Sachsen-Altenburg	20	19	17
Schwarzburg-Rudolstadt . . .	10	10	—
Saxony	—	16	16

These returns are obtained from millions of acres of forest-land, which are supervised by a well-organised staff of trained officials, and we may assume that over-felling or a decrease of the normal stock does not occur. They show clearly enough, therefore, that land of inferior quality can yield a better return to the proprietor when under timber than when let to a grazing or a sporting tenant at a low rental, although, as has been already pointed out, the State may be the only party able to look at this fact from an abstract point of view.

In conclusion I should like to emphasise the fact that the success of a plantation, whether grown with a view to profit or ornament, depends, not upon the care and attention of one, but of several generations of proprietors or foresters. The changes which so frequently occur in the working staff of an estate render the systematic treatment of plantations a weak feature in estate management, while present needs are usually considered of more importance than future prospects. Under these circumstances, therefore, we cannot reasonably expect to see any sudden change or rapid advance made in the existing customs of planting, thinning, and felling which would bring them into closer harmony with economic and scientific principles. The skill of the forester lies less in what he actually does than in his capability of taking advantage of Nature in order to get his work done for him. The acquisition and the exercise of this skill necessitate close and constant observation, so that whatever opera-

tions may be necessary may be done at the proper time, otherwise they may do more harm than good.

There are two facts which we should do well to remember in connection with timber-growing. One is, that *arboriculture* is not *sylviculture* ; and the other, that while "a tree may be growing while we're sleepin'," yet it may not be growing into good timber.

Part II.

Coppice and Hedgerow Timber.

Coppice.—The cultivation of coppice-wood is almost entirely confined to the Midland and Southern Counties of England, and in some districts occupies practically the whole of the woodland area. It is usually associated with Oak or Ash standards, which are either planted or raised from self-sown seed, or arise from "tellers" which have been retained for that purpose. A few years back coppice was probably the most profitable forest crop in the country. During the last ten years, however, prices have fallen so low in many districts that it no longer pays adequate interest on the original outlay, and scarcely covers the cost of maintenance. This fall in value is chiefly due to agricultural depression and the monopolising of small wood-consuming industries by machine-worked factories. The former cause has operated by decreasing the demand for sheep-hurdles, cribs, rakes, stakes, &c., into which the greater part of coppice-wood is manufactured, and the latter by cutting down the price of wooden articles so fine that the rural manufacturer is practically unable to compete with his stronger rival. In certain districts, however, coppice-wood still pays when properly managed, and although it may yield a smaller return than timber, yet it has an advantage over the latter in the possibility it affords of a comparatively quick return of a portion, if not the whole, of the initial outlay.

The chief products of coppice-wood are rods and poles. The former are obtained from Hazel or Willow, and the latter from Ash, Spanish Chestnut, Alder, Willow, Birch, &c. Local demand determines whether one or both of these products should be produced, but in most districts poles pay better than rods, owing to the varied uses to which they can be put. Alder poles are less

in demand, and meet with a slow sale unless of large size. Hazel rods still sell well in districts in which basket and crate making flourishes, but elsewhere are of little value.

The class of land devoted to the growth of coppice-wood must be of good quality, so as to insure a vigorous and rapid growth, and also to meet the demand which frequent removal of the crop makes upon its resources. For Hazel or Spanish Chestnut a light or well-drained loam is preferable, while Ash, Willow, &c., thrive best in a moderately damp and deep soil. In planting a piece of ground for this crop strong healthy plants, two to four feet high, and with plenty of roots, should be selected, and none but those showing a vigorous habit of growth used. Where a hard subsoil or indurated plough pan exists, this should first be broken up in the most convenient manner. When planting more than one species it is better to keep each by itself, and not to mix Hazel with Ash, or other pole-producing species, as the former reaches its most saleable age several years earlier than the latter. Two or three years after planting, or as soon as the plants are thoroughly established, the Hazel should be cut over about three or four inches from the ground, as it is only those shoots which spring from adventitious buds that are of any use for rods. Ash, Alder, &c., should be left until large enough to be of some use, as they will throw up stronger shoots when cut over after attaining a fair size. The rotations fixed for underwood vary from ten to fifteen years. For Hazel, ten years is quite long enough, as, if left standing until the rods lose their pliancy, they depreciate in value. For pole-growing the longer rotations are usually adopted, according to the size of pole most in demand.

When once thoroughly established, and all blanks planted up, coppice requires little attention. At every cutting drains should be attended to, and diseased or sickly stools replaced with young plants. When very large poles are desired, it is advantageous to thin out the weaker shoots with the handsaw about four or five years after cutting, as this allows the remainder more space for development, and also allows rods to be utilised which would otherwise become dead and dry. In cutting, the stools should be cut as close down as possible, and in such a way as to leave no jagged wood or portions of stool stripped of bark. The main point requiring attention in growing good coppice is the subjection of ground-game. Where the first year's shoots are nibbled

off by rabbits or hares the wood never regains that straightness of growth which constitutes its most desirable quality, and the number of weak shoots is increased.

The method of combining coppice and timber-growing together, in what is known as "coppice with standards," cannot be recommended on economic grounds. A short acquaintance with it will soon convince one that the timber so grown is rough and short in the bole, or if sufficiently close to encourage height-growth, then the coppice suffers from overshading. If the coppice is worth growing at all it is much better to allow it full possession of the ground as far as it goes, and confine the timber to another part of the ground. A few of the best Ash "tellers," however, may always be left standing over two or three rotations without doing much harm, while they add to the value of the wood.

Probably underwood owes its existence on many estates quite as much to the cover it affords to game as to the profit attending its cultivation. For this reason it will probably survive in many districts long after it has ceased to be a remunerative crop. Unless prices recover, however, it will be to the estate proprietor's advantage to confine it within as narrow limits as possible, and gradually fill its place with timber-trees.

Hedgerow Timber.

This, like coppice-wood, is principally confined to the Southern Counties, and is a system of timber-growing peculiar to this country. Oak and Elm constitute the great bulk of this timber, but the latter may be regarded as the more representative of the two. Probably most farmers look upon hedgerow timber as more or less of a nuisance, and on arable land it undoubtedly is so, by impoverishing the soil, choking drains, and hindering the uniform maturing of the crops. On grazing land it is beneficial in providing shelter for stock, whether from sun or wind; but, on the other hand, it is often responsible for the wretchedly weak and patchy hedges so frequently met with on South Country farms. Landlords who take an interest in arboriculture, however, are usually reluctant to cut large timber anywhere, while the warm and wooded appearance presented by a country-side well stocked with hedgerow timber induces many to tolerate its presence with a cheerful mind. Apart from the tenant-farmer's point of view, the maintenance of a

well-grown stock of hedgerow timber undoubtedly proves a source of profit, and, if properly managed, does less harm than might be supposed. Like coppice, however, it should only be grown in a good soil and climate, as poor soils cannot afford the drain which trees make upon their resources, and in unfavourable climates the latter do not make a sufficiently free growth for producing good timber.

As numerous suckers are always thrown up from Elm roots, that tree usually reproduces itself without assistance from man, hence its frequency in hedgerows. The saplings from these suckers generally push up straight and clean for the first few years, and probably form better boles than would planted trees similarly placed, and, so long as horses are kept away from them, thrive well enough. The comparatively moderate crown and erect habit of growth also renders Elm a more suitable tree for the purpose than Beech or Oak, and with a little lopping near the base its shade is not too dense to prevent the growth of grass or other crops beneath. Probably less harm is done on the whole when the trees stand two or three together than when singly, as in the former case the growth of side branches is retarded, and when the height-growth of the trees has culminated the least promising can be removed. When Elm-trees stand in the line of Thorn hedges all suckers which are not reserved for timber should be regularly cut down to the ground, otherwise the hedge will soon consist of little but Elm.

In order to obviate all unnecessary damage to hedges or crops, pruning must take a prominent place in the growing of hedgerow timber. This sometimes takes the form of the periodical lopping off of all side branches, converting the trees so treated into objects closely resembling gigantic broomsticks with tufts of feathers at the top. This treatment favours the outgrowth of spray down the whole length of the stem, which every successive lopping increases, so that in some cases the bole is entirely obscured from view. This method of pruning both disfigures the landscape and also retards the growth of the trees, while the timber is simply a mass of knots. Generally speaking, free-growing suckers require little pruning beyond the removal of low branches, and any trees that show a bushy, flat top or crooked stem should be cut out entirely, as they are never likely to become well-shaped trees. The removal of double leaders

should always be attended to in good time, and any particularly strong growing branches can be shortened back. The cleaning of the lower part of the stem should be gradually performed at periodical intervals, until it is clear for at least twenty feet up. The branches should be cut close into the bole with the hand-saw, taking care that the operation is not delayed until they are so large as to involve a large wound being made, which four or five years will not see covered. Any spray which subsequently appears should be broken (not cut) off at the base of the shoots. Above twenty feet up the branches are not likely to do much injury to things below, but all far-spreading ones should be cut back to within ten or twelve feet of the bole, both on account of decreasing the shade and also to lighten their weight, as heavy limbs are very liable to break off at the point of union with the trunk. This shortening back of heavy branches is too often neglected in Elm-growing districts, for not only is their sudden fall a source of danger to men or animals, but the large exposed surface of the fracture allows fungi and water to enter the bole, whereby the timber of the whole tree is sometimes spoilt.

Besides Elm, Poplars are also suitable trees for hedgerows especially on wet soils. As timber-trees, the Abele and Black Italian are the most useful, the former throwing up suckers as freely as the Elm. The Lombardy has the most erect growth of any, but does not form such a good timber bole. Oak, Beech, Sycamore, &c., cannot be considered suitable hedgerow trees on account of their wide-spreading habit of growth and the injury they do to the hedges.

In the great majority of cases hedgerow timber is left pretty much to itself, except when the removal of a large limb becomes imperative, or the farmer finds low branches troublesome. In the latter case the trees are often subjected to the most brutal treatment by unskilled pruners, who either leave ugly snags upon the trees, or cut off the branches so carelessly that a portion of the bole is torn away with them when they fall. The farmer also utilises the trees as fencing posts, driving nails or staples into the butts with charming impartiality and unconcern. A large proportion of hedgerow timber is consequently of little value, and in many cases its removal would be of benefit to the farmer, without greatly detracting from the beauty of the landscape.

WOODS OF KENT.

By Mr. George Bunyard, F.R.H.S.

In the papers already given the main point touched upon appears to be the production of timber; but in the greater part of Kent (as also in Sussex), as a general rule, we do not plant for *timber*, such trees as are allowed to grow up being those natural to the soil (in the case of Oaks generally springing from seed), which, when they look promising, are marked off with red paint to be left standing as "tellers" when the underwood, the real crop of the land, is sold by auction. In selling, the wood is first set out in "cants," a "wash" being cut to show the dividing lines, and they are then numbered and sold by auction in lots of one acre or less, as the form of the wood allows. The buyer pays for his lots cash down, or makes an agreement to do so at a certain time, and pays a deposit. He then cuts all the underwood to the stubs or stools, leaving, as arranged, the marked "tellers" of Oak, Ash, Chestnut, &c. He makes from this wood "cant" the following various sorts and sizes of sticks, &c.:—

Use pieces, to split for fencing, sheep-gates, and wheelwrights' work.

Hop-poles, 10 to 16 feet and 18 feet.

Clothes-props, for washing-grounds.

Birch, for turners, &c. In the North for clogs for the mines; in the South for brushes and turnery.

Birch-tops, for brooms, sold by the "kid," to make stable and lawn brooms.

Binders, for fencing and nurserymen's use.

Bean-sticks, for scarlet runners.

Thatching-wood.

Hoop-wood, to be split for cask-hoops, mostly Hazel, Ash, and Willow.

Hedge-stakes, to repair gaps, &c.

Flower-sticks, for florists and garden use.

Pea-sticks.

Faggots, for the limekilns, cement works, bakers, and domestic use.

Bush-faggots, of Thorn and Crab, for dredging meadows in spring, and for gapping hedges.

Hazel-withes, for binding faggots and for packing.

Packing-sticks, split Hazel, pointed at both ends, for fruit packed in sieves.

Chips and bark from hop-poles—the workmen's perquisite generally.

The underwood is all cleared out of the "cants" by May 1 in the best woods, or, if the Oak-trees are sold, the buyer is allowed till August 1 to flay and faggot and remove the timber, and sells the lot out by a fixed time, and removes from the wood all that remains. The stubs throw out fresh shoots in May, and the year following the woodreve proceeds to fill up vacancies by planting Spanish Chestnut or Ash, whichever the land will best carry. This plan, I venture to say, is a great mistake, for, unless great care has been taken, the new plants put in are choked by the vigour of the first year's growth from the old stubs, which may reach to 8 feet in one year. The system of allowing the underwood when cut to remain till May 1 appears to me also to be a mistake, as it could just as well be all removed by February 1, except in years when deep snow prevails, and the woodreve could then at once fill up the vacancies with young plants, which would get firm hold of the soil, and be able to hold their own before the strong second year's growth from the stubs had begun. Under the usual system nothing but Ash and Chestnut are planted; all the other trees are the produce of natural seedlings, such as Pyrus, white Beam-tree, Thorns, Mountain Ash, Sloes, Birch, Cherries, Crabs, &c. These are mostly scattered by birds; and others are brought by the winds, as Hornbeam and Sycamore, while Hazel-nuts and Beech are stored up by the mice, and thus become part of the woodland. But in our Kent woods the only really valuable underwoods are the Ash and the Chestnut, the others being almost entirely the natural products of the district, which have asserted themselves in the bare, open spaces, and formed stools in the course of years.

The best managed woods on good, deep soil, say in the valleys, come to cut when eight to ten years old while upland woods, and

others on very poor soil, may be from twelve to twenty years before they are fit to cut; but the value of the hop poles and stakes is increased where it requires the longer period to come to sale size, as the timber is closer grained. On the other hand, the valuable underwood is not so plentiful in exposed woods. Where the water lies (in small ponds, &c.), or where the surface water from the main roads runs into the woods, Alder and Plum-leaved Willow are planted also, and Ash and Chestnut should not be put in where spring frosts are frequent.

Where underwood is shaded too much by large Oaks its value is much depreciated. For example, I am told by Mr. Carman, of Larkfield, an old experienced dealer, who, with his son, has kindly given me much valuable information, that in a large wood the shaded part only made £4 to £6 per acre, while where there were no timber-trees the same wood made £40. The timber (Oaks, &c.) should, therefore, be from 50 to 100 feet apart.

As stated in previous papers, the plantations of any district must be formed to meet the trade demands of that district, and the most profitable woods in Kent are those with thick, straight, well-grown underwood. The hop trade of Kent has in the past given an impetus to the growth and care of woods; but great changes have taken place in my recollection. In the 40's, 50's, and 60's nearly all the hops were polled with home-grown poles, the tallest, 16 feet to 18 feet, being used for the Mid-Kent Goldings and Colegates, and the shorter poles, 10 feet to 14 feet, being for the Weald of Kent hops, such as Prolifics, Jones, and others. Then a rage began for poles of perfectly straight outline, and they were brought from Norway and sold by auction from 40*s*. to 60*s*. per 100, thus displacing the home-grown ones. During the last five years hop-growers have used strings fastened to overhead wires, and less poles are wanted—in many hop gardens but few are used, the overhead wires being strained from large posts of Ash and Chestnut, 18 to 21 inches in girth at the base, the bines of the hops being led up by cocoa-nut fibre string from the ground to the wire. So that good wood that once fetched as much as £40 per acre is now worth only £10, after a growth of ten to fourteen years. When large, tall Chestnut and Ash poles were in vogue as much as £80 per acre has been made. However, this new method of stringing hops is

so expensive to start that there will always be many who keep to the old system of two, three, or four poles to a hill, because they cannot afford the initial expense of the new system.

It follows, then, that when hops sell well, and sell freely early in the season, that the woods make good prices. At the same time it is obvious that the small sum of £10 per acre would only pay rates and taxes, and were it not that much woodland is only kept up for sporting purposes, this return would not encourage a landowner to lay out any money on filling-up and replanting, though I am confident that if owners would insist on the rabbits being kept down they could get a far better return from their woods than they do.

Old Chestnut woods that are thin, and where young plants of the same nature cannot establish themselves, could be filled up with the Plum-leaved Willow, which comes in for faggots, and tends, by occupying vacant spaces, to make the Chestnut straighter and more useful for the wheelwright and sheep-gate maker. Crooked butts are of no value, and for this reason Ash drawn up among Chestnut produces the greatest number of useful hop-poles. And as the Hazel is valuable for hoop-wood, it should be planted for that purpose.

A word as to the formation of woods. Ash and Chestnut should be at least 6 feet from plant to plant, and to raise them a Larch Fir should be planted between each stool to act as nurses. These come in to cut before the main wood, and can generally be sold to the florists, or as poles for young hops, at a remunerative price. I would urge landowners to endeavour to keep their young woods free from coarse weeds by a regular use of the horse-hoe; and, although the labour is expensive, a wood gets on so much faster under this treatment, that I am sure it would pay, as where an open young wood once becomes covered with weeds and coarse grasses its growth is impeded for years. If the Larch nurses were ready for cutting at ten years old, it would be best to grub them out roots and all, and then cut the Chestnut and Ash stools to the ground, when, if kept clean, the next crop of underwood would only be about ten years before it was again ready to cut. Thousands of acres of fresh woods are ruined by the want of systematic care and attention, and, what with the rabbits and weeds, become almost useless for underwood.

A word as to Oaks. From time to time it is as well to thin out the trees from 50 to 100 feet apart; but the value of Oak timber and bark is heavily discounted by the importation of foreign timber and new methods of tanning, so that this bark is of secondary importance. I offer these few remarks in the hope that it may induce some to utilise that vast acreage of land now arable which, owing to the present distressed state of agriculture and to foreign competition, cannot be made to pay with cereals, and I am not alone in giving an opinion that well-managed woods will yet pay well for attention.

Discussion.

The Chairman (Sir Alexander Arbuthnot) said before speaking on the subject of the Conference he would like to read a telegram which had been received from their valuable Secretary, Mr. Wilks, whose absence they all regretted. Mr. Wilks had been very seriously ill, and a few days before that meeting underwent a painful operation. The telegram read: "Greetings to all. Progressing most favourably. Try voice to-morrow." (Cheers.) Sir Alexander went on to say that he wished Mr. Dyer could have been in the chair at that, the second of their meetings that day, because Mr. Dyer was far more competent than he was to draw attention to the points which had been raised in Mr. Forbes's interesting paper. He thought they would all feel that his lecture was a most valuable one, and he had no doubt that those present that day, and many who were not present, would be very greatly interested in reading it when it appeared in the *Journal*. If he were to express an opinion on Mr. Forbes's lecture, it would be that the observations contained in it would be most valuable to planters. The paper contributed by Mr. Simpson in the morning was a valuable one, but if it proved anything, it proved one thing, viz. the enormous difficulty of the question of forestry in England considered from a commercial point of view. When considering the subject, he thought they should not leave out of sight altogether the risk, as time goes on, of our coal supply greatly diminishing and our wood supply diminishing at the same time, and he thought that arrangements should be made by which the State should, as in some Continental countries, and as Englishmen are now doing in India,

take into its own hands, he would not say the conservancy of our forests, but the re-afforestation of portions of the soil. That was a matter which deserved the consideration of statesmen. The policy of the age had had effects on the land of this country, which were not encouraging to the investment of capital in land. Events were marching very rapidly, and the events of the present year had been such as to afford anything but encouragement to the owners of land. Therefore he thought that when we legislated in the direction which the new views now so much in favour appeared to indicate, a matter which should occupy the serious attention of our statesmen and political leaders was whether they might not do something to applying capital to the renewal and increasing of our forests.

Mr. WEBSTER said he was very pleased with Mr. Forbes's paper. He condemned the "fallacy" of the "mixed plantation" system.

Mr. GEO. PAUL said he could not help thinking that the Society was fulfilling one of its best functions in endeavouring to improve forestry. The question of leaf-canopy, mentioned by Mr. Forbes, was a novelty to him, and seemed to carry great weight with it. The only statement on which he differed from the writer of the paper was that in which he said that we ought to confine ourselves to native trees, because in certain parts of England there might be climatic risks. He thought the papers they had heard that day were of such practical value that all the Fellows of the Society would be glad to read them. He would, therefore, propose a hearty vote of thanks on behalf of the Fellows of the Society to the writers.

Mr. GEO. BUNYARD seconded the motion.

The Conference then terminated.

EXHIBITION OF TREES AND SHRUBS.

Awards Recommended :—

Silver Gilt Flora Medal.

To Messrs. J. Veitch & Sons, Chelsea, for a collection of rare plants. (*See* p. 70.)

To Messrs. Paul & Son, Cheshunt, for a collection of hardy plants. (*See* p. 71.)

Silver Flora Medal.

To His Grace the Duke of Buccleuch, Dalkeith Palace, N.B. (gr. Mr. Malcolm Dunn), for a large collection of trees and shrubs. (*See* p. 72.)

To Colonel Sir Patrick Keith Murray, Bart., Ochtertyre, N.B., for a collection of hardy trees and shrubs. (*See* p. 82.)

To Messrs. R. Veitch & Sons, Exeter, for a group of plants. (*See* p. 85.)

To Messrs. G. Bunyard & Co., Maidstone, for a collection of hardy trees and shrubs. (*See* p. 86.)

Silver Knightian Medal.

To Her Majesty the Queen, Royal Gardens, Windsor (gr. Mr. Owen Thomas), for large bunches of Mistletoe. (*See* p. 68.)

To Captain Holford, Westonbirt, Tetbury, Gloucestershire (gr. Mr. T. Rattray), for a collection of trees. (*See* p. 87.)

To His Grace the Duke of Northumberland, Syon House, Brentford (gr. Mr. Geo. Wythes), for a collection of rare trees and shrubs. (*See* p. 88.)

To Messrs. C. Lee & Son, Hammersmith, for a collection of trees. (*See* p. 89.)

Silver Gilt Banksian Medal.

To His Grace the Duke of Wellington, Strathfieldsaye, N.B. (gr. Mr. J. W. McHattie), for a collection of trees. (*See* p. 90.)

Silver Banksian Medal.

To Viscount Powerscourt, Powerscourt, Enniskerry (gr. Mr. D. Crombie), for a choice collection of Conifers and their fruits. (*See* p. 90.)

To Wellwood H. Maxwell, Esq., Munches, Dalbeattie, N.B., for a collection of trees. (*See* p. 90.)

To A. Waterhouse, Esq., Yattendon Court, Newbury, Berks (gr. Mr. Maher), for a collection of trees. (*See* p. 92.)

To Colonel Tremayne, Carclew, Perran-ar-worthal, Cornwall (gr. Mr. Jas. Simmons), for a collection of hardy shrubs. (*See* p. 93.)

Bronze Banksian Medal.

To the Marchioness of Huntly, Orton Longueville, Peterborough (gr. Mr. A. Harding) for specimens of Conifers and cones. (*See* p. 93.)

To Earl Cowper, Panshanger (gr. Mr. Fitt), for a small collection of plants. (*See* p. 93.)

First Class Certificate.

To Ilex Aquifolium Lawsoniana, from Messrs. J. Veitch & Sons, Chelsea.

To Veronica cupressoides, V. salicornoides, and V. lycopodioides, from Messrs. Paul & Son, Cheshunt.

Award of Merit.

To Acer purpufascens Nizelli, from Messrs. Paul & Son, Cheshunt.

Other Exhibits.

[These were so many that it is very difficult to know what to chronicle and what to omit. Some exhibitors kindly handed in a list of their specimens, Mr. Malcolm Dunn in particular having taken great pains with that from Dalkeith, and made it really interesting reading (p. 72). The day also was so unutterably wet that it was with the utmost difficulty that the Society's officials and the reporters of the gardening papers could get about to make notes; however, all did all they could to help one another, and where the exhibitors did not hand in lists the following report is made up from the Society's records combined with those of the *Gardeners' Chronicle*, the *Journal of Horticulture*, the *Garden*, and the *Gardeners' Magazine*.—EDITOR.]

From the Royal Gardens, Windsor, by Her Majesty's command, Mr. Owen Thomas brought most interesting specimens of Mistletoe. Some, of course, was on Apple, and this specimen seemed to be the strongest; but there were others on Mountain

Ash, Lime, Hawthorn, Maple, Robinia, and Hickory. Mr. Thomas also brought other specimens of trees and shrubs, amongst which Kolreuteria paniculata, Sophora japonica, Taxodium distichum, and a branch of Cratægus Aronia full of berries, were the most noticeable.

From the Royal Gardens, Kew, came a magnificent collection of rare trees and shrubs, some of them being very rarely seen outside botanic gardens. Amongst them were : —

Amorpha canescens, the Bastard Indigo, with dark blue flowers.

Carya sulcata, the furrow-leaved Hickory, and C. microcarpa, the small-fruited Hickory.

Castanopsis chrysophylla.

Clematis brevicaudata, with small creamy flowers.

Cornus brachypoda variegata, a fine silver variegated Dogwood ; C. sibirica variegata, with bright red shoots ; C. Gouchautti, the clusters of pale pinkish blue berries, making it very distinct.

Cotoneaster horizontalis, full of deep scarlet berries.

Cytisus nigricans, a curious dark-coloured Broom, and C. supinus, with bright yellow flowers.

Desmodium pendulæflorum, a very pretty and elegant plant with rosy flowers.

Genista elatior, with golden flowers.

Hippophaë rhamnoides, the Sea Buckthorn, with deep yellow berries.

Hypericum Moserianum, a beautiful golden flower ; H. patulum, H. oblongifolium, and H. nepalense. These are all beautiful golden flowering autumn plants, the two first being probably hardy, and the two last, from Northern India, probably not quite so.

Indigofera Gerardiana, a doubtfully hardy species, but well worth a trial on account of its deep pink blossoms.

Ligustrum Quihoni, a Privet with beautiful panicles of white flowers.

Ptelea trifoliata, with its Hop-like cluster of fruit.

Quercus densifolia, a rare and almost evergreen species from California, and Q. rubra palustifolia, the finest of the red Oaks.

Rhus semi-alata Osbecki, a very fine bold foliage plant for

autumnal effect, and R. vernicifolia, another good Sumach from Japan.

Rosa Wichuriana, a Japanese trailing species, and R. microphylla, a Chinese species, which has a scent like Pineapple.

Rubus sorbifolius, a Japanese Bramble with finely cut foliage and yellow berries, and R. biflorus, a white-stemmed Bramble from the Himalayas.

Ulex Gallii, a dwarf Gorse with yellow flowers.

Viburnum molle, with deep-coloured berries of a blue-purple colour.

Vitis Coignetiæ, a dark-coloured species from Japan, and V. vinifera purpurea, with still darker crimson and copper-coloured foliage.

Professor Maxime Cornu sent from the Jardin des Plantes at Paris leaves of Vitis Coignetiæ for purposes of identification. They were similar to those shown by Mr. Anthony Waterer, but differed from those shown by others under the same name.

Messrs. James Veitch & Sons, Chelsea, sent a very fine collection of rare trees and shrubs, amongst which were the following :—

Acer argutum, a charming species, and A. carpinifolium.

Alnus glutinosus aureus.

Aralia cachemirica, a very fine plant.

Berberis Thunbergi and B. Lælandi.

Calluna vulgaris Alporti.

Calycanthus macrophyllus.

Castanea sativa argentea, a silver variegated Spanish Chestnut.

Catalpa bignonioides and C. b. aurea.

Citrus trifoliata.

Cladastris tinctoria.

Clerodendron trichotomum, from Japan.

Colutea arborescens purpurea.

Colletia spinosa, a very formidable-looking plant.

Cornus elegantissima and C. Spathi, two of the best Dogwoods.

Cotoneaster frigida, covered with orange-scarlet berries.

Cratægus orientalis.

Daphniphyllum glaucescens, a fine evergreen from China.

Dimorphanthus mandschuricus, with long spikes of blossom.

Gaultheria procumbens.

Hypericum oblongifolium.

Ligustrum lucidum tricolor, a beautiful coloured Privet, and L. ovalifolium elegantissimum.

Liquidambar styraciflua.

Menziesia polifolia erecta.

Nandina domestica.

Olearia macrodonta.

Osmanthus ilicifolius purpureus, one of the prettiest evergreens we have.

Parottia persica.

Pernettya mucronata, and other varieties.

Philadelphus coronarius argenteo-variegatus, a beautiful silver variety.

Ptelea trifoliata aurea.

Quercus palustris, one of the fine crimson-leaved Oaks.

Rhodotypus kerrioides.

Rhus glabra laciniata, R. g. coccinea, and R. Toxicodendron radicans, with gloriously coloured foliage.

Rubus laciniatus.

Sambucus racemosus serratifolius.

Spiræa Lindleyana.

Stephanandra flexuosa.

Styrax japonica.

Symphoricarpus vulgaris variegatus, a very pretty plant.

Vitis flexuosa, with beautiful small crimson leaves; V. Coignetiæ, of the most glorious colour, and V. vinifera purpurea.

Weigela amabilis variegata.

Messrs. Paul & Son, Cheshunt, also sent a very fine collection, mostly in pots, amongst which might be noticed:—

Acer purpurascens Nizelli, a very bronzy plant, to which an Award of Merit was given.

Alnus prunifolia plena and A. frutex speciosa.

Althæa frutex in great variety.

Azara microphylla.

Ceanothus Gloire de Versailles, with its elegant sprays of grey-blue blossom.

Cornus Mas aurea and C. Spathi.

Cotoneaster affinis, with clusters of bright red berries.

Cratægus coccinea maxima.

Edwardsia microphylla.

Ericas in great variety.

Eurya latifolia.

Garrya elliptica fœmina, a rare plant.

Hollies in great variety, to one of which, Lawsoniana, a First Class Certificate was given.

Hypericum Moserianum.

Magnolia grandiflora.

Pernettyas in great variety.

Persica purpurea.

Phillyrea decora, bearing a quantity of fruits like Sloes.

Quercus concordia.

Syringa hyacinthina fl. pl., with bronzy leaves.

Ulmus aurea, the Golden Elm.

Veronica cupressoides, a tiny plant only a few inches high; V. salicornoides, almost golden; and V. lycopodioides, to all three of which First Class Certificates were given.

Viburnum Oxycoccus and V. Opulus aureus.

Collection of Specimens of Trees and Shrubs sent to the Conference from the Gardens of the Duke of Buccleuch at Dalkeith, Midlothian, by Mr. Malcolm Dunn.

The gardens and pleasure-grounds at Dalkeith, where the trees and shrubs are growing from which the specimens sent to the Conference had been collected, extend to about 200 acres, through which the North Esk and South Esk rivers flow on their way to the sea, about three miles distant. They lie at an altitude of 120 to 200 feet above sea-level, with a gentle northern slope towards the Firth of Forth, and are well sheltered by woods and many fine old trees. The soil is a sandy loam, resting on an open, gravelly subsoil, through which water percolates freely. A light-coloured sandstone is the prevailing rock, which crops out in picturesque cliffs along the banks of the rivers, which are well clothed with trees and beautifully draped with Ivy and other creeping plants. Below the sandstone lie

the Lothian coal measures, with beds of various clays and limestone. The soil is of a good depth and generally fertile, and all kinds of hardy trees and shrubs for which it is suitable thrive well in it. Even many of those of a more or less tender nature in this northern latitude are found to do well in sheltered places, and stand the severities of ordinary winters with little or no injury from frost.

The collection of trees and shrubs has been chiefly formed during the present century; those of an older date being either indigenous—of which the "Old Oak Wood," covering an area of about 160 acres on the peninsula between the Esk rivers, just before they meet in the middle of the park, is a notable example—or planted forest and ornamental trees. Beside the Oak, *Quercus Robur pedunculata*, the Ash, Alder, Beech, Wych Elm, Sycamore, Hornbeam, Holly, Elder, Hazel, Thorn, Yew, and some other trees and shrubs appear to be either indigenous or now quite naturalised in the park, and spring up freely from seeds or from suckers. Of the introduced trees more than a century old, the Limes and Cedars of Lebanon are the most conspicuous. There are also many fine Horse and Spanish Chestnut trees, some of which have attained a considerable size, and are very effective park-trees. Holly, Yew, Laurel, Privet, Boxwood, Rhododendron, and some other evergreen shrubs have been extensively planted as underwood, and form a feature in the woods and plantations during the winter, when the deciduous trees are bare of foliage. The Holly is in greatest abundance, thriving well and fruiting freely in the warm soil; it is much used for hedges.

Specimens of about 280 species of trees and shrubs were sent to the Conference, but there are a host of others of less interest, or of which the species sent may be considered fairly representative of the genus. No Conifers are included, except the Cedar of Lebanon, which is bearing a fine crop of cones for the first time for many years; and the large-leaved variety of the Maidenhair tree, *Salisburia adiantifolia macrophylla*.

All the specimens stood through the severe frost of January 1894, when the thermometer fell to 4° Fahr. on the 7th of that month. The species that were in any way injured are noted in the following list. Those noted as "rather tender" have been injured by 15 degrees or more of frost; and those "injured by severe frost" have stood 20 degrees of frost uninjured.

List of the Specimens.

Acer palmatum vars. atropurpureum, dissectum, flavescens, laciniatum. All the Japanese Maples are beautiful small trees or shrubs, and very effective on lawns and shrubbery borders.

Acer Pseudo-Platanus vars. Fine ornamental trees.

Acer rubrum vars. Fine ornamental trees.

Æsculus Hippocastanum vars. Fine ornamental trees.

Ailanthus glandulosa. A handsome-foliaged small tree.

Akebia quinata. Hardy and interesting climber on wall.

Alnus glutinosa vars. Useful trees for wet spots.

Ampelopsis hederacea, A. lucida, and A. Veitchii. Brilliant foliage in autumn. A. Veitchii is one of the very best of climbers for covering walls.

Amygdalus nana. Very pretty flowers in profusion in spring.

Aralia mandschurica. A striking shrub, with extra large foliage.

Aralia Sieboldii. Hardy only in warm sheltered spots.

Aralia spinosa. A small and effective foliage tree.

Arbutus Unedo. Flowers freely, but seldom fruits.

Aristolochia Sipho. Large dark green foliage; a fine climber.

Aucuba japonica (male and female) and A. j. maculata nana. The female plants fruit freely some seasons, but none this year.

Azalea mollis, A. pontica, and A. speciosa. A large number of varieties of these free-flowering shrubs are grown, and many seedlings have sprung up around them in recent years.

Azara microphylla. A fine shrub; lost a few twigs last winter with 28 degs. of frost.

Bambusa Fortunei variegata. Quite hardy and pretty.

Bambusa Metake. Hardy; a very graceful plant.

Berberis Darwinii. One of the best, and thrives well.

Berberis dulcis, B. japonica, B. stenophylla, B. vulgaris purpurea, and B. Wallichii. All the Barberries are useful shrubs; very hardy, flower profusely, and bear showy berries.

Buxus arborea aurea, B. balearica, and B. thymifolia. Useful and distinct evergreen shrubs.

Calycanthus floridus and C. macrophyllus. Sweet-scented flowers, produced freely on plants on walls.

Camellia japonica vars. Stand the winter in sheltered places.

Caragana arborescens pendula. Peculiar weeping small tree.

Carpinus Betulus vars. Useful medium-sized trees.

Carya alba. Grows freely, but seldom fruits.

Catalpa bignonioides aurea. An effective small tree; fine large leaves.

Cedrus Libani. Bearing cones for first time for many years. Tree about 120 years old.

Cerasus Avium multiplex. Very beautiful when in flower.

Cerasus Lauro-Cerasus vars. and C. lusitanicus vars. Among the finest and most useful of evergreen shrubs. Seldom injured by frost.

Cerasus Padus. Indigenous, and flowers profusely every year.

Cercidiphyllum japonicum. Hardy on wall.

Cercis Siliquastrum. Very distinct and pretty flowers; on wall.

Chimonanthus fragrans. Very sweet flowers; most useful on wall.

Chionanthus virginicus. A fine hardy shrub.

Choisya ternata. One of the best flowering shrubs; sweet scented.

Cistus ladaniferus. Occasionally injured by frost; flowers freely.

Citrus trifoliata. Interesting; only small plants; quite hardy.

Cladrastis tinctoria. A pretty shrub; in sheltered places.

Clematis Jackmani and C. Vitalba. Many varieties grown; the hardiest, freest, and most showy of climbers.

Clerodendron trichotomum. Requires a warm spot; nearly killed last winter.

Cornus brachypoda variegata, C. Mas variegata, and C. sanguinea variegata. All pretty foliaged shrubs.

Corylus Avellana purpurea. Fine dark foliage.

Cotoneaster buxifolia, C. microphylla, and C. Simonsii. Neat foliage, and abundance of crimson berries.

Cratægus coccinea vars., C. Crus-galli vars., C. Oxyacantha vars., C. punctata vars., and C. tanacetifolia. The park is famed

for its fine old Thorn-trees (*C. Oxyacantha*), and numerous other species and varieties thrive well in the pleasure-grounds.

Pyrus (Cydonia) japonica vars. Nearly always in flower in mild weather.

Pyrus (Cydonia) Maulei. Flowers freely on wall in spring.

Cytisus alba. A most useful and pretty flowering shrub.

Cytisus Scoparius Andreanus. A first-rate acquisition; quite hardy.

Daphne laureola and D. pontica. Useful for undergrowth, but rather strong smelling.

D. Mezereum. Beautiful early-flowering shrub.

Daphniphyllum glaucescens vars. Fine hardy shrubs.

Desfontainea spinosa. Quite hardy; grows well; flowers sparsely.

Deutzia crenata vars. and D. gracilis. Well-known useful shrubs.

Diplopappus chrysophyllus. Distinct bushy-growing shrub.

Elæagnus pungens variegata. Injured by 20 degs. of frost. On wall.

Ercilla spicata. Injured by 20 degs. of frost. On wall.

Erica Alportii, E. arborea, E. mediterranea, E. Tetralix alba, and E. vagans alba. All the Heaths are useful decorative plants.

Escallonia macrantha and E. rubra. Useful evergreens for covering walls and buildings.

Euonymus europæus vars. Grow freely and flower well.

Euonymus japonicus vars. Thrive fairly well. Injured by severe frost.

Eucalyptus amygdalina, E. coccifera, E. Gunnii, and E. urnigera. All growing in sheltered places, and stood through the severe frost of last winter with very little injury.

Eurya japonica variegata. Pretty shrub; fairly hardy.

Exochorda grandiflora. A fine Spiræa-like shrub.

Fagus sylvatica vars. Useful and very ornamental trees.

Forsythia viridissima. A good flowering plant for walls.

Fothergilla alnifolia. A pretty shrub.

Fraxinus excelsior pendula. One of the best of weeping trees.

Fraxinus ornus. Grows well, and flowers freely in good seasons.

Fremontia californica. A pretty yellow-flowered shrub.

Fuchsia Riccartonii, and others. Hardy and free flowering; very fine.

Garrya elliptica, male and female. Male bears catkins freely; a fine shrub.

Gaultheria Shallon. A fine hardy dwarf shrub; berries freely.

Ginkgo biloba macrophylla. A very distinct variety of this fine tree.

Gleditschia triacanthos. Slightly injured by 28 degs. of frost; interesting tree.

Griselinia littoralis. Fine dwarf shrub; sometimes injured by frost.

Grevillea rosmarinifolia. A nice shrub for a wall; rather tender.

Halesia hispida. A fine hardy shrub.

Halimodendron argenteum. A good wall plant; rather tender.

Hamamelis japonica vars. Fine winter-flowering shrubs; hardy.

Hartogia capensis. Requires a warm spot; a neat shrub.

Hedera helix vars. All varieties useful for covering walls, &c.

Hydrangea hortensis. Stands well; injured only by severe frost.

Hydrangea paniculata. Perfectly hardy, and flowers freely.

Hypericum calycinum. Useful for undergrowth.

Hypericum Moserianum. A very handsome St. John's Wort.

Hippophæ rhamnoides. A useful and effective shrub.

Hymenanthera crassifolia. A distinct and pretty shrub. On wall.

Ilex Aquifolium angustifolium, I. A. ferox vars., I. A. Golden Queen, I. A. Hodginsii, I. A. Lawsoniana, I. A. maderensis vars., I. A. pendula, I. A. salicifolia, and I. A. Silver Queen. All the varieties of the common Holly thrive well, and berry freely in most seasons. This year the crop is abundant. Hollies are perhaps the most useful of all evergreen trees for decorative purposes.

Ilex cornuta. Very distinct and fairly hardy.

Ilex crenata. Slightly injured in severe winters.

Jasminum nudiflorum. Flowers freely on walls in early spring.

Jasminum officinale. The sweet-scented Jasmine.

Jasminum Wallichianum. A useful hardy species.

Juglans regia. Grows well and fruits freely; no fruit this year.

Kalmia latifolia. Thrives only moderately well on the dry, hot soil.

Kerria japonica vars. Fine hardy free-flowering shrubs.

Laburnum Adamii, L. alpinum, and L. vulgare vars. Splendid flowering trees.

Laurus nobilis vars. Slightly injured by severe frost.

Lavendula spica. Slightly injured by severe frost.

Ledum latifolium. Grows well and flowers freely.

Leycesteria formosa. Hardy, useful, and very effective shrub.

Ligustrum japonicum and L. lucidum. Useful evergreen shrubs; fairly hardy.

Liriodendron tulipifera. A handsome foliage tree.

Lonicera brachypoda aureo-reticulata, L. flava, L. Ledebourii, and L. sempervirens. Well-known useful climbers. The perfume of the Honeysuckle is generally liked.

Lycium barbarum. An interesting hardy climber.

Magnolia acuminata and M. conspicua. Thrive well; flower occasionally.

Magnolia grandiflora. Thrives well and grows freely; seldom flowers.

Magnolia macrophylla. Grows well, but often injured by frost.

Magnolia purpurea. Thrives well; flowers occasionally.

Magnolia tripetala. Grows freely and flowers in good seasons.

Mahonia Aquifolium. Most useful of dwarf shrubs.

Mahonia glumacea. A fine flowering species.

Menziesia polifolia vars. Very pretty dwarf Heaths.

Mespilus germanica. A useful ornamental small tree.

Morus nigra. Grows well; seldom fruits; bearing this year.

Myrtus communis. Grows well in shelter; nipped by severe frost.

Negundo fraxinifolium vars. Very ornamental; injured by severe frost.

Olearia Gunni. Does well on wall.

Olearia Haastii. A fine free-flowering hardy shrub.

Oreodaphne bullata. On wall; fairly hardy.

Oreodaphne californica. A fine wall shrub; seldom injured by frost.

Osmanthus ilicifolius. Slow growing, but very neat Holly-like shrub.

Ozothamnus rosmarinifolius. Nice for wall; injured by severe frost.

Pæonia Moutan vars. Hardy, and flower well in mild springs.

Paulownia imperialis. Very effective small tree; large leaves.

Pernettya mucronata vars. Neat and free-fruiting dwarf shrubs.

Philadelphus coronarius vars. Free-growing and free-flowering; fine shrubs.

Philesia buxifolia. Neat dwarf shrub; hardy.

Phillyrea latifolia. Useful evergreen shrub.

P. Vilmoriniana. A fine species; hardy.

Photinia serrulata. Grows well, but injured by severe frost.

Pittosporum eugenioides and P. Ralphii. Fine New Zealand shrubs; fairly hardy.

Populus alba vars. Fine ornamental trees.

Prunus (Myrobalana) flore pleno. Beautiful flowering small tree.

Prunus Pissardi. One of the finest of dark-foliaged small trees.

Prunus sinensis. Hardy and free-flowering.

Pyrus Aucuparia, P. Sorbus, P. vestita. Fine ornamental trees.

Pyrus Malus "Dartmouth," P. M. "John Downie," P. M. "Mammoth," P. M. "Siberian," P. M. "Toringo," and P. M. "Transparent." The Crab Apples are very effective ornamental trees, flowering profusely in spring and loaded with bright-coloured fruit in autumn.

Pyrus spectabilis flore pleno. One of the best of small flowering trees.

Quercus Robur fastigiata. A very distinct form of Oak.

Quercus Robur variegata. Beautiful foliaged tree.

Quercus Cerris, Q. coccinea, Q. Ilex, Q. palustris, Q. rubra, and Q. Zau. The numerous species of ornamental Oaks are very effective in the landscape, especially those that assume brilliant tints of foliage in the autumn.

Rhamnus Alaternus vars. Good evergreen shrubs.

Rhododendron arboreum, R. catawbiense, and R. ponticum. Numerous varieties of Rhododendron thrive well, flower profusely, and seedlings of the common varieties come up in perfect thickets.

Rhus Cotinus. A fine shrub, but injured by severe frost.

Rhus typhina. Hardy and distinct.

Ribes aureum. Hardy and free flowering.

Ribes rubrum variegatum. Nice ornamental foliaged shrub.

Ribes sanguineum vars. Most effective flowering shrubs.

Robinia Pseudacacia vars. Grow freely, but seldom flower.

Rosa elegantissima. A graceful and sweetly perfumed Briar.

Rosa centifolia vars. The Cabbage Rose; finely scented.

Rosa gallica vars. Bourbon Rose; free-flowering, and useful.

Rosa hybrida vars. Many varieties, and general favourites.

Rosa indica vars. China Rose; nearly always in flower.

Rosa lutea vars. Austrian Briar; free-flowering and attractive.

Rosa rubiginosa. Sweet Briar; a general favourite.

Rosa rugosa vars. Japan Rose; fine for front of shrubberies.

Rosa spinosissima vars. Scots Rose; many varieties; very pretty.

Rosmarinus officinalis. Forms a nice shrub; dwarf and bushy.

Rubus fruticosus flore pleno. Fine for covering rough places.

Ruscus aculeatus. A useful dwarf shrub.

Ruscus racemosus. Graceful habit; dwarf.

Salix alba vitellina. Golden Willow; fine for moist spots.

Salix babylonica. Common Weeping Willow; one of the best.

Salix Caprea pendula. Kilmarnock Weeping Willow; very distinct.

Sambucus nigra vars. Very hardy, and useful where little else will grow.

Sambucus racemosa. Berries profusely, but taken early by birds.

Senecio rotundifolia. A fine shrub from New Zealand.

Skimmia Foremanii. A handsome berried shrub; one of the best.

Skimmia japonica. Berries profusely; often cleared by birds.

Sophora japonica. A fine small tree; grows well.

Spartium junceum. Spanish Broom; useful, but rather tender.

Spiræa bella, S. Bumalda, S. callosa, S. c. pumila alba, S. confusa, S. Douglasii, S. Lindleyana, and S. Reevesiana. All the ligneous Spiræas are useful and attractive flowering shrubs, generally hardy, and thriving well in most soils and situations.

Staphylea Bumalda, S. colchica, and S. pinnata. Useful and interesting shrubs; flower freely, but seldom fruit.

Stauntonia latifolia. Hardy on wall; free-growing; seldom flowers.

Styrax japonica. A slow-growing dwarf shrub.

Symphoricarpus racemosus. Large showy white berries.

Syringa persica vars., S. vulgaris vars., and S. v. flore pleno vars. The Lilacs are among the very best of deciduous flowering shrubs, and the double-flowered varieties are an acquisition.

Thea viridis. In sheltered corner; seldom injured by frost.

Thermopsis laburnifolia. Grows well, and flowers freely on wall.

Tilia europæa vars. Very handsome ornamental trees.

Ulmus montana pendula. The Camperdown Elm; fine weeping tree.

Ulex europæa vars. Useful hardy shrubs.

Veronica Armstrongii, V. carnosula, V. cupressoides, V. diosmæfolia, V. ignota, V. Kirkii, V. Lyallii, and V. Traversii. Most of the shrubby Veronicas from the southern parts of New Zealand are quite hardy, growing and flowering freely, and form neat, compact bushes.

Viburnum Awafukii. A distinct evergreen shrub; rather tender.

Viburnum Lantana, V. Opulus, and V. plicatum. Fine deciduous flowering shrubs.

Viburnum Tinus. Flowers well in mild seasons; injured by severe frost.

Vinca major and V. minor. The Periwinkles are very useful for covering ground shaded by trees.

Viscum album. The Mistletoe grows freely, and fruits in fine seasons.

Weigela amabilis variegata. Free flowering, with pretty foliage.

Weigela rosea vars. All the varieties flower profusely fine shrubs.

Wistaria sinensis. Grows very freely, and flowers well.

Xanthoceras sorbifolia. Fine foliage ; grown on wall ; rather tender.

Colonel Sir Patrick Keith Murray, Bart., sent a grand collection of Cupressus, Taxus, and other varieties of Conifers, showing fruit and foliage, from his garden at Ochtertyre, N.B.

Cupressus Lawsoniana and its varieties, alba spica nana, alba pendula, albo-variegata, Allumii, argentea, argenteo-variegata, aureo-variegata, Bowlerii pendula, erecta viridis, erecta stricta, ericoides, filiformis, Fleetii, Fraserii, intertexta, lutea, patula, Shawii, and Ochtertyre Seedling.

Cupressus nutkaënsis and its varieties, variegata argentea, variegata aureo-nova, compacta, and glauca.

Cupressus arizonica.

Cupressus McNabiana.

Cupressus macrocarpa.

Cupressus thyoides and its varieties, aurea, glauca, leptoclada, and variegata.

Taxus adpressa and its variety, stricta.

Taxus baccata varieties, argentea, aurea, Dovastonii, D. aurea, and a French form of Dovastonii, elegantissima, erecta, e. variegata, ericoides, fastigiata argentea, f. aurea, Foxii, fructo-lutea, glauca, pendula, pyramidalis variegata, recurva.

Taxus canadensis varieties, aurea and Washingtonii.

Taxus cuspidata.

Taxus Lindleyana.

Torreya grandis.

Cephalotaxus drupacea.

Cephalotaxus Fortunei.

Cephalotaxus pedunculata and its variety fastigiata.

Abies cephalonica, A. grandis, A. nobilis, A. Nordmanniana, A. Veitchii.

Picea ajanensis, P. Menziesi, P. orientalis, P. Smithiana.

Tsuga Mertensiana, Pseudotsuga Douglasii.

Biota orientalis aurea.

Cedrus Libani glauca.

Juniperus communis, J. Sabina, J. recurva.

Pinus montana, P. Murrayana, P. koraiensis.

Retinospora obtusa, R. filifera, R. pisifera.

Saxe-Gothæa conspicua.

Sequoia gigantea.

Thuia gigantea, T. occidentalis and its varieties elegantissima, Ellwangeriana, and Vervæneana.

Thuia Standishii.

Ornamental Trees.

Acer macrophyllum, A. platanoides, A. rubrum, A. Pseudo-Platanus varieties albo-variegata, foliis purpureis, and variegata aurea.

Æsculus rubicunda.

Fagus sylvatica varieties asplenifolia and purpurea.

Juglans regia laciniata.

Pyrus americana, P. aucuparia variegata pendula, P. prunifolia, P. Aria.

Quercus Ilex, Q. pannonica, Q. coccinea, Q. Cerris fulhamensis, Q. pedunculata varieties, asplenifolia, cucullata, fastigiata, and pyramidalis.

Sambucus nigra varieties, foliis aureis and racemosus.

Ulmus montana varieties, fastigiata and pendula.

Evergreen Shrubs.

Andromeda floribunda, A. japonica.

Berberis Darwinii, B. japonica.

Buxus balearica, B. thymifolia variegata, and seven other varieties.

Cerasus lusitanicus myrtifolia, C. Lauro-Cerasus angustifolia and its varieties caucasica, colchica, latifolia, rotundifolia, parvifolia, variegata aurea, and variegata argentea.

Cotoneaster microphylla.

Cratægus Pyracantha.

Escallonia rubra.

Garrya elliptica.

Hartogia capensis.

Jasminum humile, J. officinale.

Kalmia latifolia.

Laurus nobilis.

Osmanthus ilicifolium and its variety argenteum.

Rhamnus Alaternus.

Ruscus aculeatus, R. Hypoglossum.

Skimmia japonica.

Hedera donerailensis variegata, H. maderensis variegata,

H. hibernica variegata, H. Osborn's New Silver, H. maculata minor, H. fructo-lutea, H. picta, H. Golden Gem, H. tricolor, H. palmata, H. Clouded Gem, H. taurica, and three other varieties.

Deciduous Shrubs.

Ampelopsis hederacea.
Cotoneaster frigida.
Cydonia japonica and variety rosea.
Dimorphanthus mandschuricus.
Jasminum nudiflorum.
Kerria japonica.
Ligustrum vulgare variegata.
Lonicera Ledebouri.
Philadelphus coronarius nanus.
Ribes floridum.
Rubus laciniatus.
Salisburia adiantifolia.
Symphoricarpus racemosus.
Viburnum Opulus.
Xanthorhiza apiifolia.

Hollies.

Leaves Green.—1 Ilex nobilis, 4 I. latifolia, 5 I. Hodginsii, 6 I. platiphylla, 7 I. belgica, 8 I. rigida, 9 I. alcicornis, 12 I. fructu-luteo, 14 I. costita, 16 I. heterophylla, 18 I. Beetii, 19 I. handsworthensis, 20 I. Smithiana, 22 I. whittingtonensis, 23 I. donningtonensis, 24 I. myrtifolia, 25 I. serratifolia, 26 I. recurva, 27 I. hastata, 31 I. maderensis, 32 I. balearica, 38 I. Hendersoni, 39 I. ovata, 40 I. Foxii, 41 I. ciliata major, 50 I. laurifolia, 53 I. integrifolia, 54 I. scotica, 55 I. trapeziformis, 56 I. latispina, 57 I. tortuosa, 58 I. ferox.

Leaves Silver-variegated.—Ilex argentea varieties: 60 marginata major, 63 regina, 65 varians, 67 elegantissima, 68 marginata, 75 mediopicta, 76 handsworthensis, 77 purpurea, 79 obscura, 80 pectinata major, 82 pectinata minor, 86 laurifolia, 87 sulphurea, 91 ferox.

Leaves Gold-variegated.—Ilex aurea varieties: 92 regina and 93 regina nigra, 96 I. aureo-marginata; I. aurea varieties: 99

Note.—The numbers used here are those of the late Mr. Moore's Monogram (see *Gardeners' Chronicle* for 1874, 1875, 1876).

angustifolia and 107 muricata; 103 I. aureo-marginata fructuluteo; I. aurea varieties: 108 angustifolia marginata, 105 marginata intermedia, 112 nana, 120 maculata; 131 I. Lawsoni, 135 I. heterophylla aureo-marginata; I. aurea varieties: 138 laurifolia and 141 longifolia; 142 I. Watereriana, 146 I. heterophylla aureo-picta, 147 I. aureo-mediopicta, 151 I. aurea ferox.

Additional varieties.—(*a*) Ilex Cunninghamii, (*b*) I. crenata and its variety (*c*) Fortunei.

Messrs. R. Veitch & Son, of Exeter, sent a beautiful group, some of them obviously being only suitable to the South and West of England. Amongst them were:—

Acacia angustifolia.
Acer tataricum Ginnala.
Aralia spinosa and A. cachemerica.
Bignonia radicans.
Buddleya Lindleyana.
Catalpa aurea.
Ceanothus americanus and C. Gloire de Versailles.
Choisya ternata.
Colutea arborescens purpurea.
Cotoneaster Hookeri.
Desmodium penduliflorum.
Dimorphanthus mandschuricus.
Euonymus purpureus.
Erythrina Crista-galli.
Escallonia exoniensis.
Genista tinctoria.
Ginkgo biloba.
Hippophaë rhamnoides.
Hydrangea albo-rosea.
Leycesteria formosa.
Magnolia conspicua and M. tripetala.
Populus Riccardii.
Pterocarya sinensis.
Rhus coccinea.
Rosa rugosa.
Sorbus Aria and S. macrophyllus rotundifolius.
Spartium junceum.

Messrs. George Bunyard & Co., Maidstone, sent a very interesting collection, containing :—

Aralia chinensis (Dimorphanthus mandschuricus), which makes a noble tree of moderate size.

Acer tataricum Ginnaea, leaves crimson in autumn.

Arundo donax and donax var., handsome tall plants for pond-sides.

Aralia Maximowiczii, very fine palmate foliage, striking and quite hardy.

Beech, Purple Weeping, a new variety, which promises to be a great acquisition.

Betula purpurea, a distinct and telling small tree.

Betula Youngii pendula, striking weeping subject.

Betula Maximowiczii, the new large-leaved Japanese Birch.

Berberis Thunbergii, leaves flame colour in October.

Berberis vulgaris purpurea, telling and useful to cut.

Buxus pyramidalis or acuminata (?), a fine but little known form of close conical growth.

Cornus sibirica elegantissima, one of our best silvery-leaved shrubs.

Cornus alba (?) "Spathi," fine golden shrub.

Cercis Siliquastrum (Judas-tree), one of the best flowering trees.

Cotoneaster frigida, covered with berries of coral colour in October ; small tree.

Comptonia asplenifolia (Fern-leaf Gale), an almost lost form.

Eulalia japonica gracillima, narrow-leaved, elegant.

Eulalia japonica variegata, a good silvery form.

Eulalia japonica Zebrina. The Eulalias are hardy at Maidstone.

Euonymus europæus fructu-albo, an interesting sub-shrub.

Gymnocladus canadensis (Kentucky Coffee), a distinct small tree, elegant foliage.

Hydrangea paniculata grandiflora, one of the best hardy low shrubs.

Hypericum prolificum, pretty, a close small shrub.

Hypericum elatum, berries red and purple, good.

Hypericum Moserianum, the best of the low-growing kinds.

Laurus (Laurel) pseudo-Cerasus caucasicus rotundifolius. In this variety the leaves are dark olive-green, close habit.

Populus argentea Bolleana, a strict, distinct, and valuable white-leaved Poplar.

Prunus Myrobalana Pissardi, a fine ornamental tree for town gardens.

Phillyrea Vilmoriniana, a good town evergreen.

Pyrus Aria (white var.), foliage silvery-white beneath; good on chalky soils.

Quercus pannonica, a very bold foliaged sort.

Quercus palustris, foliage intense crimson in October, leaves much cut.

Rubus leucodermis, stems glaucous, striking.

Rhus glabra laciniata, a valuable Fern-leaved Sumach, small tree; bears cutting back for bedding.

Spiræas, good, late in autumn, as Nobleana, Billardi, Fontenaysi or alba, and the dwarf Bumalda and callosa alba.

Styrax japonica. This lovely Japanese shrub is not quite hardy at Maidstone.

Tamarix gallica, a fine glaucous form.

Tilia mississippiensis, foliage very large.

Tilia Parmentierii pendula, one of the most striking trees, foliage silvery beneath.

Ulmus monumentalis, a strict form, leaves clasping the stem, striking.

Ulmus Wreedi aurea, a good golden tree.

Ulmus campestris (?) albo-variegata, large-leaved form of variegated Elm.

Captain Holford, Westonbirt, Gloucestershire, sent a large collection, containing splendid cones of Pinus Ayacuite, Cornus, Maples, Oaks, Birches, and Viburnum. Especially noticeable were:—

Acer palmatum dissectum.

Berberis Thunbergi.

Cornus sibirica.

Cotoneaster ovalifolia, Nummularia, and others.

Cratægus in great variety.

Hippophaë rhamnoides.

Leycesteria formosa.

Magnolia acuminata.
Pavia macrostachya.
Pyrus americana and P. Maulei.
Quercus nigra.

From the Duke of Northumberland, Syon House, Mr. Wythes brought a magnificent collection, including :—

Quercus Brantii ; Q. ambigua ; Q. castanæfolia ; Q. Cerris (Turkey Oak) ; Q. C. argentea ; Q. C. fulhamensis ; Q. C. pendula ; Q. coccinea ; Q. Daimio ; Q. discolor ; Q. laurifolia ; Q. macrocarpa ; Q. palustris ; Q. pedunculata ; Q. p. argenteo-variegata ; Q. p. asplenifolia ; Q. p. concordia ; Q. p. latifolia ; Q. p. Louettei ; Q. p. purpurea ; Q. rubra (Champion Oak) ; Q. Tauzin ; Q. splendens ; Q. pannonica ; Q. nigra ; Q. coccinea macrophylla ; Q. serrata ; Q. lutea ; Q. stellata ; Q. pubescens ; Q. laciniata ; Q. regia ; Q. r. glaucescens ; Q. r. spicata ; Q. r. sessiliflora ; Q. sessiliflora purpurea ; Q. s. heterophylla ; Q. alba ; Q. rubra ; Q. glauca ; Q. Suber ; Q. reticulata ; Q. falcata ; Q. bambusifolia ; Q. nobilis ; Q. Ægilops.

Acer saccharinum (Sugar Maple) ; A. tataricum ; A. platanoides Reitenbachii ; A. rubrum ; A. macrophyllum ; A. palmatum atropurpureum ; A. platanoides aureo-variegatum ; A. creticum ; A. Pseudo-Platanus atro-purpureum.

Abelia serrata ; A. triflora.

Æsculus hippocastanum ; Æ. (Pavia) flava ; Æ. sinensis.

Alnus tinctoria ; A. glutinosa monstrosa ; A. g. laciniata.

Ailanthus flavescens ; A. glandulosa.

Aralia spinosa ; A. japonica ; A. hybrida ; A. pentaphylla variegata.

Calycanthus floridus.

Carpinus Betulus.

Carya alba.

Castanea vesca ; C. sativa aureo-variegata.

Catalpa Bungei ; C. Kæmpferii ; C. bignonioides.

Cerasus japonica flore roseo-pleno ; C. j. multiplex.

Cercis Siliquastrum.

Chimonanthus fragrans.

Cornus stolonifera Spathii.

Corylus Avellana laciniata ; C. A. pendula.

Cratægus coccinea.

Diospyros Lotus; D. virginiana.

Cydonia japonica.

Fraxinus excelsior Wentworthii; F. e. pendula; F. e. argenteo-variegata.

Ginkgo biloba macrophylla.

Gleditschia sinensis and sinensis pendula.

Halesia hispida; H. tetraptera.

Taxodium distichum.

Hippophaë rhamnoides.

Hydrangea paniculata.

Kolreuteria paniculata.

Liquidambar styraciflua.

Juglans fraxinifolia; J. nigra.

Pterocarya caucasica.

Liriodendron tulipifera; L. t. aureum.

Magnolia conspicua; M. c. acuminata; M. c. Soulangeana; M. c. speciosa; M. c. stellata; M. c. obovata.

Morus alba.

Negundo fraxinifolium albo-variegatum; N. f. cissifolium.

Platanus orientalis; P. californica.

Pyrus prunifolia; P. sinensis; P. Sorbus; P. Aria; P. americana.

Robinia Pseudacacia angustifolia elegans; R. P. monophylla; R. P. tortuosa; R. P. Bessoniana.

Sophora japonica; S. j. pendula.

Tamarix gallica.

Sambucus nigra argenteo-variegata; S. n. heterophylla.

Stuartia virginica.

Messrs. Lee & Son, Hammersmith, sent a collection including:—

Acer platanoides elegantissimum; A. laciniatum; A. Colchicum rubrum.

Castanea vesca albo-marginata.

Cornus fœmina variegata.

Fagus sylvatica asplenifolia.

Gleditschia triacanthos.

Ginkgo biloba.

Populus tremula and P. canadensis aurea.

Pyrus Sorbus Aria.

Quercus Cerris variegata; Q. concordia; Q. tricolor; Q. tinctoria.

Robinia Pseudacacia aurea.

Salix rosmarinifolia.

Ulmus viminalis variegata.

The Duke of Wellington sent from Strathfieldsaye a very large collection containing 200 varieties, amongst them:—

Acer Colchicum rubrum and A. Lorbergi.

Ailanthus glandulosus.

Alnus glutinosa laciniata.

Ampelopsis quinquefolia.

Berberis nepalensis and B. Darwinii.

Buddleia globosa.

Cratægus Pyracantha.

Danaë racemosa.

Kerria japonica.

Libocedrus decurrens.

Liriodendron tulipifera.

Nyssa biflora.

Quercus pedunculata.

Rhus Cotinus.

Rosa rugosa.

Symphoricarpus racemosus.

Viburnum Opulus and V. Tinus.

Viscount Powerscourt sent from Ireland a collection chiefly composed of Conifers, and these mostly bearing fruit, and so greatly adding to their interest. Amongst the finest examples sent were:—

Abies Webbiana; A. cephalonica; A. Nordmanniana; A. contorta.

Cupressus torulosa; C. Corneyana; C. atlantica.

Desfontainea spinosa.

Fitzroya patagonica.

Picea magnifica; P. Pindrow; P. Pinsapo.

Wellwood H. Maxwell, Esq., sent about 150 specimens from his estate at Munches, Dalbeattie, of which he says, "They

certainly are hardy, as they have most of them stood the storms and frosts of twenty years and more."

Acer dasycarpum vars., Jühlkei, Wieri laciniatum, pulverulentum, macrophyllum, pyramidalis, longifolium, lutescens, and six unnamed Japanese vars.; A. platanoides vars., Lorbergi digitat. fol. aureo-marginitum, Buntzeli, Ockonomicrath Stoll, purpureum Reitenbachi, Schwedleri, laciniatum (eagle-clawed); A. Pseudo-Platanus vars., Simon Louis frères, fol. purpureis "Prinz Handjery," erythrocarpum, aureo-variegatum, rubrum var. Schlessenceri; A. rubrum; A. saccharinum; A. pennsylvanicum; A. Negundo variegatum, and N. aureum.

Alnus monstrosa; A. aurea; A. laciniata; A. oregona; A. incana occidentalis.

Corylus aurea; C. purpurea; C. laciniata.

Quercus, seven varieties.

Ulmus glabra sibirica; U. campestris vars., argentea marginata, myrtifolia purpurea, latifolia alba var. pyramidalis; U. montana vars., atropurpurea, gigantea, macrophylla, crispa, crispa aria, turkestanica, pendula macrophylla.

Fraxinus americana and a. variegata.

Castanea vars., alba, aurea, cut-leaved, and C. laciniata.

Carpinus, two varieties.

Prunus Pissardi; P. padus; P. alleghanensis.

Betula, eight varieties.

Cratægus, three varieties.

Sambucus, three varieties.

Viburnum, two varieties.

Tilia gigantea; T. americana; T. heterophylla.

Fagus, cut-leaved.

Populus canadensis vars., aurea and alba.

Kolreuteria paniculata.

Pittosporum.

Aristotelia.

Buffalo-berry.

June-berry.

Pyrus Maulei; P. japonica.

Cornus alba (Spathii); C. elegantissima, and three varieties unnamed.

Elægnus longipes; E. variegata.

Weigela rosea nana fol. var.; W. striata.

Rhus Cotinus ; R. americana.
Rhamnus.
Cladrastis tinctoria.
Ptelea trifoliata.
Shepherdia argentea.
Dimorphanthus mandschuricus.
Cercidiphyllum japonicum.
Lonicera tartarica and two unnamed varieties.
Pyrus Malus floribunda.
Amelanchier canadensis.
Abelia rupestris.
Leycesteria formosa.
Veronica.
Hypericum, two varieties.
Ligustrum aurea var.
Cydonia japonica.
Hedysarum multijugum.
Carpenteria californica.
Chimonanthus fragrans.
Andromeda floribunda.
Ostrya virginiana.
Fontanesia tilariensis.
Garrya elliptica.
Azara microphylla.
Diplopappus chrysophyllus.
Gaultheria procumbens.
Spiræa, two varieties.
Bird-Cherry.
Barberry, two varieties.
Cotoneaster.
Pyracantha.
Hammamelis.

A. Waterhouse, Esq., Yattendon Court, Newbury, sent, amongst other things, very fine examples of:—
Cassinia fulvida.
Cornus sanguinea.
Dimorphanthus mandschuricus.
Olea fragrans.
Quercus coccinea.

Colonel Tremayne, Carclew, Cornwall, sent a good collection, mostly of Conifers bearing fruit, with a few other plants ; amongst them were :—

Abies Albertiana.
Azara microphylla.
Benthamia fragifera.
Berberis Bealei.
Chionanthus virginicus.
Desfontainea spinosa.
Embothrium coccineum.
Eurya latifolia.
Ginkgo biloba.
Larix Kæmpferi.
Osmanthus ilicifolius.
Phyllocladus rhomboidalis.
Pinus patula.
Sciadopitys verticillata.

The Marchioness of Huntly sent Conifers in fruit, and other things ; amongst them were :—

Libocedrus decurrens.
Thuia gigantea.
Wellingtonia gigantea.
Torreya myristica.

Abies Douglasi, A. grandis, A. Morinda, A. concolor, A. nobilis, A. cephalonica, A. magnifica, A. amabilis, A. Pinsapo, A. lasiocarpa.

Cedrus atlantica, C. Libani, C. Deodara.

A section of Thuia gigantea was also shown from the same collection, cut from a pole 21 feet high, and it was stated that trees of it 60 feet high have a girth of 5 feet at 1 foot from the ground, and seed saved from them and sown in 1879 has now produced beautiful specimens 30 to 40 feet high.

Earl Cowper, Panshanger, showed sprays of Loquat, a large branch of Azara microphylla, some growths of a very handsome Vine with deep red foliage, and magnificent specimens of Magnolia grandiflora.

Mr. Anthony Waterer, Woking, exhibited his magnificent new

deep crimson variety of Spiræa Bumalda called "Anthony Waterer," two fine specimens of Picea pungens, and the beautiful glaucous variety of Cedrus atlantica, together with a basket of Pernettya mucronata in berry. Also Weigela Eva Rathke, a fine dark red variety, and a Vine (the true Vitis Coignetiæ) of most glorious crimson colour and large thick leathery leaves.

Messrs. Cripps, Tunbridge Wells, sent a pretty variegated form of Hypericum labelled tricolor.

Mr. F. Riddell, Pakenham, Stroud, sent a very remarkable specimen of contorted Hazel.

Mr. H. Smale, Tawsley Gardens, sent Pyrus domesticus and P. torminalis, bearing an abundance of fruit.

The Rev. Dennis Knox, of Virginia, Ireland, gives the following short notice of the effects of frost the first week in January 1894 :—

Eurybia Gunni.—Killed to ground under south wall, but shooting now at base.

Double striped Camellia.—Against south wall, all flower buds destroyed.

Lonicera brachypoda.—On south wall, a good deal cut up; on west wall, a very little injured; on north wall, not touched at all.

Lonicera japonica.—On south wall, killed; on west wall, very much injured.

Lonicera flexuosa.—On south wall the long hanging shoots all killed, the body of plant uninjured.

Rhododendrons.—All the old *early* crimsons very much injured. The following new hybrids killed :—Leopardi, Lady Alice Peel, Baron Schröder, Joseph Whitworth, Soleil d'Austerlitz.

Choisya ternata.—Against south wall, tips of shoots injured.

Messrs. Dicksons, of Chester, have kindly sent us the following list of the observed hardiness of the shrubs named :—

(i) Lowest temperature registered, 10°.

(ii) Altitude of position, 72 feet above sea.

(iii) General nature of soil, plunged in pots.

(iv) List of new, and not sufficiently known older, shrubs (*a*) uninjured, (*b*) touched, (*c*) crippled, (*d*) killed.

(*a*) Eurybia ilicifolia, Azalea amœna, Veronica cupressoides, Romneya Coulteri, Nerium splendens, Senecio elæagnifolia, Laurus lusitanicus azorica, Eugenia Ugni, Eugenia apiculata, Euonymus fimbriatus, Embothrium coccineum, Camellia pontica, Escallonia viscosa, Escallonia philippiana, Rhamnus angustifolia fol. aur., Fabiana imbricata, Eurybia Gunni, Photinia arbutifolia, Cassinia leptophylla, Olearia macrodonta, Swammerdamia antennaria, Pittosporum Mayii, Grevillea rosmarinifolia, Dracæna australis, Eurya angustifolia variegata, Fontanesia phillyræoides, Cupressus pyramidalis, Spanish Broom (new variegated), Azara integrifolia, Ephedra distachya, Corylopsis spicata, Aloysia citriodora, Caryopteris masticanthus.

(*b*) Hypericum empetriforme, Phormium tenax, Abelia rupestris, Viburnum odoratissimum, Benthamia fragifera, Chamærops humilis, Eugenia Ugni variegata, Pittosporum macrophyllum variegatum, Smilax sagittæfolia, Clethra arborea, Pittosporum eugenioides variegata, Rubus australis, Corokia Cotoneaster, Cunninghamia lanceolata, Acacia armata, Cupressus macrocarpa alba variegata, Pittosporum coriaceum.

(*c*) Ardisia japonica, Nandina tenuifolia, Grevillea robusta, Casuarina tenuissima, Smilax asparagoides, Citharexylum ligustrum, Diosma capitata, Corypha australis, Hakea suaveolens, Clethra arborea variegata.

(*d*) Griselinia macrophylla, Acacia Riceana, Anthericum variegatum.

PART II.

GREAT EXHIBITION OF AND CONFERENCE ON BRITISH-GROWN FRUIT,

HELD AT THE CRYSTAL PALACE, SEPTEMBER 29 AND OCTOBER 1 AND 2, 1894.

FOR many years the Directors of the Crystal Palace at Sydenham have held a large Autumn Fruit Show, which had come to be regarded by gardeners throughout the country as the principal Annual Exhibition of British-grown Fruit in the Kingdom. This Show the Directors of the Palace discontinued in 1893, and in the spring of 1894 an appeal was made to the Council of the Royal Horticultural Society to step in and fill up the gap thus left in the year's horticultural meetings. The Crystal Palace offered to assist the Society by lending the building and contributing £100 towards the working expenses, &c. The Secretary of the R.H.S. then issued an appeal to all interested in fruit culture in this country to contribute a sum of not less than £100 towards the prizes, and on condition of this sum being raised the Council of the Society agreed to accept the responsibility of the Show and to combine with it a Conference on British Fruit Culture.

Those whose names are given below kindly and generously responded to the invitation, and to them, in conjunction with the Royal Horticultural Society and the Crystal Palace Company, the 1894 Autumn Fruit Show was due.

LIST OF SUBSCRIBERS TO THE PRIZE FUND.

	£	s.	d.
Alexander, Mrs. B., The Bury, Pavenham, Bedford	1	0	0
Barker, John, 51 Portland Place, W.	10	0	0
Bartrum, Rev. Dr., D.D., Wake's Colne, Halstead, Essex	0	10	6
Bonavia, Dr., Harrington Mansions, South Kensington	5	0	0
Bunyard & Co., The Old Nurseries, Maidstone	5	5	0
Cannell & Sons, H., Swanley	1	1	0
Cheal & Sons, J., Lowfield Nurseries, Crawley, Sussex	2	2	0
Chester Paxton Society, Grosvenor Museum, Chester	1	1	0
Crasp, T. H., Clyne Valley Nursery, Sketty, Swansea	1	1	0
Cripps & Son, Thos., Tunbridge Wells	1	1	0
Cutbush & Son, W., Highgate, N.	1	1	0
Dicksons, The Nurseries, Chester	5	5	0
Dunn, Malcolm, Dalkeith Palace Gardens, N.B.	2	2	0
Fish, D. T., Hardwick House, Bury St. Edmunds	1	1	0
Foster & Pearson, Beeston, Notts	2	2	0
Fraser, John, The Nurseries, South Woodford	2	2	0
Gaymer & Son, W., Banham, Attleborough, Norfolk	5	0	0
Grant, W. J., Bassaleg, Newport, Mon.	0	10	6
Harrison & Sons, John, Market Place, Leicester	1	1	0
Haywood, T. B., Woodhatch, Reigate	2	2	0
Hereford Fruit and Rose Company, Hereford	2	2	0
Horticultural College, Swanley	1	1	0
Hurst, B., Burbach Grove, near Hinckley	1	1	0
Hurst & Sons, 152 Houndsditch, London, E.C.	1	1	0
Jefferies, W. J., Royal Nurseries, Cirencester	1	1	0
Laing & Sons, J., Forest Hill, S.E.	2	2	0
Lee Campbell, C., Glewston Court, Ross, Hereford	1	1	0
Low & Co., H., Clapton, N.E.	5	5	0
McIndoe, J., Hutton Hall Gardens, Guisborough	2	0	0
McKenzie, J., Linton Park Gardens, Maidstone	0	10	0
Milner, R., Penrice Castle Gardens, Swansea	0	10	6
Muir, Jas., Margam Park Gardens, Glamorgan	1	0	0
Paul & Son, The Old Nurseries, Cheshunt	2	2	0
Pearson & Sons, J. R., Chilwell, Notts	5	5	0
Perkins & Sons, T., Northampton	1	1	0
Prall, J., Brenchley, Kent	0	10	6
Protheroe & Morris, 67 Cheapside, E.C.	2	2	0
Rivers & Son, T., Sawbridgeworth, Herts	5	5	0
Slocock, W. C., Goldworth, Woking	1	1	0
Smith & Co., R., St. John's, Worcester	2	2	0
Smith, R., Shrewsbury	0	10	6
Spooner & Sons, S., Hounslow	1	1	0
Sutton & Sons, Reading	5	0	0
Thomas, Owen, Royal Gardens, Windsor	2	2	0
Turner & Sons, C., Royal Nurseries, Slough	2	2	0
Turton, T., Maiden Erlegh, Reading	1	0	0
Veitch & Sons, J., Royal Exotic Nurseries, Chelsea	10	10	0
Veitch & Sons, R., Royal Nurseries, Exeter	1	1	0
Ward, H. W., Longford Castle, Salisbury	0	10	6
Watkins, John, Pomona Farm, Withington, near Hereford	1	1	0
Westminster, Duke of, Grosvenor House, S.W.	5	0	0
Wheeler & Son, J. C., Kingsholm Nursery, Gloucester	2	2	0

SUBSCRIBERS OF SPECIAL PRIZES.

The Worshipful Company of Gardeners	6	0	0
Weir, Archibald, Bendarrock, Ottery St. Mary, Devon	2	2	0
Webber, J., Covent Garden Market	3	10	0
Monro, Geo., Covent Garden Market	3	10	0
Vegetarian Federal Union, Memorial Hall, Farringdon Street, E.C.	15	0	0

The Council of the Society wish it to be as widely known as possible that they are at all times willing to undertake the work and organisation of any great national show, whether of fruit or of flowers or of vegetables, or of anything interesting or instructive to gardeners or to the public, but the regular work of the Society is already so large that in any exceptional cases they must look to the public for funds, as the means at the disposal of the Council are not sufficient to supply all the prize-money for any great National Show. The Council have, however, accepted the responsibility of another similar British Fruit Show and Conference at the Crystal Palace in 1895. Promises of help towards the prize-fund should be sent to the Secretary, R.H.S. office, 117 Victoria Street, Westminster.

The success of the 1894 Show and Conference was far greater than the Society's officers could have anticipated. The number of persons attending the Conference on each of the three days was so great that a larger hall had to be provided than had been considered beforehand to amply suffice, and the greatest possible interest was shown on all sides. The Show, considered as an object-lesson in fruit and fruit-culture, was of the highest possible educational value. Almost every seasonable fruit of any excellence could be seen true to name and well grown, and the different varieties could be easily compared one with another. The following passage from the current number of the *Garden* will show that this is not the opinion of the Society's officers only :—

> "This gathering, held under the auspices of the Royal Horticultural Society, must be pronounced a great success. Both in extent and quality it left nothing to be desired, exceeding in both respects the hopes of those interested in the welfare of fruit culture in this country. The one marked feature throughout the entire schedule, with but very few exceptions, was the keen competition that was evinced. The non-competitive exhibits were also remarkably fine, these forming no inconsiderable portion of the show. A larger or a finer display, occupying as it did both of the transepts on either side of the large organ, has not been seen at the Crystal Palace for many years. It was also thoroughly

representative of British fruit culture, both under glass and outside. The arrangements were excellent in every respect, the disposal of the tables being an object-lesson for the managers of other shows to copy. These were arranged in two long lines, with intervals about equal to the length of each separate set of tables, and in these open spaces diamond-shaped arrangements of the tabling were made, these forming the central line, the angles pointing into the open spaces of the other two lines. This afforded most excellent means of close inspection, with the additional convenience of easy access to different parts of the show. These arrangements also made it far easier for exhibitors to stage their productions as well as for the judges to perform their work. Both Mr. Barron, the R.H.S. Superintendent, and Mr. Head, Chief of the Horticultural Department of the Crystal Palace, are to be congratulated on this arrangement."

The *Gardeners' Chronicle*, the *Journal of Horticulture*, indeed all the leading horticultural papers, had similar highly appreciative remarks. The *Gardeners' Magazine* actually went to the trouble of making an analysis of the fruits shown, which, as it may interest gardeners, we have asked leave to reprint below. But in estimating the size and extent of the Show it must be borne in mind that the analysis is only of the fruit sent for competition, and does not include any of that (like the magnificent exhibit of Her Majesty, for instance) sent simply for exhibition. And it is estimated that these non-competitive exhibits contained a quite equal number of dishes of fruit to those sent for the prizes.

For the prizes there were no less than 1,301 separate entries, and the analysis shows that there were staged 1,027 dishes of Apples of 172 varieties; Pears, 829 dishes of 106 varieties; Grapes, 105 dishes of 21 varieties; Plums, 90 dishes of 21 varieties; Peaches, 51 dishes of 12 varieties; Nectarines, 15 dishes of 8 varieties; Damsons, 6 dishes of 4 varieties; Quinces, 6 dishes of 1 variety; Bullaces, 5 dishes of 2 varieties; Figs, 4 dishes of 1 variety; Apricots, 2 dishes of 1 variety; and Gooseberries, 1 dish. Total, 2,148 dishes of 957 varieties.

Apples

Varieties	Dishes
Warner's King	44
King of the Pippins	42
Peasgood's Nonesuch	42
Ribston Pippin	41
Worcester Pearmain	34
Cox's Orange Pippin	31
Bismarck	29
Ecklinville Seedling	29
Cox's Pomona	27
Lord Suffield	24
Lord Derby	23
Mère de Ménage	22
Hawthornden	21
Blenheim Orange	20
Dumelow's Seedling (Wellington)	20
Emperor Alexander	19
Stone's or Loddington	19
Stirling Castle	17
The Queen	17
Cellini	15
Lane's Prince Albert	15
Mother	15
Washington	14
Potts' Seedling	13
Golden Spire	13
Golden Noble	13
Bramley's Seedling	12
Gascoigne's Scarlet	11
Tower of Glamis	11
Sandringham	10
Rosemary Russet	9
Alfriston	9
Beauty of Kent	9
Grenadier	9
Duchess of Oldenburg	8
King of Tomkins County	8
Lord Grosvenor	8
Mannington Pearmain	8
New Northern Greening	8
Spencer's Favourite (Queen Caroline)	8
Lady Henniker	7
Waltham Abbey Seedling	7
Reinette de Canada	7
Red Beitigheimer	6
Duke of Devonshire	6
Frogmore Prolific	6
Gloria Mundi	6
Wealthy	6
Duchess Favourite	5
Fearn's Pippin	5
Hollandbury	5
Red Reinette	5
Manx Codlin	5
Adams' Pearmain	4
Belle de Pontoise	4
Belle Dubois	4
Braddick's Nonpareil	4
Colonel Vaughan	4
Cornish Aromatic	4
Keswick Codlin	4
Lady Sudeley	4
Margil	4
Newton Wonder	4
Scarlet Nonpareil	4
Scarlet Pearmain	4
Tibbet's Pearmain	4
Tyler's Kernel	4
Northern Dumpling	4
Annie Elizabeth	3
Gold Medal	3
Gospatrick	3
Gravenstein	3
Melon	3
Vicar of Beighton	3
Rymer	3
Schoolmaster	3
Kerry Pippin	3
Yellow Ingestre	3
Barnack Beauty	3
Cornish Gilliflower	2
Devonshire Quarrenden	2
Domino	2
Duchess of Gloucester	2
Egremont Russet	2
Grand Duke Constantine	2
Heston Favourite	2
Hoary Morning	2
Jefferson	2
Mrs. Barron	2
Striped Beefing	2
Reinette de Osnabruck	2
High Canons	2
Nelson's Codlin	2
Huntingdon Codlin	2
Yorkshire Beauty	2
Cockle's Pippin	2
Crimson Quoining	2
Royal Jubilee	2
Dartmouth Crab	2
American Beauty	1
Baldwin	1
Beauty of Bath	1
Beauty of Wilts	1
Benoni	1
Brownlee's Russet	1
Calville Blanche	1
Chatley Kernel	1
Court Pendu Plat	1
Crown Apple	1
Foster's Seedling	1
Flanders Pippin	1

Varieties	Dishes	Varieties	Dishes
Filibuster	1	Wallon Beauty	1
Golden Reinette	1	Calville Rouge	1
Herefordshire Beefing	1	Jolly Miller	1
Jennet Moyle	1	Edulis Crab	1
Large America	1	Black Crab	1
Mulakoona	1	White Melrose	1
Maiden's Blush	1	Absconder	1
Nanny	1	Transparent Crab	1
Okera	1	Lady Alice Eyre	1
Oberlein d'Hiver	1	Roundway Magnum Bonum	1
Peck's Pleasant	1	Memento	1
Royal Jubilee	1	Bedfordshire Seedling	1
Small's Admirable	1	Pomme Royal	1
Williams' Favourite	1	Spring Grove Codlin	1
Winter Reinette	1	Magnum Bonum	1
Twenty Ounce	1	Tom Putt	1
Wadhurst Pippin	1	Transparens de Conseils	1
Marfit's Seedling	1	Lincoln Pippin	1
James Grieve	1	Royal Somerset	1
Swedish Reinette	1	Furness Pippin	1
English Codlin	1	Cat's Head	1
St. Lawrence	1	Kirke's Fame	1
Sops in Wine	1	St. Edmonds	1
Emily Childs	1	Dr. Lennox	1
Early Julian	1	Dutch Codlin	1
Mark Marshall	1	Flower of Kent	1
Rainbow	1	Orange Goff	1
Barchard's Seedling	1	Irish Peach	1
Betty Geeson	1		
Wiltshire Defiance	1	Total	1,027

Apricots.

Moor Park	2

Bullace.

Bullace	5

Damsons.

Farleigh Prolific	2	Crittenden	1
Prune	2		
Cheshire	1	Total	6

Cherries.

Morello	7

Figs.

Brown Turkey	4

Grapes.

Muscat of Alexandria	22	Foster's Seedling	2
Black Alicante	15	Golden Queen	2
Gros Colmar	11	Lady Hutt	2
Gros Maroc	11	Trebbiano	2
Madresfield Court	7	West St. Peter's	2
Alnwick Seedling	6	Appley Towers	1
Mrs. Pince	4	Dr. Hogg	1
Black Hamburgh	3	Duke of Buccleuch	1
Barbarossa	3	Muscat Hamburgh	1
Buckland Sweetwater	3		
Lady Downe's Seedling	3	Total	105
Mrs. Pearson	3		

Gooseberry.

Varieties	Dishes
Warrington	1

Nectarines.

Pineapple	5	Humboldt	1
Victoria	3	Lord Napier	1
Belgowan	2	Newington	1
Albert Victor	1		—
Elruge	1	Total	15

Peaches.

Princess of Wales	12	Late Admirable	3
Sea Eagle	9	Belle Dorée	2
Lord Palmerston	5	Nectarine	2
Walburton Admirable	5	Diamond	1
Barrington	4	Comet	1
Exquisite	4		—
Bellegarde	3	Total	51

Pears.

Pitmaston Duchess	67	Conseiller de la Cour	6
Doyenné du Comice	42	Hacon's Incomparable	6
Louise Bonne of Jersey	39	Triomphe de Vienne	6
Durondeau	37	Marie Benoist	5
Marie Louise d'Uccle	37	Marguérite Marillat	5
Marie Louise	35	Beurré Baltet père	4
Beurré Superfin	30	Autumn Bergamot	4
Beurré Hardy	26	Triomphe de Joidoigne	4
Beurré Diel	25	King Edward	4
Beurré d'Amanlis	23	Gratioli of Jersey	4
Brockworth Park	23	Beurré Rance	4
Duchesse d'Angoulême	23	Chaumontel	3
Beurré Clairgeau	22	Magnate	3
Maréchal de la Cour	21	Fertility	3
General Todleben	21	Flemish Beauty	3
Souvenir du Congrès	18	Le Lectier	3
Glou Morceau	16	Belle d'Ecully	3
Winter Nelis	16	Bellisime d'Hiver	3
Beurré Bosc	14	Beurré de Capiaumont	3
Josephine de Malines	13	Beurré de Anjou	3
Fondante d'Automne	13	Directeur Alphand	2
Van Mons (Léon Leclerc)	11	Gilogil	2
Doyenné Boussoch	11	Idaho	2
Catillac	10	Mikado	2
Vicar of Winkfield	10	Thérèse	2
Gansel's Bergamot	10	Bergamot	2
Madame Treyve	9	Poire de Barnett	2
Princess	9	Brown Beurré	2
Thompson's	9	Beurré Jean van Geert	2
Uvedale St. Germains	9	Comte de Flandres	2
Beurré Bachelier	8	Seckle	2
Williams' Bon Chrétien	8	Urbaniste	2
Emile d'Heyst	8	Prince Napoléon	2
Gros Calabasse	8	Easter Beurré	1
Nouvelle Fulvie	7	Beurré Fouqueray	1
Conference	7	Beurré Mastillet	1
Comte de Lamy	6	Bergamot d'Esperen	1

Varieties	Dishes
Clapp's Favourite	1
Duchesse de Mouchy	1
Jargonelle	1
Léon Leclerc de Laval	1
Madame André Leroy	1
Orchard Baker	1
Olivier de Serres	1
Parrot	1
Swan's Egg	1
Verulam	1
Belle von Fouqueray	1
Beurré Alexander Lucas	1
St. Lizin	1
De Mont Vernon	1
Duchesse de Bordeaux	1
André Leroy	1
Madame Chaudy	1
Président d'Osmonville	1
Huyshe's Bergamot	1
Alexander Chomer	1
Prince Imperial	1
Keele Hall Beurré	1
Beurré Bonne	1
Maréchal de Zehon	1
Soldat Labarreur	1
White Doyenné	1
Von Siebold	1
Bon Vicar	1
Fondante de Theynotte	1
Total	829

PLUMS.

Varieties	Dishes
Coe's Golden Drop	19
Pond's Seedling	9
White Magnum Bonum	7
Transparent Gage	5
Bryanston Gage	5
Monarch	5
Victoria	4
Grand Duke	4
Diamond	4
Reine Claude de Bavay	3
Lawson's Golden Gage	3
Autumn Compôte	2
Belle Septembre	2
Impératrice	2
Goliath	2
Jefferson	2
Orleans	2
Prince Englebert	2
Angelina Burdett	1
White Perdrigon	1
Ponport	1
Golden Transparent	1
Italian Prince	1
Denniston's Superb	1
Aurora	1
Autumn de Charnal	1
Total	90

QUINCES.

Quince	6

The Exhibition itself was in every way most encouraging and instructive to the supporters of British fruit-growing. The Apples and Pears were of course not so large or so highly coloured as in some years, but considering the season they were, on the whole, very fine, proving beyond any dispute that even in unfavourable seasons hardy fruit can be grown with success in this country. It must also, we should hope, have had some effect from an educational point of view, considering that it was visited by almost 25,000 people.

The following is a reprint of the schedule, with the names of the prize-winners added :—

Great Exhibition of British Fruit at the Crystal Palace, September 29 and October 1 and 2, 1894.

Prize List.

Division I.—Fruits grown under Glass or otherwise. Open to all.

Class 1. Collection of Ripe Fruit, fifteen distinct varieties. To include two varieties of Melons, and a dish of each of the following:—Black Grapes, White Grapes, White or Yellow Plums, Red or Black Plums, Peaches, Nectarines, Apples, Pears, and five other dishes of other kinds of fruit or of distinct varieties. First, £10, Sir Jos. Pease, Bart., Hutton Hall, Guisborough (gr. Mr. McIndoe).

Class 2. Collection of Ripe Fruit, nine distinct varieties, Pines excluded. To include two dishes of Grapes, distinct, one Melon, one dish each of Peaches, Nectarines, Pears, Apples, and two other dishes of other kinds or of distinct varieties. First, £5, Countess of Camperdown, Shipston-on-Stour, Warwick (gr. Mr. Masterson); second, £3, Hon. D. P. Bouverie, Coleshill House, Highworth (gr. Mr. Haines); third, £2, Mrs. Wingfield, Ampthill House, Ampthill (gr. Mr. Empson).

Class 3. Grapes, six distinct varieties, two bunches of each, both black and white must be represented. First, £5, J. T. Paton, Esq., Norwood, Alloa, N.B. (gr. Mr. A. Kirk); second, £3, C. Bayer, Esq., Tewkesbury Lodge, Forest Hill (gr. Mr. Bury); third, £2, Sir J. Pease, Bart. (gr. Mr. McIndoe).

Class 4. Grapes, three distinct varieties, two bunches of each. First, £2. 10*s*., Messrs. de Rothschild, Gunnersbury Park, Acton (gr. Mr. Reynolds); second, £1. 10*s*., C. J. Massey, Esq., Galloway House, Garliestown, Wigtonshire (gr. Mr. Day); third, £1, W. K. D'Arcy, Esq., Stanmore Hall, Middlesex (gr. Mr. Tidey).

Class 5. Grapes, Black Hamburgh, three bunches. Second, £1, Earl Cowley, Draycot House, Chippenham (gr. Mr. Gibson); third, 10*s*., H. Tate, Esq., Streatham Common (gr. Mr. Howe).

Class 6. Grapes, Madresfield Court, three bunches. First, £1. 10*s*., Mrs. Wingfield (gr. Mr. Empson); second, £1, Earl Cowley (gr. Mr. Gibson); third, 10*s*., A. Pears, Esq., Spring Grove House, Isleworth (gr. Mr. Farr).

Class 7. Grapes, Gros Colmar or Gros Maroc, three bunches.

First, £1. 10*s*., Messrs. de Rothschild (gr. Mr. Reynolds); second, £1, Sir Jos. Pease, Bart. (gr. Mr. McIndoe); third, 10*s*., C. Lee Campbell, Esq., Glewston Court, Ross, Hereford (gr. Mr. Wright).

Class 8. Grapes, Alicante, three bunches. First, £1. 10*s*., T. Astley, Esq., Coombe Bank, Kingston-on-Thames (gr. Mr. Griffin); second, £1, J. Chaffin, Esq., Bath (gr. Mr. Taylor); third, 10*s*., H. Tate, Esq. (gr. Mr. Howe).

Class 9. Grapes, any other Black Grape, three bunches. First, £1. 10*s*., C. J. Massey, Esq. (gr. Mr. Day); second, £1, Messrs. de Rothschild, Gunnersbury House, Acton (gr. Mr. Hudson); third, 10*s*., W. Sanders, Esq., Andover.

Class 10. Grapes, Muscat of Alexandria, three bunches. First, £2, W. K. D'Arcy, Esq. (gr. Mr. Tidey); second, £1, F. A. Bevan, Esq., 60 Prince's Gate (gr. Mr. Lees); third, 10*s*., C. Bayer, Esq. (gr. Mr. Bury).

Class 11. Grapes, any other White Grape, three bunches. First, £1. 10*s*., L. J. Baker, Esq., Ottershaw Park, Chertsey (gr. Mr. Osman); second, £1, Messrs. de Rothschild (gr. Mr. Reynolds); third, 10*s*., R. Sneyd, Esq., Keele, Newcastle, Staffs (gr. Mr. Wallis).

Class 12. Peaches, three dishes, distinct. First, £1. 10*s*., Mr. J. Gore, Polegate, Sussex; second, £1, R. Leigh, Esq., Barham Court, Teston, Maidstone (gr. Mr. Geo. Woodward); third, 10*s*., Sir. Jos. Pease, Bart. (gr. Mr. McIndoe).

Class 13. Peaches, one dish, of one variety. First, 10*s*., R. Sneyd, Esq. (gr. Mr. Wallis); second, 7*s*., Mr. T. Lunt, Dumblane; third, 3*s*., Viscountess Falmouth, Mereworth Castle, Kent (gr. Mr. Markham).

Class 15. Nectarines, one dish, of one variety. First, 10*s*., R. Sneyd, Esq. (gr. Mr. Wallis); second, 7*s*., Mr. W. Pope, Highclere Castle Gardens, Newbury; third, 3*s*., Hon. D. P. Bouverie, Coleshill House, Highworth (gr. Mr. Haines).

Class 16. Figs, one dish, of one variety. First, 10*s*., Mr. W. Pope; second, 7*s*., C. W. Parker, Esq., The Priory, Witham (gr. Mr. Kerry); third, 3*s*., Hon. D. P. Bouverie (gr. Mr. Haines).

Class 17. Tomatos, four dishes of distinct varieties, nine fruits of each. First, £1. 10*s*., Mr. J. Gore; second, £1, H. Tate, Esq. (gr. Mr. Howe); third, 10*s*., E. Ryder, Esq., Orpington.

Class 18. Tomatos, one dish of nine fruits, of one variety. First, 7*s*., Mr. Garraway, Roseland Villa, Balebrook, Bath; second, 5*s*., F. C. S. Roper, Esq., Polegate, Sussex (gr. Mr. Blake); third, 3*s*., Messrs. W. & E. Wells, Hounslow (gr. Mr. Thomson).

Class 19. Tomatos, six ripe clusters as cut from the plants, of one variety. First, £1, Mr. J. Gore; second, 15*s*., Mr. J. Hill, jun., The Nursery, New Malden, Surrey; third, 10*s*., A. Pears, Esq. (gr. Mr. Farr).

Class 20. Three Vines, bearing ripe fruit, in pots. First, £3, Messrs. T. Rivers & Son, Sawbridgeworth.

Class 21. Collection of Hardy Fruit, grown partly or entirely under glass, to illustrate Orchard-house Culture. (Nurserymen excluded.) First, £3, Sir Mark Collet, Bart., St. Clere, Kemsing, Sevenoaks (gr. Mr. Potter); second, £2, Sir Jos. Pease, Bart. (gr. Mr. McIndoe); third, £1, J. W. Melles, Esq., Sewardstone Lodge, Chingford (gr. Mr. Nicholson).

Division II.—Open to Nurserymen only.

Class 22. Collection of Fruit Trees bearing Fruit, in pots. First, R.H.S. Gold Medal, Messrs. T. Rivers & Son, Sawbridgeworth; second, Silver Gilt Flora Medal, Messrs. George Bunyard & Co., Maidstone.

Class 23. Collection of Hardy Fruits, grown partly or entirely under glass, to illustrate Orchard-house Culture. First, R.H.S. Silver Gilt Flora Medal, Messrs. George Bunyard & Co., Maidstone; second, Messrs. T. Rivers & Son, Sawbridgeworth.

Class 24. Collection of Hardy Fruits, in baskets or dishes grown in the open. First, R.H.S. Gold Medal, Messrs. George Bunyard & Co., Maidstone; second, Messrs. J. Cheal & Sons, Lowfield, Crawley, Sussex; third, Mr. H. Berwick, Sidmouth Nurseries, South Devon.

Note.—As in all other Divisions, so also in Division II., all the Exhibits must have been grown by the Exhibitors.

Division III.—Fruits grown in the Open Air. Open to Gardeners and Amateurs only.

Class 25. Apples, eighteen dishes, distinct, twelve cooking, six dessert. First, £3, R. Leigh, Esq. (gr. Mr. G. Woodward);

extra prize (equal to second), £2, C. Lee Campbell, Esq. (gr. Mr. Wright).

Class 26. Apples, twelve dishes, distinct, eight cooking, four dessert. First, £2, A. T. Killick, Esq., Weavering, near Maidstone; second, £1, Viscount Gage, Firle Park, Lewes (gr. Mr. Helman); third, 15*s*., Rev. E. Bartrum, Halstead, Essex.

Class 27. Apples, nine dishes, distinct, six cooking, three dessert. Second, 15*s*., Lady Fortescue, Dropmore, Maidenhead (gr. Mr. Herrin).

Class 28. Cooking Apples, six dishes, distinct. First, £1, R. Leigh, Esq. (gr. Mr. G. Woodward); second, 15*s*., C. Lee Campbell, Esq., Glewston Court, Hereford (gr. Mr. S. Wright); third, 10*s*., Mrs. Killick, Mount Pleasant, Langley, near Maidstone.

Class 29. Cooking Apples, three dishes, distinct. First, 10*s*., Mr. A. Killick, Weavering, near Maidstone; second, 7*s*., J. R. Brougham, Esq., Carshalton (gr. Mr. Jones); third, 5*s*., J. Hargreaves, Esq., Reading (gr. Mr. Turton).

Class 30. Dessert Apples, six dishes, distinct. First, £1, R. Leigh, Esq. (gr. Mr. Geo. Woodward; second, 15*s*., C. Lee Campbell, Esq.; third, 10*s*., W. G. Dawson, Esq., Plumstead Common (gr. Mr. Heston).

Class 31. Dessert Apples, three dishes, distinct. First, 10*s*., Sir Mark Collet, Bart., Sevenoaks (gr. Mr. Potter); second, 7*s*., J. Hargreaves, Esq. (gr. Mr. Turton); third, 5*s*., Mr. W. H. Apthorpe, Cambridge.

Class 32. Dessert Pears, eighteen dishes, distinct. First, £4, R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, £3, H. C. Moffatt, Esq., Ross, Hereford (gr. Mr. T. Spencer); third, £2, A. H. Smee, Esq., The Grange, Wallington (gr. Mr. Cummins).

Class 33. Dessert Pears, twelve dishes, distinct. First, £3, H. S. Vincent Ames, Esq., Westbury-on-Trym (gr. Mr. Bannister); second, £2, Mr. A. Basile, St. George's College Gardens, Woburn Park, Weybridge.

Class 34. Dessert Pears, nine dishes, distinct. First, £2, Lord Suffield, Gunton Park, Norwich (gr. Mr. Allan); second, £1, Captain Harcourt Rose, Oxonheath Park, Tonbridge (gr. Mr. Cotterell); third, 15*s*., J. R. Brougham, Esq. (gr. Mr. W. Jones).

Class 35. Dessert Pears, six dishes, distinct. First, £1. 10*s*.,

Mrs. Crawford, Gatton, Reigate (gr. Mr. Slowgrove); second, 15*s.*, Earl Cowley (gr. Mr. Gibson); third, 10*s.*, W. A. Cook, Esq., Compton Bassett, Calne, Wilts.

Class 36. Dessert Pears, three dishes, distinct. First, £1, Dowager Lady Freake, Fulwell Park, Twickenham (gr. Mr. Rickwood); second, 10*s.*, Mr. J. Hill, Babraham Gardens, Cambridge; third, 5*s.*, Mr. W. H. Apthorpe, Cambridge.

Class 37. Stewing Pears, three dishes, distinct. First, £1, R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 10*s.*, Captain Harcourt Rose (gr. Mr. Cotterell); third, 5*s.*, F. C. S. Roper, Esq. (gr. Mr. Blake).

Class 38. Stewing Pears, one dish, of one variety. First, 7*s.*, Countess of Camperdown (gr. Mr. Masterson); second, 5*s.*, Mr. W. A. Cook; third, 3*s.*, Mr. T. S. Girdler, Rosedale House, Lowther Hill, Forest Hill, S.E.

Class 39. Peaches, three dishes, distinct. First, £1. 10*s.*, R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, £1, Countess of Camperdown, Shipston-on-Stour (gr. Mr. Masterson); third, 10*s.*, F. A. Bevan, Esq., New Barnet (gr. Mr. W. H. Lees).

Class 40. Peaches, one dish, of one variety. First, 10*s.*, Viscountess Falmouth, Mereworth (gr. Mr. Markham); second, 7*s.*, Mrs. Hulse, Carshalton (gr. Mr. Sclater); third, 3*s.*, Mr. G. Fennell, Fairlawn Gardens, Tunbridge.

Class 41. Nectarines, three dishes, distinct. Second, £1, Mr. W. Pope, Newbury.

Class 42. Nectarines, one dish, of one variety. First, 10*s.*, A. Pears, Esq., Isleworth (gr. Mr. Farr); second, 7*s.*, Earl Cowley (gr. Mr. Gibson); third, 5*s.*, T. Astley, Esq., Kingston-on-Thames (gr. Mr. Griffin).

Class 43. Plums, four dishes of Dessert, distinct. First, £1, W. H. Long, Esq., M.P., Trowbridge (gr. Mr. Strugnell); second, 15*s.*, Countess of Camperdown (gr. Mr. Masterson); third, 10*s.*, C. J. Massey, Esq. (gr. Mr. Day).

Class 44. Plums, one dish of Dessert, of one variety, not Gages. First, 7*s.*, J. Hargreaves, Esq. (gr. Mr. Turton); second, 5*s.*, Mrs. Wingfield, Ampthill (gr. Mr. Empson); third, 3*s.*, Mr. R. Edwards, Sevenoaks.

Class 45. Plums, four dishes of Cooking, distinct. First, £1, Mr. W. Pope; second, 15*s.*, C. J. Massey, Esq. (gr. Mr. Day); third, 10*s.*, J. Hargreaves, Esq. (gr. Mr. Turton).

Class 46. Plums, one dish of Cooking, of one variety. First, 7*s*., Mrs. Wingfield (gr. Mr. Empson); second, 5*s*., Rev. E. Bartrum, Halstead, Essex (gr. Mr. Graves); third, 3*s*., Viscountess Falmouth (gr. Mr. Markham).

Class 47. Gage Plums, one dish, any green or golden variety. First, 7*s*., Countess of Camperdown (gr. Mr. Masterson); second, 5*s*., Lady Fortescue, Dropmore (gr. Mr. Herrin); third, 3*s*., Sir J. W. Pease, Bart., Guisborough (gr. Mr. McIndoe).

Class 48. Any purple Gage Plum, one dish. Second, 5*s*., Mr. J. Neighbour, Copped Hall Gardens, Epping.

Class 49. Damsons and Prunes, three dishes, distinct. First, 15*s*., Mr. Austin T. Killick, Weavering, Maidstone; second, 10*s*., G. W. Dawson, Esq. (gr. Mr. Heston).

Class 50. Bullaces, one dish. First, 7*s*., Mr. G. Tebbutt, Mogden House, Isleworth; second, 5*s*., F. G. Arbuthnot, Esq., Bexley (gr. Mr. Wells); third, 3*s*., G. W. Dawson, Esq. (gr. Mr. Heston).

Class 51. Morello Cherries, one dish. First, 7*s*., Countess Camperdown (gr. Mr. Masterson); second, 5*s*., Dowager Lady Freake (gr. Mr. Rickwood); third, 3*s*., Mr. R. Edwards, Twickenham.

Class 52. Nuts, collection of, may include Walnuts, Filberts, Cobs, Chestnuts, Hazel, &c., one dish of each. First, £1. 10*s*., J. Hargreaves, Esq. (gr. Mr. Turton); second, £1, Mr. Goodwin, Mereworth; third, 10*s*., Colvile Browne, Esq., Horticultural College, Swanley.

Class 53. Quinces, one dish. First, 7*s*., Captain Harcourt Rose (gr. Mr. Cotterell); A. J. Howard, Esq., Worton Hall, Isleworth (gr. Mr. Pentney); second, 5*s*., A. J. Humphrey, Esq., Walton Leigh, Addlestone (gr. Mr. Barleycorn); third, 3*s*., Mrs. Wingfield (gr. Mr. Empson).

Division IV.—Single Dishes of Fruit grown in the Open Air. Open to all.

Dessert Apples.

Class 55. Adams' Pearmain. First, 7*s*., R. Leigh, Esq. (gr. Mr. George Woodward); second, 5*s*., Mr. W. Tayler, Osborn Nursery, Hampton, Middlesex; third, 3*s*., English Fruit and Rose Company, Hereford.

Class 56. Braddick's Nonpareil. First, 7*s.*, English Fruit and Rose Company, Hereford; second, 5*s.*, Mr. W. Tayler.

Class 57. Cox's Orange Pippin. First, 7*s.*, W. H. Long, Esq., M.P. (gr. Mr. Strugnell); second, 5*s.*, R. Leigh, Esq. (gr. Mr. G. Woodward); third, 3*s.*, Mrs. Wingfield (gr. Mr. Empson).

Class 58. Duke of Devonshire. First, 7*s.*, Lieut.-Col. Archer Houblon, Welford Park, Newbury (gr. Mr. Ross); second, 5*s.*, Mr. H. Berwick; third, 3*s.*, Viscount Gage (gr. Mr. Helman).

Class 58*a*. Golden Reinette. First, 7*s.*, Mr. H. Berwick.

Class 59. King of the Pippins. First, 7*s.*, Captain Harcourt Rose (gr. Mr. Cotterell); second, 5*s.*, English Fruit and Rose Company, Hereford; third, 3*s.*, Mr. Garraway, Bath.

Class 60. Lady Sudeley. First, 7*s.*, Mr. R. Edwards; second, 5*s.*, Mr. H. Berwick.

Class 61. Mannington's Pearmain. First, 7*s.*, F. S. W. Cornwallis, Esq., M.P., Maidstone (gr. Mr. Mackenzie); second, 5*s.*, J. W. Melles, Esq. (gr. Mr. Nicholson); third, 3*s.*, R. Leigh, Esq. (gr. Mr. G. Woodward).

Class 62. Margil. First, 7*s.*, R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 5*s.*, Mr. Jas. Spottiswood, Queen's Park Gardens, Brighton; third, 3*s.*, Viscount Gage (gr. Mr. Helman).

Class 63. Mother (American). First, 7*s.*, F. S. W. Cornwallis, Esq., M.P. (gr. Mr. Mackenzie); second, 5*s.*, R. Leigh, Esq. (gr. Mr. Geo. Woodward); third, 3*s.*, C. Lee Campbell, Esq. (gr. Mr. Wright).

Class 64. Reinette de Canada. First, 7*s.*, R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 5*s.*, Mr. W. Tayler; third, 3*s.*, English Fruit and Rose Company.

Class 65. Ribston Pippin. First, 7*s.*, C. Lee Campbell, Esq. (gr. Mr. Wright); second, 5*s.*, F. S. W. Cornwallis, Esq., M.P. (gr. Mr. Mackenzie); third, 3*s.*, J. Hargreaves, Esq. (gr. Mr. Turton).

Class 66. Rosemary Russet. First, 7*s.*, J. Hargreaves, Esq. (gr. Mr. Turton); second, 5*s.*, P. Cavanagh, Esq., Convent Gardens, Roehampton Lane, S.W.; third, 3*s.*, Mr. H. Berwick.

Class 67. Scarlet Nonpareil. First, 7*s.*, R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 5*s.*, Mr. Garraway, Bath.

Class 68. Worcester Pearmain. First, 7*s.*, R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 5*s.*, C. Lee Campbell, Esq. (gr. Mr. Wright); third, 3*s.*, F. S. W. Cornwallis, Esq., M.P. (gr. Mr. Mackenzie).

Class 69. Any other variety. First, 7*s*., R. Leigh, Esq. (gr. Mr. Geo. Woodward), for "Washington"; second, 5*s*., Mr. R. Edwards, Beechy Lees, for "Washington"; third, 3*s*., English Fruit and Rose Company, for "Wealthy."

Cooking Apples.

Class 70. Alfriston. First, 7*s*., Duke of Northumberland, Syon House, Brentford (gr. Mr. Wythes); second, 5*s*., Mr. H. Berwick; third, 3*s*., Mr. P. Cavanagh, Roehampton.

Class 71. Beauty of Kent. First, 7*s*., R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 5*s*., Lady Fortescue (gr. Mr. Herrin); third, 3*s*., Mr. H. Berwick.

Class 72. Bismarck. First, 7*s*., F. S. W. Cornwallis, Esq., M.P. (gr. Mr. Mackenzie); second, 5*s*., R. Leigh, Esq. (gr. Mr. G. Woodward); third, 3*s*., English Fruit and Rose Company.

Class 73. Blenheim Orange. First, 7*s*., Mr. P. Cavanagh; second, 5*s*., A. J. Humphreys, Esq. (gr. Mr. Barleycorn); third, 3*s*., Mr. R. Edwards.

Class 74. Bramley's Seedling. First, 7*s*., C. Lee Campbell, Esq. (gr. Mr. Wright); second, 5*s*., English Fruit and Rose Company; third, 3*s*., Mr. G. Garraway.

Class 75. Cellini. First, 7*s*., Mr. H. Berwick; second, 5*s*., English Fruit and Rose Company; third, 3*s*., Mr. P. Cavanagh.

Class 76. Cox's Pomona. First, 7*s*., F. S. W. Cornwallis, Esq., M.P. (gr. Mr. Mackenzie); second, 5*s*., Mr. Geo. Woodward; third, 3*s*., J. Hargreaves, Esq. (gr. Mr. Turton).

Class 77. Duchess of Oldenburg. First, 7*s*., Mr. Austin T. Killick; second, 5*s*., English Fruit and Rose Company; third, 3*s*., Mr. W. Tayler.

Class 78. Dumelow's Seedling, *syns*. Wellington and Normanton Wonder. First, 7*s*., J. Hargreaves, Esq. (gr. Mr. Turton); second, 5*s*., Messrs. W. & E. Wells (gr. Mr. Thomson); third, 3*s*., Mr. H. Berwick.

Class 79. Ecklinville Seedling. First, 7*s*., C. Lee Campbell, Esq. (gr. Mr. Wright); second, 5*s*., Mr. Austin T. Killick; third, 3*s*., Mr. H. Berwick.

Class 80. Emperor Alexander. First, 7*s*., F. S. W. Cornwallis, Esq., M.P. (gr. Mr. Mackenzie); second, 5*s*., R. Leigh, Esq. (gr. Mr. G. Woodward); third, 3*s*., Messrs. T. R. Rivers & Son.

Class 81. Gascoigne's Scarlet, *syn.* Glory of England. First, 7*s.*, R. Leigh, Esq. (gr. Mr. G. Woodward); second, 5*s.*, Mr. A. T. Killick; third, 3*s.*, Mr. H. Berwick.

Class 82. Golden Noble. First, 7*s.*, R. Leigh, Esq. (gr. Mr. G. Woodward); second, 5*s.*, F. S. W. Cornwallis, Esq., M.P. (gr. Mr. Mackenzie); third, 3*s.*, Mr. H. Berwick.

Class 83. Golden Spire. First, 7*s.*, R. Leigh, Esq. (gr. Mr. G. Woodward); second, 5*s.*, Mr. A. T. Killick; third, 3*s.*, English Fruit and Rose Company.

Class 84. Grenadier. First, 7*s.*, R. Leigh, Esq. (gr. Mr. G. Woodward); second, 5*s.*, Lady Fortescue (gr. Mr. Herrin); third, 3*s.*, F. S. W. Cornwallis, Esq., M.P. (gr. Mr. Mackenzie).

Class 85. Hawthornden (new). First, 7*s.*, J. Hargreaves, Esq. (gr. Mr. Turton); second, 5*s.*, R. Leigh, Esq. (gr. Mr. G. Woodward); third, 3*s.*, H. Vincent Ames, Esq. (gr. Mr. Bannister).

Class 86. Lane's Prince Albert. First, 7*s.*, C. Lee Campbell, Esq. (gr. Mr. Wright); second, 5*s.*, R. Leigh, Esq. (gr. Mr. G. Woodward); third, 3*s.*, Messrs. T. R. Rivers & Son.

Class 87. Lord Derby. First, 7*s.*, R. Leigh, Esq. (gr. Mr. G. Woodward); second, 5*s.*, Messrs. de Rothschild (gr. Mr. Hudson); third, 3*s.*, Mr. W. Tayler.

Class 88. Lord Grosvenor. First, 7*s.*, F. S. W. Cornwallis, Esq., M.P. (gr. Mr. Mackenzie); second, 5*s.*, R. Leigh, Esq. (gr. Mr. G. Woodward); third, 3*s.*, Lady Fortescue (gr. Mr. Herrin).

Class 89. Lord Suffield. First, 7*s.*, Mr. A. T. Killick; second, 5*s.*, R. Leigh, Esq. (gr. Mr. G. Woodward); third, 3*s.*, Mr. H. Berwick.

Class 90. Mère de Ménage. First, 7*s.*, Mr. A. T. Killick; second, 5*s.*, F. S. W. Cornwallis, Esq., M.P. (gr. Mr. Mackenzie); third, 3*s.*, R. Leigh, Esq. (gr. Mr. G. Woodward).

Class 91. Northern Greening. First, 7*s.*, English Fruit and Rose Company, Hereford; second, 5*s.*, Capt. Harcourt Rose, Tunbridge (gr. Mr. Cotterell); third, 3*s.*, Mr. W. Tayler, Hampton.

Class 92. Newton Wonder. First, 7*s.*, C. Lee Campbell, Esq.; second, 5*s.*, Mr. G. Garraway, Bath.

Class 93. Peasgood's Nonesuch. First, 7*s.*, R. Leigh, Esq. (gr. Mr. G. Woodward); second, 5*s.*, F. S. W. Cornwallis, Esq.,

M.P., Maidstone (gr. Mr. Mackenzie); third, 3*s*., Mr. W. Tayler.

Class 94. Potts' Seedling. First, 7*s*., Mr. W. Tayler; second, 5*s*., English Fruit and Rose Company; third, 3*s*., R. Leigh, Esq. (gr. Mr. Geo. Woodward).

Class 95. Sandringham. First, 7*s*., Mr. H. Berwick, Sidmouth, Devon; second, 5*s*., Duke of Northumberland, Isleworth (gr. Mr. Wythes); third, 3*s*., R. Leigh, Esq. (gr. Mr. Geo. Woodward).

Class 96. Spencer's Favourite, *syn.* Queen Caroline. First, 7*s*., R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 5*s*., C. Lee Campbell, Esq.; third, 3*s*., Mrs. Killick.

Class 97. Stirling Castle. First, 7*s*., F. S. W. Cornwallis, Esq., M.P.; second, 5*s*., C. Archer Houblon, Welford Park, Newbury; third, 3*s*., Messrs. T. R. Rivers & Son, Sawbridgeworth.

Class 98. Stone's, *syn.* Loddington Seedling. First, 7*s*., R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 5*s*., F. S. W. Cornwallis, Esq., M.P.; third, 3*s*., Mr. H. Berwick.

Class 99. The Queen. First, 7*s*., R. Leigh, Esq. (gr. Mr. G. Woodward); second, 5*s*., Mr. H. Berwick; third, 3*s*., Mr. W. Tayler.

Class 100. Tower of Glamis. First, 7*s*., F. S. W. Cornwallis, Esq., M.P.; second, 5*s*., R. Leigh, Esq. (gr. Mr. Geo. Woodward); third, 3*s*., C. Lee Campbell, Esq.

Class 101. Tyler's Kernel. First, 7*s*., Mr. H. Berwick.

Class 102. Warner's King. First, 7*s*., Mr. W. Tayler; second, 5*s*., F. S. W. Cornwallis, Esq., M.P.; third, 3*s*., Mr. Austin T. Killick, Weavering, Maidstone.

Class 103. Waltham Abbey Seedling, *syn.* Dr. Harvey. First, 7*s*., R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 5*s*., F. S. W. Cornwallis, Esq., M.P.; third, 3*s*., J. Hargreaves, Esq.

Class 104. Any other variety. First, 7*s*., R. Leigh, Esq. (gr. Mr. Geo. Woodward), for "Belle Dubois"; second, 5*s*., English Fruit and Rose Company, for "Frogmore Prolific"; third, 3*s*., Mr. G. Tebbutt, Isleworth, for "Lady Henniker."

Dessert Pears.

Class 105. Beurré Bosc. First, 7*s*., Messrs. W. & E. Wells, Hounslow (gr. Mr. Thomson); second, 5*s*., Horticultural College, Swanley; third, 3*s*., Mr. W. Fife, Wantage, Berks.

Class 106. Beurré Diel. First, 7*s*., Mr. W. Tayler; second, 5*s*., Dowager Lady Freake, Twickenham (gr. Mr. Rickwood); third, 3*s*., Duke of Northumberland (gr. Mr. Wythes).

Class 107. Beurré d'Amanlis. First, 7*s*., H. C. Moffatt, Esq. (gr. Mr. Spencer); second, 5*s*., Earl Cowley, Draycot House, Twickenham (gr. Mr. Gibson); third, 3*s*., R. Leigh, Esq. (gr. Mr. Geo. Woodward).

Class 108. Beurré Hardy. First, 7*s*., R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 5*s*., Mr. Jas. Spottiswood, Brighton; third, 3*s*., Mr. J. Turner, Week Hall, Brighton.

Class 109. Beurré Superfin. First, 7*s*., R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 5*s*., H. Vincent Ames, Esq. (gr. Mr. Bannister); third, 3*s*., H. C. Moffatt, Esq. (gr. Mr. Spencer).

Class 110. Bon Chrétien (Williams'). First, 7*s*., C. J. Massey, Esq., Garliestown, Wigton (gr. Mr. Day); second, 5*s*., G. W. Dawson, Esq. (gr. Mr. Heston); third, 3*s*., A. J. Humphrey, Esq., Walton Leigh, Addlestone (gr. Mr. Barleycorn).

Class 111. Comte de Lamy. First, 7*s*., R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 5*s*., J. Hargreaves, Esq. (gr. Mr. Turton); third, 3*s*., Col. Archer Houblon (gr. Mr. Ross).

Class 112. Conference. First, 7*s*., Messrs. T. R. Rivers & Son; second, 5*s*., J. W. Melles, Esq., Chingford (gr. Mr. J. Nicholson); third, 3*s*., R. Leigh, Esq. (gr. Mr. Geo. Woodward).

Class 113. Maréchal de la Cour. First, 7*s*., R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 5*s*., Mrs. Hulse, Carshalton; third, 3*s*., Mrs. Crawford, Gatton (gr. Mr. Slowgrove).

Class 114. Doyenné du Comice. First, 7*s*., Sir Mark Collet, Bart. (gr. Mr. Potter); second, 5*s*., Lord Suffield, Norwich (gr. Mr. Allan); third, 3*s*., Viscount Gage, Lewes (gr. Mr. Helman).

Class 115. Durondeau. First, 7*s*., R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 5*s*., Sir Mark Collet, Bart. (gr. Mr. Potter); third, 3*s*., Lord Suffield (gr. Mr. Allan).

Class 116. Emile d'Heyst. First, 7*s*., R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 5*s*., Lord Suffield (gr. Mr. Allan); third, 3*s*., Mr. Berwick.

Class 117. Fondante d'Automne. First, 7*s.*, G. W. Dawson, Esq. (gr. Mr. Heston); second, 5*s.*, Mr. W. Tayler; third, 3*s.*, Mr. W. Fife.

Class 118. Glou Morceau. First, 7*s.*, Lord Suffield (gr. Mr. Allan); second, 5*s.*, Sir Mark Collet, Bart. (gr. Mr. Potter); third, 3*s.*, R. Leigh, Esq. (gr. Mr. Geo. Woodward).

Class 119. Josephine de Malines. First, 7*s.*, R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 5*s.*, Mr. J. Hill, Babraham Hall Gardens, Cambridge; third, 3*s.*, H. C. Moffatt, Esq.

Class 120. Louise Bonne of Jersey. First, 7*s.*, Messrs. T. R. Rivers & Son; second, 5*s.*, Mr. J. Hill; third, 3*s.*, H. C. Moffatt, Esq. (gr. Mr. Spencer).

Class 121. Marie Louise. First, 7*s.*, T. B. Haywood, Esq., Woodhatch, Reigate (gr. Mr. Salter); second, 5*s.*, Mr. C. Chard, Bygrove House Gardens, Clapham Park; third, 3*s.*, J. Hargreaves, Esq. (gr. Mr. Turton).

Class 122. Nouvelle Fulvie. First, 7*s.*, H. C. Moffatt, Esq. (gr. Mr. Spencer); second, 5*s.*, Mr. G. Fennell; third, 3*s.*, Duke of Northumberland (gr. Mr. Wythes).

Class 123. Pitmaston Duchess. First, 7*s.*, Lord Suffield (gr. Mr. Allan); second, 5*s.*, Capt. Harcourt Rose; third, 3*s.*, Mr. W. A. Cook, Calne, Wilts.

Class 124. Souvenir du Congrès. First, 7*s.*, Col. Archer Houblon (gr. Mr. Ross); second, 5*s.*, Messrs. W. & E. Wells (gr. Mr. Thomson); third, 3*s.*, Messrs. de Rothschild (gr. Mr. Hudson).

Class 125. Thompson's. First, 7*s.*, Lord Suffield (gr. Mr. Allan); second, 5*s.*, Mr. H. Berwick; third, 3*s.*, G. W. Dawson, Esq. (gr. Mr. Heston).

Class 126. Triomphe de Vienne. First, 7*s.*, R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 5*s.*, G. W. Dawson, Esq. (gr. Mr. Heston).

Class 127. Winter Nelis. First, 7*s.*, Capt. Harcourt Rose (gr. Mr. Cotterell); second, 5*s.*, Mr. Garraway; third, 3*s.*, T. B. Haywood, Esq. (gr. Mr. Salter).

Class 128. Any other variety. First, 7*s.*, Mrs. Hulse (gr. Mr. Sclater), for "General Todleben"; second, 5*s.*, Mr. H. Berwick, for "Brockworth Park"; third, 3*s.*, Mrs. Crawford (gr. Mr. Slowgrove), for "Doyenné Boussoch."

Division V.—Dried Fruits, not preserved in Fluid or Sugar.

Class 129. Collection of Dried Fruits. Silver Gilt Medal Mr. W. A. Trotter, The Gardens, Broomboro' Place, Ledbury.

Class 130. Apples, sliced, 1 lb. weight. First, 15*s.*, Mr. W. A. Trotter; second, 10*s.*, Colvile Browne, Esq., Horticultural College, Swanley.

Class 131. Apples, whole, 1 lb. weight. First, 15*s.*, Mr. W. A. Trotter.

Class 132. Plums, whole, 1 lb. weight. First, 15*s.*, Mr. W. A. Trotter.

Class 133. Cherries, whole, 1 lb. weight. First, 15*s.*, Mr. W. A. Trotter.

Class 134. Six varieties of Hardy Fruits, grown in the open air, two gallons of each, at least two kinds of fruit must be represented. Open to *bonâ fide* market growers only. Presented by the Worshipful Company of Gardeners. First, £3, Mr. A. Wyatt, Hatton, Middlesex.

Class 135. Ten bushels (42 lbs. each) of Cooking Apples, of one variety, and ten half-bushels (20 lbs. each) of Dessert Apples (of one variety), packed for market; packages at discretion of exhibitor, provided that each contains the weight of fruit specified above. Particulars of the trees, soil, system of culture, method of packing and grading employed, and the acreage of Apples grown by the exhibitor to be stated on a card or cards placed on the packages. Open to *bonâ fide* market growers only. *See Note below.* Presented by Messrs. Monro & Co. and Messrs. Webber & Co., Covent Garden salesmen. First, £5, Mr. G. Tebbutt, Mogden, Isleworth.

Class 137. The best packed basket (or other package) of Grapes, 12 lbs. weight of fruit, received by rail. First, £2, Mr. J. Gore, Polegate, Sussex; second, £1, Sir J. W. Pease, Bart. (gr. Mr. McIndoe); third, 10*s.*, Mr. C. Cooper, The Vineries, Sunninghill, Ascot.

Class 138. The best packed box (or other package) of Peaches, twenty-four fruits, received by rail. First, £1, R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 10*s.*, R. Sneyd, Esq., Keele Hall, Stafford (gr. Mr. Wallis); third, 5*s.*, A. J. Howard, Esq. (gr. Mr. Pentney).

Class 139. The best packed box (or other package) of Ripe

Pears, twenty-four fruits, received by rail. First, £1, R. Leigh, Esq. (gr. Mr. Geo. Woodward); second, 10*s*., Mr. Garraway; third, 5*s*., Mr. J. Clarke, Albion Nursery, Farnham.

Note.—In Classes 135 to 139 the "grading," "packing," "packages" and their "cost" will be taken into account by the Judges. In Classes 137, 138, 139, the fruit must have travelled at least 20 miles by rail. It must be directed *Secretary, R.H.S., Crystal Palace, Sydenham*, and be plainly marked "Packing Competition"; it should be timed to reach the Palace on Friday, September 28.

Class 140. Packages, superior to the ordinary bushel and half-bushel baskets, for the carriage of Apples, either by rail or road. The packages must be shown of two sizes, one holding 42 lbs., the other 20 lbs. of fruit, and their cost must be stated. Open. Prize offered by Messrs. Monro & Co. and Messrs. Webber & Co., Covent Garden salesmen. Prize, £2, Mr. Savage, Peckham.

Class 141. The best collection of Fruits, Nuts, Grains, Seeds and Pulses, to illustrate their value as foodstuffs. In this class only it is not necessary that all the exhibits should be of British growth, or have been grown by the exhibitor; two of them must have been so grown, and weight will be given to the most home-grown collection. Every variety shown must be named, and the place of its growth indicated as correctly as possible. Given by the Vegetarian Federal Union, of the Memorial Hall, Farringdon Street. First, £7, C. Lee Campbell, Esq. (gr. Mr. Wright).

Miscellaneous Exhibits.

Silver Gilt Knightian Medal.

Awarded to Her Majesty the Queen (gr. Mr. O. Thomas) for a collection of fruit.

To Messrs. J. Veitch & Sons, Chelsea, for a collection of fruit.

To Messrs. J. Laing & Sons, Forest Hill, for a collection of fruit.

Silver Knightian Medal.

To Messrs. Spooner & Sons, Hounslow, for a collection of fruit.

Silver Banksian Medal.

To A. Weir, Esq., Bendarroch, Ottery St. Mary, Devon, for examples of a new system of packing.

To Messrs. C. Lee & Son, Ealing, for a collection of fruit.

To Messrs. Peed & Son, Roupell Park, Norwood Road, S.E., for a collection of fruit.

To Messrs. G. Paul & Son, Cheshunt, for a collection of fruit.

To the Hereford Fruit and Rose Company, Hereford, for a collection of fruit.

Bronze Banksian Medal.

To Messrs. Gaymer & Sons, Attleboro', Norfolk, for a collection of Apples selected for cider.

To Messrs. Cutbush & Son, Highgate, for a collection of fruit.

Special Vote of Thanks.

To the Superindendent, Mr. A. J. Brown, Chertsey Boys' Home, Chertsey, for a collection of Apples and Pears.

Besides the fruit staged for prizes, there was almost as much, if not more, sent for exhibition alone, not for competition, to which the medals immediately preceding were awarded.

By command of Her Majesty the Queen, Mr. Owen Thomas, Chief of the Royal Gardens, Windsor, exhibited a magnificent collection containing Apples, Pears, Pines, Grapes, Melons, Plums, Tomatos, Peaches, and Nectarines. The Pears shown included Beurré d'Amanlis, Pitmaston Duchess, Doyenné Boussoch, Louise Bonne of Jersey, Madame Treyve, Durondeau, and others. Amongst the Apples were Bramley's Seedling, Frogmore Prolific, Wellington, Peasgood's Nonesuch, Golden Noble, Flower of Hants, and Ribston Pippin. The Frogmore selected Tomatos were very beautiful, and the Pines were very fine.

With respect to this beautiful exhibit, sent by the kindness of the Queen, it may be as well to emphasize the point that it was distinctly *not for competition*, because a fanciful report was published in one of the society papers to the effect that the Queen had won "the First Prize," much to the disgust of the other competitors, who wished they had the same means at command as Her Majesty has. It is needless to say the report was a mere flight of fancy, probably created by the desire to supply something sensational at the cost of the chief lady in the land. The kindness of Her Majesty was most heartily appreciated by the President and Council, who recognised it in the only way in their power—by an address of thanks, and by the award of a medal according to the excellence of the fruit in the Judges' opinion.

A very fine collection was sent by Messrs. Jas. Veitch & Sons,

Royal Exotic Nursery, Chelsea, consisting of 170 dishes of Apples and 150 dishes of Pears. Specially fine amongst the Apples were Peasgood's Nonesuch, Sandringham, Stirling Castle, Blenheim Orange, King of the Pippins, Duchess' Favourite, Colonel Vaughan, Worcester Pearmain, Hollandbury, Dumelow's Seedling, Potts' Seedling, Alexander, Cox's Pomona, Washington, Winter Hawthornden, Lord Derby, Tower of Glamis, Lord Grosvenor, Bramley's Seedling, and Ecklinville. The Pears included Brockworth Park, Marguérite Marillat, Dr. Hogg, Gansell's Bergamot, Seckle, Doyenné Boussoch, Fertility, Magnate, Beurré Clairgeau, Beurré Baltet père, Triomphe de Vienne, Grosse Calabasse, Louise Bonne of Jersey, Doyenné du Comice, Pitmaston Duchess, Beurré Superfin, Maréchal de la Cour, Souvenir du Congrès, Beurré Hardy, and Flemish Beauty. A few of the later varieties of Plums, Damsons, Raspberry Superlative, and the two Blackberries Wilson Junior and Laciniatus were also shown.

Messrs. J. Laing & Sons, Forest Hill, sent a splendid collection of 250 dishes of Apples and Pears. Amongst the Apples we may mention Lord Suffield, Cellini Pippin, Stirling Castle, Peasgood's Nonesuch, Potts' Seedling, Bismarck, Hollandbury, Scarlet Pearmain, Mère de Ménage, New Hawthornden, Red Beitigheimer, and two little known varieties, Nouvelle France and Takapuna Russet. And amongst the Pears were Louise Bonne of Jersey, Marguérite Marillat, Beurré Clairgeau, Pitmaston Duchess, Marie Louise d'Uccle, Maréchal de la Cour, Beurré Bosc, Duchesse d'Angoulême, and the little known varieties, Le Lectier, Président Drouard, Madame Chaudy, and La France.

Archibald Weir, Esq., of Ottery St. Mary, Devon, sent a most interesting exhibit of cases, some packed and some empty, illustrating his improved system of packing choice fruits.

Messrs. Charles Lee & Son, Hammersmith, sent a good collection of Pears, including Brockworth Park, Beurré d'Amanlis, Souvenir du Congrès, Vicar of Winkfield, Beurré Superfin, Maréchal de la Cour, Beurré Hardy, and Doyenné du Comice.

Messrs. S. Spooner & Sons, Hounslow, sent an interesting collection of Plums, Apples, and Pears. Of Apples, Stirling Castle, Colonel Vaughan, Royal Russet, Councillor, Lord Suffield, Golden Spire, Bismarck, Grenadier, Hollandbury, Duchess' Favourite, Warner's King, Potts' Seedling, Ecklinville, and

Manks Codlin were very fine; and amongst the Pears Durondeau, Beurré Clairgeau, Marie Louise d'Uccle, Mary Louise, Beurré Diel, Pitmaston Duchess, and Glou Morceau were very good. Rivers' Monarch Plum was also finely shown.

Messrs. Paul & Sons, The Old Nurseries, Cheshunt, contributed a large collection of Apples and Pears. The fruit was of excellent quality; but, as is usually the case, lacking in colour to that grown on the south side of London. Among the Apples in this contribution Warner's King, Peasgood's Nonesuch, Ribston Pippin, Lord Suffield, Gold Medal, Tower of Glamis, Stirling Castle, Cox's Pomona, Lord Derby, Frogmore Prolific, and Duchess of Oldenburg, and a little known variety Transparent de Crousels. Of Pears, Louise Bonne of Jersey, Vicar of Winkfield, and Marie Louise were noticeable.

The English Fruit and Rose Company, King's Acre Nurseries, Hereford, sent a fine collection of 170 dishes of Apples and Pears. Amongst the former Lord Suffield, Colonel Vaughan, Royal Codlin, Cellini, Gascoyne's Seedling, Lady Sudeley, Wealthy, Warner's King, Peasgood's Nonesuch, Potts' Seedling, Yorkshire Beauty, Duchess' Favourite, Grenadier, Ecklinville Seedling, and Tom Putt were the best; the Pears being admirably represented by Doyenné du Comice, Beurré Superfin, Durondeau, Gratioli de Jersey, and Beurré d'Amanlis.

Arranged on one table was a very large collection of Apples and Pears grown by Messrs. J. Peed & Son, Mitcham Road, Streatham, S.W. This contribution included a hundred distinct varieties of Apples and fifty varieties of Pears. The best included Peasgood's Nonesuch, Worcester Pearmain, Cox's Pomona, Lady Henniker, Frogmore Prolific, Gold Medal, Golden Spire, Bismarck, Kentish Fillbasket, Newton Wonder, Ringer, and King of Tomkins County. Amongst the Pears were Marguérite Marillat, Pitmaston Duchess, Flemish Beauty, and King Edward.

Messrs. W. Thomson & Sons, Tweed Vineyards, Clovenfords, sent some fine Grapes, including a bunch of Gros Colmar, $4\frac{3}{4}$ lbs. in weight, with berries $4\frac{1}{2}$ inches in circumference.

The Committee of the School of Handicrafts for Boys at Chertsey showed a collection of forty-five varieties of Apples and Pears, most of which, though small, from an exhibition point of view, did great credit to the institution.

A collection of cider Apples came from Messrs. Gaymer

& Son, Banham, Norfolk, who also exhibited various dishes of Pears.

From the Society's gardens at Chiswick came a small collection of eighty-five varieties of Apples, all distinctly labelled and true to name, thus forming a standard of reference.

Mr. J. Clarke, Farnham, sent a very interesting exhibit of twenty-seven bunches of Grapes, all of which had, it was stated, been grown without any artificial heat, a wonderful thing for so cold and ungenial a summer as that of 1894. The varieties included Alicante, Alnwick Seedling, Gros Colmar, and Lady Downe's, besides others.

The Judges.

The following gentlemen very kindly acted as Judges on this occasion, and the best thanks of the Society are due to them for their labours: H. Balderson, W. Bates, Geo. Bunyard, T. Camp, J. Cheal, J. Cranston, A. Dean, W. H. Divers, J. Douglas, M. Dunn, T. Glen, W. J. Grant, J. Hudson, W. Iggulden, W. Jefferies, Peter Kay, F. Q. Lane, H. Markham, J. McIndoe, J. McKenzie, G. T. Miles, E. Molyneux, G. Norman, G. Paul, A. H. Pearson, T. F. Rivers, C. Ross, O. Thomas, A. Turner, J. Walker, J. Watkins, J. Willard, A. Weir, J. Wright, and Geo. Wythes.

The Luncheon.

It was most gratifying to see the large number of persons who responded to the invitation for holding a gardeners' luncheon in connection with the Show. It was held at 1.30 o'clock on Saturday, the 29th, in the dining-room attached to the Garden Hall. T. B. Haywood, Esq., presided, and was supported by many well-known fruit growers as well as by gardeners, both amateur and professional, to the number of about 110.

After the toast of "The Queen" had been duly honoured, Mr. G. Bunyard proposed "The Crystal Palace Company," coupled with the name of Mr. Biggs. In doing so he said there was no better place in the world for holding such a grand horticultural exhibition as that which they had that day.

Mr. Biggs, one of the Directors, briefly responded on behalf of the Company, and reminded those present that the Crystal Palace was a great educational institution, and he ventured to hope that the present magnificent fruit show was the first of many successive ones.

Dr. Masters proposed the toast of "The Royal Horticultural Society," and remarked that he thought everyone present would admit that the authorities of the Royal Horticultural Society were deserving of their best thanks for providing such an exhibition. Twice in that week they had held exhibitions and conferences, that at Chiswick, however, taking place under most depressing circumstances. On this occasion a splendid show was held in a magnificent building, and in wet or fine weather the Royal Horticultural Society always does its duty alike. If the Society did not always do what the public or its Fellows thought should be done, it was not always the fault of the authorities. He thought they ought not to part before sending a telegram to the Rev. W. Wilks, whose absence through illness they so much deplored, informing him of the success of the Show.

Mr. Philip Crowley, Treasurer of the Society, in responding, observed that the Royal Horticultural Society was at present in a very satisfactory financial condition. Since its foundation ninety years ago it certainly had seen some ups and downs, and at one time it appeared to be about to merge into oblivion. Happily, however, matters had changed for the better, and there were now nearly 3,500 Fellows, 2,000 of whom had been elected during the past four or five years. The periodical meetings held at Westminster were very creditable indeed, and the Temple Show of this May eclipsed those held in previous years. The present Fruit Show at the Crystal Palace he regarded as a magnificent one, there being exhibitors from all parts of the kingdom. At Chiswick the trial of vegetables and other useful work was being carried on, and the *Journal* of the Society had reached large dimensions.

Mr. J. T. Bennett-Poë briefly gave "The Judges," thanking them for the very valuable services which they were at all times so ready and willing to freely give to the Society.

Mr. Owen Thomas responded, remarking on the general

excellence of the fruit shown at the exhibition, which he said could nowhere, he believed, be excelled.

Mr. A. H. Pearson proposed "The Press," which was responded to by Mr. Ranger Johnson, F.R.H.S., of the *Morning Post*.

CONFERENCE.

Saturday, September 29, 1894.

The Chair was taken by Mr. James Douglas, F.R.H.S., at 3.30 p.m.

Mr. Bunyard, when called upon by the Chairman, said that the paper which he was about to read professed to have been prepared by himself and the Rev. W. Wilks, Vicar of Shirley and Secretary of the Society, whose absence through severe illness no one regretted more than himself. But he wished it to be quite plainly understood that, though the paper was in a sense a joint paper, yet it was only so in the sense that Mr. Wilks had done the lion's share and he had contributed the tail.

HARDY FRUITS FOR SMALL GARDENS.

By the Rev. W. Wilks, M.A., Vicar of Shirley, Surrey; Secretary of the Royal Horticultural Society: and Mr. George Bunyard, F.R.H.S., The Nurseries, Maidstone.

The three subjects selected for discussion on the afternoons of this Exhibition of British-grown Fruit were not hastily determined. In thinking of the many points connected with fruit-growing, to which it would be well to draw attention, or on which the general public required authoritative information, it was considered that Fruit-growing, both for Cottagers and in tiny gardens, had been sufficiently covered for some years to come by that admirable little pamphlet published by our Society at the price of one half-penny, entitled "Fruits for Cottagers"—a special edition being

also published for Scotland and the northern counties of England. It was thought, again, that fruit-growing in *large* private gardens hardly required discussion, as by far the greater number of such gardens are so admirably cultivated, and the selection of their fruit stock has been made with such judgment, and as the result of such long experience, that as a body the heads of such establishments require no information or word of advice from us, but rather are themselves the sources of much of that knowledge which our Society endeavours from all sides to collect in order to diffuse and utilise it for the general welfare of the nation.

The subjects of Railway Rates, Public Markets, and Tenants' Holdings were in turn considered, only to be set aside for the present in favour of the two more practical and more generally interesting ones of (1) "Small Gardens" and (2) "Growing for Market" (for our third day's discussion on "Sorting, Grading, Marketing, &c.," is the necessary pendant upon "Growing for Market"), and on these two subjects we know from almost daily experience at the Society's office that further information will be gladly welcomed by many.

What, then, do we intend by the term "small gardens," as distinguished from "cottagers' gardens" and "large gardens"? We mean gardens in which from half an acre to an acre and a half is set apart for fruit and vegetable culture. Terms are always relative, and to dwellers in towns even half an acre of such garden will seem "large," whilst to the head of a really large garden half an acre would seem all too small for Strawberries and Raspberries alone. Therefore, simply for the sake of convenience, we will call gardens under half an acre "tiny gardens," and those which have more than an acre and a half of kitchen-garden "large gardens," and all the intermediate sizes "small gardens."

Now if fruit is to be grown to any reasonable extent in a small garden at all—if, that is, the gardener is expected to furnish the dinner-table with relatively as much of fruit as he does of vegetables—then rather more than half the space at his disposal should be devoted to it. Owners very often do their gardeners a great injustice from this cause. They (or the cooks, who in England are so fearfully wasteful of vegetables) demand an enormous supply of vegetables for the house—far more than is

really needed—so that three quarters of the garden, and of the labour and attention, has to be given up to them, and then the owners grumble at the gardener because they get so very little fruit. Let me lay this down, then, as an axiom, that if you want fruit and vegetables in proportionate quantities for the table you must see that the total space set apart for fruit is never less than half the garden. Many people I know will say, "We don't want them in proportionate quantities. We *must* have the vegetables; the cooks won't do without them; the fruit is more of a luxury, and so we must be satisfied with a little, rather than have fewer vegetables." Well and good. If such be your wish tell the gardener so, but don't blame him afterwards because "We get so little fruit." One thing at least let me urge, viz. that the growth of Potatos should be strictly limited, and the extra space given up to fruit. A few Ashleafs for early Potatos is all, I think, that should be grown. The main stock and supply can be bought nowadays at a relatively cheaper price than they can be grown in such a garden as we are speaking of.

Another way in which a great economy of space can be made in small gardens is by planting standard Apples and Plums and early Pears (if they are wanted) and Cherries (if the birds will let them ripen) in the pleasure-garden. An Apple-tree planted in front of a couple of Evergreen Oaks and surrounded with an undergrowth of Rhododendrons or Laurestinus, &c., will make a lovely picture, worthy of any gentleman's garden. Or a half-standard Apple, with the lower branches encouraged at first so as to sweep down upon the turf, is quite as pretty as nine-tenths of the lawn-trees that one sees. *Yellow Ingestre* makes a charming lawn Apple on account of its beautiful drooping habit. A standard *Williams' Bon Chrétien* on the Pear stock (if an early Pear be wanted) will make a by no means unlovely object. *Beurré d'Amanlis* and *Jargonelle* are both of handsomer foliage, and have much finer flowers than *Williams' Bon Chrétien*, but the flavour of *Amanlis* is not equal to *Bon Chrétien*, and *Jargonelle* so very quickly rots.

Plums and Cherries will also clothe the garden with a wealth of blossom in the spring, quite as beautiful as many of our so-called ornamental trees, besides providing a wealth of fruit in the autumn and adding immensely to the general interest of the pleasure-garden. A Mulberry and a Medlar, if

they are had at all, should certainly be on the lawn—the foliage of the Mulberry and its peculiar growth making it a good contrast to almost all other trees, and the massive white blossoms of the *Large Dutch* Medlar and the glorious tints of its foliage in autumn mark it out as a desirable ornamental tree without considering its fruit, whilst its drooping habit renders it not unfitted to cover a low summer-seat.

Roughly speaking, I should say that every third tree in any pleasure-garden might, without any disfigurement or lessening of the general effect, be a fruit-tree. It need hardly be said that all fruit-trees in the ornamental garden should be grown on the extension system, *i.e.* be pruned but sparingly, the leaders of all the branches being allowed almost free play, cutting back only to balance the head when young, the side shoots being clean cut out to a couple of buds if the inner growth appears too dense.

Where the lie of the ground permits and there is space sufficient, it is a good plan to lay out a tiny orchard of 10 to 14 standard trees between the lawn and the kitchen-garden. The size of the plot of ground should be so arranged as to leave a distance of 20 feet between the line of the stems of the outside trees and the path or lawn adjoining. On those sides of this plot which face the house or lawn, and at a distance of 8 or 10 feet from the stems of the fruit-trees, plant a belt of Rhododendrons or other low-growing bushy evergreen shrubs, and then between the shrubs and the path or lawn you have ample space for a grand wide border of herbaceous plants, interspersed with Dahlias, &c., in the summer. Such a tiny orchard is a lovely object to look upon from the house in spring, the fruit-trees wreathed with blossoms pink and white, bending down as it were to meet the dark-leaved Rhododendrons half-way, while in autumn the burden of Apples and Plums makes a far from uninteresting background to the broad band of Phloxes, Pentstemons, Dahlias, Sunflowers, and Michaelmas Daisies below them; in fact the whole forms a natural trophy sufficient to inspire a poet with the theme of Flora half-reclining on the turf and Pomona stooping down to kiss her sister goddess on the brow.

We turn now to the *kinds* of fruits to be grown and the varieties of each to be preferred. The kinds will, of course, be dependent on the likes and dislikes of the household, and every

gardener should be prepared at once to conform to his employer's tastes. I was once told of a household where none of the family liked Strawberries, and only a day or two ago I heard a young lady say, when pressed a second time to take a piece of Pine-apple, "But, indeed, I don't like it a little bit." It would be folly in such case to grow Strawberries or Pines. Hence it is impossible to lay down any hard-and-fast rule as to what kinds of fruit should be grown in a small garden and what not. Each case must be settled by itself.

In the same way the *proportion* of the various kinds to one another will depend to a great extent on the preferences of each household. When I came to my present garden I found fifty Red Currant bushes, occupying even more ground than was devoted to the Raspberries; and as I hold very strongly the peculiar notion that Red Currants were invented for only two reasons, viz. (1) Currant jelly, with haunch of venison or mutton, and (2) to utterly spoil Raspberry pies, I at once reduced their number to ten, amply sufficient to make jelly, and increased the proportion of the Raspberries, which to my mind are, after Apples, the best cooking fruit we have. Some people, again, love Quinces and Medlars, while others positively dislike both.

So that both the kinds themselves and the proportionate breadths devoted to each can only be decided after consulting the preferences—likes and dislikes—of the household. This, however, will be true in ninety-nine cases out of a hundred, viz. that Cooking Apples are by far the most important fruit crop in the garden. And setting aside individual cases, the order of relative importance, from a household point of view, will probably be nearly this, viz.: 1, Cooking Apples; 2, Cooking Plums; 3, Gooseberries; 4 Strawberries; 5, Raspberries; 6, Red Currants; 7, Dessert Apples; 8, Dessert Plums; 9, Cherries; 10, Black Currants; 11, Dessert Pears; 12, Stewing Pears; 13, Medlars; 14, Quinces; 15, Mulberries. I know that a very large number of amateur gardeners will exclaim with horror at my putting Dessert Pears so low down in the scale, but I do so after the utmost consideration, being convinced that, whatever may be the opinion of those many amateurs who make a hobby of Pears (of whom I myself am one), the housekeepers would by a large majority declare that they could more easily do

without Pears than any other of the fruits which I have placed above them. I will, therefore, say a few words on each kind of fruit in the order I have suggested. I do not intend to speak of Peaches, Nectarines, or Apricots, which, though in a sense hardy in the South of England, are to my mind far better grown in an orchard-house,* if grown at all in a small garden, and the wall-space they would otherwise occupy devoted to Pears and Plums.

Before, however, speaking of the different fruits individually, let me enunciate what seems to me to be another general axiom for deciding on the varieties of each kind to be grown. In my opinion the very reverse holds good in small gardens to what should obtain in growing fruit for market. Growers for market should plant as few varieties of any kind of fruit (in reason) as possible, in order that they may be able to place a large quantity at a time of one variety upon the market, and so lessen expenditure and labour, and get a better price too, than for comparatively little parcels of a number of different varieties. In small gardens, however, where all that is grown is intended for the one household's consumption, almost the exact opposite (again in reason) should be the rule, in order that there may always be a constant supply of each fruit in its season, and not superabundance at one time and scarcity at another. It is better, therefore, if needs be, to plant an inferior variety which ripens earlier or later than one we already possess, than a superior one which ripens at exactly the same time. Bearing this, then, well in mind, and also that throughout this paper I am speaking of a "small garden," and contemplating an ordinary household with no special hobbies, likes or dislikes, we will proceed to consider each kind of fruit in turn.

1. *Apples for Cooking.*—In such a garden, *i.e.* from half an acre to an acre and a half of combined kitchen garden and orchard, there should be from five to eight Cooking Apples, some as standards in the tiny orchard patch or elsewhere, and one or two as bush-trees on or about the lawn, and allowed to grow freely into a large head. Great care should be taken in selecting the varieties, so that the whole Apple season from the middle of September to the end of March may be duly covered. For the

* For an article on "Orchard-house Trees" see *R.H.S. Journal*, Vol. XV., p. 251.

earliest choose either *Potts' Seedling*, *Ecklinville*, *Grenadier*, or *Lord Grosvenor*. Either of these will serve for September and half of October. I do not think earlier Apples than these are needed, as windfalls will supply abundance of Cooking Apples during the last half of August and the beginning of September. For your second Apple, from mid-October to December, choose *Warner's King* (which makes a very pretty graceful half-bush half-tree upon the lawn, if planted in bush form and allowed to extend) or *Stirling Castle*. For the third or Christmas Apple have either *Tower of Glamis*, *Waltham Abbey*, or, if you do not mind waiting a few years, *Blenheim Orange*, which, although it does not bear in a young state, is excellent either for cooking or dessert. The fourth, to carry you well through January, should be *Lane's Prince Albert* in bush form, or as an alternative *Wellington* (a grand Apple where it does well, but on my light soil it is one mass of canker) or *New Northern Greening*, though this is said to split and spot on some soils. The fifth, for February and March, should be either *Bramley's Seedling*, *Newton Wonder*, or *Alfriston*. If you can manage a sixth, have *Bismarck* or *Golden Noble*, either of which makes a very pretty small standard tree, and would help your second Apple to fill up November and December. For seventh I would have a second out of the three I have named for the fifth place, so as to make sure of late-keeping Apples; and if an eighth be possible, *Lord Derby* (in bush form), which is perhaps the loveliest of all Apples when in bloom, would be sure to be acceptable, and come into use between your first and second. I would strongly, very strongly, urge eight varieties (in my own garden I have ten), and if you can possibly manage a ninth try *Annie Elizabeth*, the latest Apple of all, which keeps good up till May. In this way, except for spring frosts, which no forethought can avoid, you should have Apples the whole season through.

It must be borne in mind, however, that Apples require well-gathering and well-keeping. It is impossible to say exactly when any one variety will be fit to gather; it varies so with varying seasons that to name a date would mislead as often as it guided aright. They must be watched and tried from time to time from the beginning of September onwards, and when they part easily from the tree then they are fit to pick.

In gathering, the fruits must be handled very carefully; no tumbling them into baskets, and no shooting them from one

basket into another. Each fruit should be deliberately *placed* in the smaller basket used for gathering, and transferred (if needs be) from it by hand carefully into a larger basket or, better still, big tray, and thence again transferred by hand on to the store shelf. What are known as "trug baskets" or "bodges" are far better than wicker baskets, which are themselves apt to indent and bruise the fruit. All bruised and diseased fruits should be put aside with windfalls for immediate use, and should never on any account be stored with good ones for keeping. The Apple-store (if there be no proper* fruit-room) should be in a shed as equable in temperature as possible, not exposed to hot sun or to extreme cold. Facing north or east is best. A light thatch put on over (outside) the roof and sides, and refreshed every third year or so, is an admirable way of converting a common shed into a very fair fruit-store. There should be no window, and the door must shut very closely. Inside it should be entirely surrounded with tiers of open shelves, not solid, but made of strips of wood about a third of an inch apart to admit free circulation of the air. The Apples should be laid stalk downwards upon these shelves, preferably a single layer only upon each, but never more than three Apples deep, all being placed carefully in position one by one. A little extra care in this way will be a thousandfold repaid. Each variety should be kept by itself, and plainly labelled, and a look should be given every now and then over the different shelves, and any fruits showing symptoms of decay removed at once.

2. *Plums for Cooking.*—Of these five will perhaps suffice, though I should prefer seven. *Rivers' Early Prolific*, ripe the first week in August, one of the finest-flavoured Plums known, should be in every garden. The next, for mid-August, should be *The Czar*. For the third, at end of August, choose either *The Sultan* or *Belgian Purple*. For the fourth *Victoria* should certainly be chosen. I have never known it fail, and it almost always gives quite a heavy crop requiring to be thinned, and the thinnings make excellent green plum jam about the second week in August. For the fifth, to use in the middle and towards the end of September, take either *Pond's Seedling* or *Monarch*. Then I would, if possible, add a tree of Damson, either *Farleigh*, or *Bradley's King* which is grand in the last days of September, and one of

* For particulars of a good fruit-room see p. 145.

Shepherd's Bullace, which, after the light frosts of early October, cooks splendidly and makes very toothsome jam.

Wherever bullfinches abound a very sharp look-out should be kept with a gun over the Plums from early in February till they have done blooming, or the handsome red-breasted and black velvet-capped gentlemen will strip the branches of almost every single bloom-bud. For this reason it is well to plant the Plums as near the house as possible, as bullfinches are generally a little shy at coming near to traffic.

3. *Gooseberries.*—I am not at all sure I ought not to have put these before Plums, they are so very valuable where there is a family, and to an unjaded palate the ripe fruit is delicious. It is astonishing to me why this fruit should of late years have been so much neglected! How many bushes there should be it is hard to say—there can scarcely be too many; twenty-five to forty at least, considering their twofold use for cooking and dessert. There are so many good varieties that I almost hesitate to name any, but every collection should include *Whitesmith*, *Bobby*, *Crown Bob*, *Pitmaston Greengage*, *Whinham's Industry*, *Keepsake*, *Early Sulphur*, *Warrington*, *Leader*, *Broomgirl*, and *Leveller*. Three bushes of each of the first three named and two each of the others would make a good twenty-four, but so fond am I personally of Gooseberries, and so wholesome are they, that I would recommend a still larger number.

In gathering Gooseberries green for cooking, either a small plantation of *Whinham's Industry* or *Keepsake* (or of both) should be grown specially for the purpose, or else care should be particularly taken that all the bushes be thinned, and not entire bushes stripped at a picking. Indeed, even if a special plantation be grown for cooking, it is better to take a few from each bush when any are wanted than all from one.

Gooseberries are often planted singly along the paths of the kitchen garden, but in many country places the birds would not leave us a single berry unless the bushes are netted both from the time of pruning till the blooming is over, and then again when the fruit is ripe. We, therefore, prefer to grow them in a patch for ease of netting. Lines of flat-trained bushes in hedge form are recommended, as they are so easily netted, but I have personally no experience of them. Very early fruit can be had by planting cordons on a south or west wall, *if it is to spare*,

whilst late fruit may be had in the same way on walls facing east or north.

Those who are really fond of Gooseberries would do well to try them as Cordons, trained upon fences like espalier Apples and Pears, or in lines of not less than 5 feet apart. Any inner fence might well be covered with cordon Gooseberries. This is the mode of culture to make the most of the ground. Strawberries could be grown between lines of Gooseberries, thus economising also the netting in use.

4. *Strawberries.*—These, like Gooseberries, must in the country be netted before they begin to colour, or the birds will not leave one to ripen, and so they, too, are better planted in beds, and not as a sort of edging to the paths, as is so often seen. In order really to supply a family with Strawberries, a good-sized piece of ground must be devoted to them. You should have at least 350 plants, better still 500; but unless you have a hobby for trying new varieties, only three, or at most four, need be grown, but as to what they should be opinions would greatly differ. For a light soil do not hesitate to plant *Vicomtesse Héricart de Thury* for the earliest; my experience of the earlier sorts on light soil has been distinctly disappointing. For the next gathering *President* is invaluable, but a new one called *Royal Sovereign* may perhaps supersede it. My third would be *Countess*, in my opinion a grand Strawberry, but too little known; the berries are not very large it is true, but it is a fine cropper and of glorious flavour. The latest I care to have is either *Gunton Park* or *Lord Suffield*. I have never grown Strawberries on a heavy soil, but I am much mistaken if the same selection of varieties would not be best on it as well, adding, perhaps, for an early crop a few of *Noble*, which certainly has some flavour on clay lands, and for a late crop *Latest of All* or *British Queen*. If other varieties are wanted, *Lucas*, *Georges Lesuir*, and *Filbert Pine* are all first-rate. A new Strawberry called *Empress of India* has lately been introduced; on my light soil it is a bad doer compared with its two fine brethren *Lord Suffield* and *Gunton Park*, but its flavour is quite wonderful. It is well worth trying on at all heavy soils. *Waterloo* is a fine wet-weather Strawberry, but to my mind its dark livid colour is greatly against it.

5. *Raspberries.*—It is difficult to say exactly how much

space should be devoted to this most useful fruit, but for such a garden and family as I am contemplating a line of 100 or 120 yards in length will not be too much, and this should, of course, for facility of netting from the birds, be broken up into several shorter lines 6 feet apart. It is a great saving of space to plant Raspberries in lines (not in clumps); it makes them easier both to support and gather. The best method of support is to strain two or three stout wires from end to end of each row and tie the canes up to them. Many people are hardly aware of how many varieties of Raspberries there are, but *Red Antwerp* is still the best for flavour, though, considering the size and prolific bearing of *Superlative*, it is, I think, to be preferred, and in flavour it is not far behind *Red Antwerp*. It might be well to grow half of each, and use *Superlative* for cooking, and for dessert when *Red Antwerp* is over. Other good kinds are *Carter's Prolific*, and *Norwich Wonder* a very favourite Raspberry in Kent. The white or yellow Raspberries I do not recommend at all; nor the white Strawberries.

6. *Red Currants.*—A very few of these will suffice if plenty of the better fruits are grown. About twelve bushes would be enough, and I would advise half being of *Red Dutch* and half of *Raby Castle*. Of White Currants, as of White Raspberries, to plant them seems to me to waste good ground where better things might be grown, but if they are required *White Transparent* and *Versailles* are the best.

7. *Apples for Dessert.*—Five of these should, if possible, be planted, and mostly in bush form. The first early Apple should be *Irish Peach* or *Devonshire Quarrenden*, both ripening in August. The next, for September and early October, should be either *Lady Sudeley*, *Gravenstein*, or *Worcester Pearmain*. Then should come three trees of *Cox's Orange*, the prince of all Dessert Apples,* and one that keeps fairly well. People often talk of the fineness of the American Apple called Newtown Pippin, but the best American Newtown Pippin ever grown is not to be compared with a good British Cox's Orange. In my opinion it is hardly worth while in a small garden to grow later Dessert Apples than *Cox's Orange*, which will often keep till Christmas, according to

* A very promising new Apple has made its appearance since the above was written, called *South Lincoln Beauty*. The specimens shown at the Society's meeting on November 13, 1894, were of the highest excellence, and I would advise all who can get it to try it.

the season, especially if you happen to have Blenheim Orange among the cooking sorts, which is a very fair Dessert Apple in December. If, however, later varieties be wanted they will be best found amongst *Sturmer Pippin*, *Duke of Devonshire*, or *Rosemary Russet*.

8. *Plums for Dessert.*—The number of these and of Dessert Pears must depend greatly on the amount of wall-space or close wooden fencing at command. All should be grown either on a wall or fence or in bush form. Three or four would probably be enough, as they are more of luxuries than other fruits. *Deniston's Superb* would be the first, followed by *Rivers' Early Transparent*, and that again by *Jefferson's*, ending the season with *Coe's Golden Drop*, which should certainly have a wall. *Late Transparent* is also a very fine Plum, and thoroughly deserves a wall. Where bullfinches abound Greengages should be avoided, as, unless a very sharp look-out be kept, every bloom-bud will be eaten.

9. *Cherries.*—Here again comes in the question of the birds, but only with regard to the ripe fruit, and if they will let the fruit ripen there is no fruit-tree which is prettier on a lawn somewhat in the background than a Cherry or two; but I do not myself think that in a small garden they are ever worth a wall or the space a bush-tree takes, in which forms alone they can be netted from the birds. The finest Cherries for dessert are *Early Rivers* (black) and *Kent Bigarreau* (white); and for cooking there is none to approach *Kentish*, which, when really fully ripe, is also of grand flavour for dessert. Any north or north-east wall can hardly be better used than by planting a *Morello* against it.

10. *Black Currants.*—About ten or twelve bushes of these should be grown, as they make excellent jelly, and one or two puddings of them in the season are always appreciated in the kitchen, even if they be considered too strong-flavoured a fruit for the parlour. The best variety, I think, is *Baldwin's*, or, if that cannot be had true, *Lee's Prolific*.

11. *Pears for Dessert.*—Considered from a housekeeper's point of view, Pears are of little value in an ordinary family, where no great amount of company is kept and dinner parties are not of constant occurrence. Where this is the case a "large garden" will be required, and then Pears will be of great im-

portance. But although, no doubt, in any family a few Pears for dessert are useful, yet generally speaking they can be well spared. Nevertheless, so very many amateur possessors of small gardens make a speciality or hobby of their Pears that I will not even suggest how many should be grown, but will make a few general remarks.

After many years' experience (for I have grown Pears in great variety for upwards of thirty years, and my father did so before me) I am convinced that it is nothing but space and labour lost and vexation of spirit for nine people out of ten to attempt to grow *late* Pears; such, I mean, as *Easter Beurré*, *Beurré Rance*, *Zepherin Gregoire*, *Doyenné d'Alençon*, *Passe Crasanne*, and such like. I also think it a terrible mistake to grow too many varieties in a small garden, the watching over a few fruits, each of a number of different varieties when ripening, being exceedingly difficult and anxious work. Again, to grow very early Pears appears to me unnecessary; they are not so toothsome as an early Apple, and they rot in a few hours.

The earliest Pear I would advise is *Williams' Bon Chrétien*, and it may be grown either as a standard or bush tree. This may be followed by *Louise Bonne*, *Beurré Hardy*, *Pitmaston Duchess*, and *Durondeau*, all of which do quite well as bush-trees or as espaliers. All people have their peculiar likes and dislikes, and to my mind *Marie Louise* is a somewhat over-rated Pear—sweet, buttery, and juicy, but wanting in piquancy of flavour, and, if wall-space be limited, I certainly do not think *Marie Louise* should have any of it; indeed its flavour is better from an espalier or bush-tree, in either of which forms it does fairly well, although I admit the crop is not so constant.

The best of all Pears is *Doyenné du Comice*,* and if I had only wall-space in my whole garden for three trees, one, if not two, of them should be *Doyenné du Comice*, and the other *Winter Nelis*—an exquisite little December Pear. Only in very favoured places are either of them of any use in bush form.

In a small garden you will certainly not be willing to spare

* Pears differ somewhat in different seasons. This year (1894) I have not had any Pear equal in flavour to *Beurré Dumont*—it has been superb. I have also, since this paper was written, made the acquaintance of two excellent Pears, not actually new I believe, but very seldom met with, and at least new to me, *Le Lectier* and *Beurré Dubuisson*. Pear-fanciers should certainly try them both.

room (unless you have a hobby for Pears, and I am not now writing for such) for more than these, viz.: *Williams' Bon Chrétien* as a half-standard, *Louise Bonne*, *Beurré Hardy*, *Pitmaston Duchess*, *Durondeau*, and (?) *Marie Louise* as bush-trees or as espaliers, and *Doyenné du Comice* and *Winter Nelis* on a wall or fence, preferably with southern or western aspect, though I have one plant of *Comice* which does admirably on a due east wall.

12. *Pears for Cooking.*—These, if grown at all, should be in bush or espalier form, the fruits being so very heavy. *Catillac* is the best for the purpose, the blossom also being really most beautiful and ornamental.

13. *Medlars.*—If any of the household like Medlars, the variety called *Large Dutch* (syn. *Monstrous*) forms a very pretty small lawn-tree; the curious Japanese-like contortions of its branches, the large white solitary flowers, the drooping habit, and most of all the exquisite colour of its autumn foliage, make it highly ornamental. Few people seem to know how very delicious Medlar jelly is.

14. *Quinces.*—If there be any odd damp corner, or an unoccupied spot near a pond, a Quince-tree is always useful, either to make jelly or to put a small slice of one in Apple puddings and pies. The *Pear-shaped* variety should be preferred.

15. *Mulberries.*—This tree, again, may with great advantage be planted as a lawn-tree in the South of England, its rounded outline and dense heavy foliage forming a good contrast to almost any other trees. It should be grown as a standard with as high a stem as may be, in order that the grass of the lawn may grow well underneath it and form a soft carpet for the ripe fruit to be shaken upon, as in a small garden there will probably not be labour enough to spare on the tiresome task of gathering Mulberries. A tall stem also lifts the tree more out of the influence of spring frosts.

I have endeavoured in most cases to give alternative varieties of the different fruits, not because I do not know which I myself should prefer, but because, happily, tastes differ, and it is not well that all should grow exactly the same; moreover, all varieties do not succeed equally well at all places.

At this point I had intended my paper to close, but it has been urged on me very strongly to make it more complete by

adding some few directions for planting and pruning. And as at the time of the issue of the leaflet on "Fruits for Cottagers" I took very great pains to draw up and condense into the smallest possible compass some notes upon these subjects, which notes were very kindly revised and approved by several members of our Society's Fruit Committee, it can do no harm to repeat them in substance, as this paper may reach some who have not seen the other.

The best time for planting all fruits is late October and throughout November, except for Strawberries, which should be planted in August or early in September.

Just digging a hole, cramming the roots in, shovelling the soil over, stamping it down, and leaving it is *the wrong way to plant* any trees, and can only result in failure.

The *right way is* :—

i. Break up all the earth to a depth of 18 inches, either in a square or circle of at least 3 feet across, but without bringing the bottom spit to the top.

ii. If the roots are in any way jagged or torn, cut the points cleanly off with a sharp knife, and at the same time shorten back all straight-downward roots, unless they will easily bend out to right and left.

iii. Place the tree in the hole at such a depth that when the planting is finished it will be at the same depth as it was in the nursery, which will be easily seen by the soil-mark on the stem. The depth should be such that the uppermost roots will be about three or four inches below the surface when the planting is finished.

iv. The roots will generally be found to be growing from various parts of the stem. Spread out the lowest roots carefully on the soil in the hole and scatter a little fine earth over them; then spread out the roots next above these, adding more soil; then those above them, and so on, giving a little shake now and then to let the soil run in between the fine roots. The object of this is that when all is finished and done, the roots may lie in the ground almost at right angles with the part of the stem from which they issue, and tier above tier.

v. When all the roots are spread out and covered, give the tree a good vigorous shake, add a little more soil, and

then tread it in firmly (not hard), and fill up the hole slightly above the surrounding soil, as it will sink one or two inches.

vi. Put a strong stake to the tree, and be sure that the way the two are fastened together is such as to make it impossible for the stem of the tree to chafe itself against the stake when the winds blow. The fastening of all trees should be undone and retied every spring to prevent choking the rise of the sap. A wisp of hay or straw, or a bit of old sacking, should be placed round the stem to prevent the string cutting into the bark; and every spring, in retying, it is as well to vary the spot slightly if possible, so as to expose the previously covered up bark to the sun and air. (*See* also page 164).

vii. Protect the trees from rabbits, cattle, and sheep.

It is impossible to exaggerate the importance of all the above details of planting.

If the natural soil is very poor, a little better garden soil may be brought for the operation described in paragraph iv., shaking it in amongst the roots just to give the tree a good start, but no dung whatever should be used *under* the ground, though a thin layer over the surface when the planting is done will be helpful.

It is very important not to plant too deeply (iii.), especially in wet or heavy land. In very wet land it is far safer to plant the trees almost on the surface, and to mound the earth up to and over the roots.

It is very important to spread out *all* the roots down to the smallest fibres (iv.), and none should be allowed to take a directly downward direction. Let every one be duly spread out, slanting very slightly, if at all, downwards from the point at which they grow out of the stem.

It is very important that the soil should not be left loose about the stem and roots (v.), but firm treading does not mean hard ramming.

It is very important to fill up the hole 2 or 3 inches above the level (v.), and not leave a hollow for stagnant water to fill.

It is very important to stake the tree (vi.) firmly, so that the roots are not strained by the wind; but better not stake at all

than so as to let the stake chafe through the bark, or the twine to choke it and throttle it. (*See* page 164.)

It is better to lay the tree in, just lightly covering the roots up with soil, for a week or so, than to plant in wet sticky weather or in sharp frost.

In planting trees on the lawn or in meadow-land the turf must not be relaid close up to the stems of the trees, but a little round bed 3 feet across should be left over the roots. This should be kept slightly stirred from time to time to a depth of 2 or 3 inches, and may be planted with any shallow-rooting annuals or bedding-out plants that do not require deep holes to be dug. These little round beds also make it very much easier to water the trees the first summer if at all hot and dry, as the turf edges prevent the water running away to a distance and compel it to sink direct to the roots. After about four or five years, when the trees have got well hold of the ground, these round beds should be turfed over.

It is very important the first summer to give the trees a good soaking with water once every fortnight if the weather be hot and the soil naturally dry. Too much water on a heavy soil will be disadvantageous. It is a great assistance to young trees to keep the surface-soil friable by frequent hoeing, so as to let in sun and air; it also has the advantage of preventing excessive evaporation.

It is also important the first spring after planting to look over the young trees carefully as they are beginning to grow into leaf, and pick off all caterpillars and grubs, by which they are almost sure to be haunted. The leaves and the roots of a tree are so mutually interdependent that many a good tree is lost or crippled for life by allowing the grubs to eat up the first year's spring foliage.

In planting Strawberries it is very important that they be planted neither too deep nor too shallow. If planted too deep the crown eye in the centre of each will probably rot, whereas if planted too shallow the roots which issue forth from the neck as the plants grow will have no chance of forming. The collar or neck, therefore, should be just, but only just, under the ground. The plants should never be roughly dibbled in with a dibber, as is so frequently done, but a little hole dug with a trowel, and the roots carefully spread out all round, and the soil

firmly pressed down among them. Strawberries should always be firmly planted, and, unless the season be wet, will probably need frequent waterings. A new bed made in this way in the middle of August, and kept thoroughly watered, will bear a very fair crop of fruit the first season. Strawberries are far better planted in rows than in groups of threes.

Raspberries, again, are much better in rows. In planting be very careful to spread out the roots on all sides, and make the soil firm. The canes should at once be shortened to a height of 18 inches or 2 feet. They will not, of course, bear fruit in this way the first summer, but they will throw up fine fruiting canes for the year after. If allowed to remain their full length, and to bear fruit the first year, the roots will receive a check which they will be years in outgrowing. Many growers bend the canes over in a "bow"; this form of training is very pretty, and exposes the eyes more to the sun, and so the fruit is more freely produced.

The subject of Pruning is a very difficult one to treat of in a small space. Standards and half-standards, and bush-trees planted on the lawn and therefore presumably intended for extension, will need very little pruning at all. The year of planting, unless you have some knowledge of the subject yourself, or can get the help and advice of some thoroughly reliable gardener, I am strongly of opinion that you will do less harm to your trees by leaving them all quite unpruned than to allow ignorant experiments to be made upon them. Bush-trees intended to be restricted in growth should, however, have the side shoots of the branches well shortened back to three or four eyes every year, and the leading shoots to eight or ten eyes. After the first year's growth has been made, standards and other unrestricted trees will only need the removal of shoots that cross one another and a few inches cut off the points of strong shoots. I should, however, like to repeat what I have said elsewhere, that with fruit-trees on the lawn the less pruning they have the more ornamental will they become. The side shoots, where the foliage is dense, should be cut right back to an eye in August, but the leaders of all the branches should be allowed almost, if not quite, free course.

When not wanted for fresh beds, the "runners" of Strawberries should be cut off as they appear, so as to throw all

the strength into the main crown of the plant. Fresh beds should be made every third year, as after that the old plants are worn out, but the best plan of all is to renew a third part of the beds every year, so as always to have one-third of your plants in their first year, one-third in their second, and one-third in their third year of bearing. Never permit the barbarous plan of cutting all the Strawberry leaves off in the winter. It is most detrimental.

Thin out the young growths of Raspberries in early summer by *pulling up* the superfluous ones, and then cut out the old canes altogether as soon as ever they have done fruiting. Manure should be laid over the roots; but the soil should never be dug near the canes, as Raspberries are essentially surface-rooting plants. The canes, when tied in, should be shortened to a convenient height, and if the bent-over system of training be adopted you may take about one foot off the ends.

Red and White Currants should have the side shoots of the last summer's new growth shortened back to a couple of eyes and the main leading shoots to five or six eyes, more or less, according as it is wished to let the bush increase in size or not. The centre of the bushes should be kept quite free from growths. Black Currants should be pruned on the exactly opposite plan, cutting out the old wood and leaving the young summer growths their full length, only removing shoots in the centre to let in the sun and air. The reason for this is that Red and White Currants bear chiefly on the old wood; Black Currants on the new (*i.e.* last year's) growth.

Gooseberries should have the side shoots of each year's new growth well thinned, cutting them almost all out to an eye, but the leaders of the different branches should be little pruned till the bushes have grown their full size. I prefer to prune Gooseberries and Currants about the first week of February, and then to net them at once from the birds, but in some places it may be needful to net all the winter, in which case they may be pruned in December. I am told that if a mixture of whiting made with milk, with a little glue stirred in, be brushed over the bushes with a long-haired brush immediately after pruning, it will often be enough to keep the birds from eating out the buds. If the colour is objected to, a little soot can be added to the mixture just to darken it.

Wherever I have advised to cut out all the side shoots of fruit bushes or trees, it is, of course, supposed that judgment will be used where to leave one here and another there to form an altogether new branch to extend and furnish the tree. The object of cutting out the side shoots of the branches is to prevent crowding and to let in plenty of air and light; it is, therefore, far easier to prune before the leaves fall, when dark and crowded places make themselves more apparent, than when only the bare shoots are left.

It is a mistake to give young trees heavy dressings of manure, as the ordinary soil of gardens is rich enough. For the first few years aim at laying the foundation of a good tree; keep the boughs rather thin, *i.e.* well apart, not crowded, but fully exposed to sun and air so as to ripen the wood, and thus form a sturdy basis for future good crops. Some kinds will bear the second year, and may then be assisted by manure laid on the surface after the fruit is well set, or by waterings of liquid manure, or soapy water, &c., in summer; but fruit-trees, young or old, if they are growing and healthy, should only have manure applied when they are bearing a crop, so as to enable them to bring the year's fruit to perfection, and at the same time form fresh blossom-buds for next year.

[Up to this point this paper has been written by the Rev. W. Wilks, of Shirley, and revised by Mr. George Bunyard, of The Nurseries, Maidstone. From this point to the end the process has been exactly the reverse. Neither writer is absolutely bound to the opinions of the other, although agreeing in a general way.]

A critic wishing to exercise his skill may possibly object that the foregoing paper deals only with the making of an entirely new garden. This, of course, is easily replied to by pointing out that in writing such a paper it is never supposed that any one person will be able to carry out all the details and suggestions made. The idea rather is that the owner of a small garden should have something to guide him, and towards which to work, in all and any alterations he may be able to carry out. Nevertheless, as the majority of people enter upon the occupation of an already existing garden, it seems well to add a word or two on

worn-out and dilapidated gardens. Perhaps the garden is such a one as we sometimes see advertised as "fully stocked with the choicest fruit-trees," &c., but on inspection these grand examples are found to be (*a*) overgrown or (*b*) of unsuitable varieties, and (*c*) the wall-trees are spurred and pruned to give a neat appearance rather than a crop of fruit. If the owner enter upon such a garden at Lady-day, he had better let things remain as they are, and learn what trees to destroy from the results of the summer and autumn, merely taking out the superfluous inner shoots in August, and marking such trees as are unsuitable or those which do not bear, retaining, of course, those which are desirable to keep for shelter or for a blind to neighbouring windows. When the leaves have fallen the whole should be thoroughly overhauled. The condemned specimens should be grubbed out, and care taken to get out of the soil all the old roots and fibres, and, after the land has settled, new trees should be introduced of the varieties already named. The remaining trees should be carefully pruned. Wherever it is necessary to saw out branches, the wound should be rounded off and the surface smoothed with a sharp knife, to allow the young bark to creep over and cover the exposed wood. The points of long shoots should be shortened, and a winter dressing of surface manure be given to those which have made but little growth. It too frequently happens that trees in small gardens are planted by the speculative builder, who has picked them up at some auction sale, and, consequently, several trees of one variety are often found in such gardens. Duplicates can be got rid of to make room for new useful varieties. All prunings of trees should be collected at once, and the small wood burned, to destroy insects, &c., and the larger branches can be sawn up by the gardener during frost and snow, when he cannot work outside.

If the entry be made at Michaelmas the latter part of this routine need only be carried out. In the case of unsuitable varieties, recourse should again be had to the lists already given, which are reliable; and as but few trees in such gardens are on stocks that will admit of root-pruning, it is best to clear them out at once, and purchase fruiting trees from a reliable source. As regards neglected wall-trees, overgrown Peaches and Nectarines with coarse breastwood and wild shoots are better replaced by Pears and Plums; but old Plums can be recovered by cutting

in the spurs, thinning out the trained branches, and, if strong growth is evident, root-pruning can be effectually carried out. (A paper on this subject is given in the Royal Horticultural Society's *Journal*, Vol. XV., page 211.)

Pears on walls are generally too crowded in the branches, and cleaner fruit will be obtained if not only these, but the spurs also, are reduced to about one half; and it is better to replant cordons on the Quince stock of the varieties already named, which can be bought in a fruiting state, than to plant espaliers again, as the cordon system gives great variety in a small space, and fruit of a larger size.

Bush-fruits are frequently too crowded in small gardéns, and unless they are healthy, and show bold, clean young growth, had better be rooted up at once, and a fresh stock be planted. The existing beds of Strawberries and Raspberries can be tried for a year, but some fresh plants should be introduced, especially in suburban gardens, as these subjects seem to carry with them something of the vitality and freedom of growth they have laid up in the country.

Again, most old gardens are benefited more by the addition of fresh turfy loam than by strong nitrogenous manure, as in time all the holding qualities of the soil in town gardens seems to vanish, and it assumes such a loose nature that the roots of fruit-trees cannot duly perform their functions in it.

New Apple-trees should be upon the Paradise stock, and a pretty form of standards called "amateurs' standards" can now be purchased where there is room for them, while cordons and fancy trees, with pyramids, come into bearing at once.

The Quince stock is also preferable for Pears, except on sandy and gravelly soils, when they should be on the free stock.

HOW TO MAKE A FRUIT-ROOM.

By Mr. George Bunyard, F.R.H.S.

Foundation.—First level the soil and dig out holes for the corners large enough to admit brick piers 14 by 14, or stones about 1 foot square; fix an iron dowel in the centre to receive the corner posts of the structure. Some provision for air (air

bricks), or an aperture covered outside and inside with perforated zinc, should be provided just above the ground line. If the room is to be over 20 feet long an extra foundation should be put in at the half distance.

Main Posts.—Make these 6 feet long, 6 inches square, and prepare a hole in the foot to receive the dowel mentioned in the last paragraph; this will keep the framework firm. The main ground plate should be 4½ by 3, and the top plate of the same size. Support and steady these in the usual way with quartering 4½ by 3, and when this is fixed, choose a dry day and pitch, tar, or cold creosote the lower plates and all the woodwork 2 feet up from the ground, to protect from damp. The quartering should show an even outside face.

Outside Covering.—The cheapest material will be ¾ match-board, and it may as well be fixed on the rafters also. Pitch-board 4½ by 1, rafters 3 by 2.

Bonds from one side to the other should be 4½ by 3; if stout they are useful to hold planks, on which baskets can be placed overhead in the roof. In order to receive the outside thatch, a side board is attached 6 inches wide from the ground to the roof, in which the thatch is placed upright, and it is kept in position by lateral splines of wood 3 by 1, which are shown in the figure.

The Thatch may be 18 inches thick on the roof, and 6 inches at the sides. Where it can be procured, carex or reed is the strongest and most lasting, but it may be of wheat straw or of heather.

Doors.—An inside and outside door should be provided, and they must be made to fit closely, to exclude draughts.

Windows.—In order that visitors may fully inspect the fruit, windows of 21 oz. glass may be inserted, and this saves the use of a candle at storing time, but outside shutters are provided to keep the room as dark as possible; but a fruit-room is perhaps really better without any windows at all.

Ventilation should be provided by an opening under the apex of roof at each end, 1 by 9, a small opening being left between the dairy shutters, which can be stopped by hay or moss in severe weather; the inside should be protected by perforated zinc, fine enough to keep out wasps and flies.

Thieves and Rats.—It has been suggested that, in order to protect the contents, a half-inch stout wire netting should be

fastened to the matchboard outside, so that an entry would be difficult. This is advisable also to keep out rats.

Inside Shelves, on which to lay the fruit, are readily fixed at the sides. First place uprights 2 by $1\frac{1}{2}$ from the ground to the roof, and then attach bearers 2 by $\frac{3}{4}$ on this to the quartering. I find 1 foot between the shelves a very convenient distance ; this places the lowest shelf 6 inches from the ground, making six in all up to the eaves. The shelves are made of $\frac{3}{4}$ matchboard,

and need not quite meet each other, so as to allow a slight circulation of air. Upon this we place lengths of clean wheat straw, so that the fruit shall not quite touch the shelves. In the centre of the fruit-room we have a narrow table with a raised edge, made of three lengths wide of matchboard set on trestles ; this is useful to set up exhibition collections or to show special samples.

Names.—Get a slip of zinc 4 inches long, turn up one end 1 inch at an angle of 45, and then slit this angle three times, and bend it so that it will hold a neat card ; the other end can be slipped under the straw.

The Fruit must never be wet when stored, and should be handled very carefully and laid singly on the shelves, but in the case of small Apples (Russets, &c.) they keep well three or four deep. Look over carefully from time to time and remove rotten or specked fruit, and keep the floor always damp.

These few hints will enable growers to keep late Pears to March, and Apples to May or June. It was from our fruit-room, constructed on these lines, that we put up forty dishes of fresh clean Apples at the Temple Show in London on May 23, 1894. Our house is constructed in the open, on the soil, and is 30 feet by 12 feet, outside measure, and easily takes 300 kinds of fruit. The cost was about £30.

Discussion.

The Chairman, in inviting discussion, said they often learnt more from their failures than from their successes. He then told the meeting of a gentleman who was taught by bitter experience, because, contrary to instructions, his trees were planted too deep, and because a dead dog, a dead cat, and butcher's offal were placed at the roots of some Pear and Apple trees. Trees could not live on such food, said the Chairman, who added that as they would not go to a cheap grocer for their tea, so they should go to none but the best sources for their fruit-trees.

Mr. John Wright paid a high tribute to the Rev. Mr. Wilks, whom they greatly missed at that Conference. He could easily have imagined that the paper had been written by a professional gardener instead of by an amateur. He could scarcely find one fault with it; but there was one omission—Mr. Wilks did not mention that grand old favourite among Strawberries, the *Sir Joseph Paxton*.

Mr. Bunyard said the flavour was not good enough.

Another gentleman in the hall suggested that it was "worn out."

Mr. Wright vigorously defended "*Sir Joseph Paxton*" from these onslaughts. He was glad to see the importance attached by Mr. Wilks to the Gooseberry and the Raspberry. These were the fruits for the amateur, as they gave an ample return for the space allotted them. He told of a man who divided his allotment

from his neighbour's by a hedge of Raspberries. The hedge was some seventy-five yards long, but after consuming all he required the grower sold between £3 and £4 worth each year. That was an example of how to utilise ground which might have been planted with a useless bush. If we only did justice to the soil by the exercise of intelligence and due care, Englishmen could produce fruit as good as was ever sent from any other country in the world. It was only knowledge, judgment, and ordinary business commercial care that was needed.

Mr. A. H. PEARSON said he was very pleased Mr. Wilks had taken up the subject of planting fruit-trees as ornamental trees, and he could assure them, from having seen Mr. Wilks' own garden, how lovely a lawn might be made by the fruit-trees, both in the spring and the autumn.

Mr. RIVERS alluded to the *Times* correspondence. He said that if an orchard yielded a profit three years out of five they ought to be satisfied. The remainder of the rent would be paid by the bush-fruits. He would like to give to the meeting a recipe for canker which had been made by Mr. Tonks, of Birmingham. It had proved most successful, and was as follows :

Superphosphate of lime	35 lbs.
Nitrate of potash	21 „
Nitrate of soda	28 „
Sulphate of lime	28 „

A quarter of a pound to the square yard should be applied in the autumn and spring.

A vote of thanks to Mr. Wilks and to the Chairman concluded the proceedings of the first day.

On the second day of the Conference, Monday, October 1, the Chair was taken at 3.30 P.M. by Mr. GEO. BUNYARD, F.R.H.S.

FRUIT-GROWING ON A LARGE SCALE.

By Mr. CHARLES D. WISE, F.S.I., F.R.H.S.

OWING to the great increase in the fruit-growing industry a good deal has been written during the last few years on fruit-farming and the enormous profits to be made. The bulk of these reports are greatly exaggerated, although under certain conditions, which I will endeavour to set clearly before you, fruit-growing yields a fair return on capital expended. Many people think that fruit-trees have merely to be planted, and that profitable returns in due course are assured; and it is only by experience, and in many cases by loss of capital, that they find that fruit-growing is a *business* and a *science*, and that, as is the case in other trades, the apprenticeship has to be gone through and the business thoroughly studied—I do not say *learned*, as the fruit-grower learns something new every day, and his lessons will never be over.

Why do not farmers go in for fruit-growing? This question is asked again and again; I think the simple answer is that, even if they felt inclined to do so, they do not know how to set about it, and not only do they not understand the business, but where is the necessary capital to come from?—and even should that be forthcoming, it is not on every farm that land adapted for fruit-culture is to be found.

We have also these important considerations:—

1. There are only selected areas where you can hope to succeed so far as soil, shelter, and situation are concerned.

2. Fruit-growing, especially on a large scale, should be within reasonable distance of a good market or railway station.

3. The tenant must be prepared to stand out of his capital for certainly four years, or perhaps longer, before a fair return is obtained; and no tenant should plant on a large scale except under a lease of at least twenty-one years, and with compensation for improvements fully assured at the end of his tenancy.

Given suitable soil and situation, with railway accommodation

at hand and security of tenure, I am of opinion that hundreds of acres of land might be planted with fruit, to the advantage of both landlord and tenant. The landlord should give every encouragement to a tenant who wishes to plant fruit, either by finding the trees or by giving him written permission to plant under the Agricultural Holdings Act, which will entitle him to obtain compensation at the termination of his tenancy. It is most certainly to the interest of the landlords to meet tenants in this way, as by the planting of fruit the value of their property is enormously increased.

Under the Agricultural Holdings Act, 1883, a tenant is entitled to compensation (taking into consideration the inherent capability of the soil) for the planting of orchard fruit-trees and fruit-bushes, provided such planting is done with the written consent of the landlord. Market-gardeners and their landlords have been much interested in the Market Gardeners Bill promoted by Sir E. Lechmere, but which has been thrown out during the past session. Market-gardeners contend that if they plant land which they rent *as market-garden land* with fruit stocks the written consent of the landlord for such planting is not necessary, and that at the termination of their tenancy they should receive compensation for all fruit-trees which they have planted. They further contend that the landlord in letting land as a market-garden presupposes that such land would be planted as *a market-garden*, and their great point is, Does not that supposition include the planting of fruit-trees? It certainly seems rather hard on the market-gardener if he is to obtain no compensation for fruit-trees which he has planted and brought to maturity, and by the planting of which (with his own capital) he may have doubled the value of the landlord's property. Taking this view, if the landlord does not wish land, which he lets as a market-garden, to be planted with fruit-trees, he would make a special stipulation to that effect, and in the event of his not doing so, at the termination of the tenancy, if the trees have been well cared for and the plantations have been planted with judgment, then the landlord or incoming tenant would pay a fair valuation for all growing crops, including the fruit trees and bushes. And if the trees have not been properly pruned and cared for, and the plantation is unfavourably situated, the valuation would be proportionately lower.

I understand it was proposed to make the new Act retrospective for three years only; but the tenant, supposing he had planted four or five years ago and quitted his holding at the end of the fourth or fifth year, would have received practically no return from his fruit-trees, and it therefore seems to me that the Act should be retrospective for a longer period, taking into consideration the number of years during which the different varieties of fruit-trees growing on the land will remain in profitable bearing after the termination of the tenancy. The question of compensation to market-gardeners, and also to fruit-growers, is a most important and difficult one, and should be fully discussed by all interested parties.

We hear a great deal of what the Royal Commission on Agriculture is going to do for the tenant-farmer; but I fear, unless the tenant-farmers look after themselves, they will obtain very little help from that quarter; and, although I do not say that fruit-growing will be the salvation of the agriculturist throughout the country, I do maintain that on very many farms, if a certain proportion of the acreage were under fruit, it would be to the advantage of both landlord and tenant. A few acres should be planted to start with, and as experience in management is gained the acreage may be steadily increased until the 5-acre plantation soon becomes 50 acres, and a good business is developed. Where agriculturists have planted fruit, and the soil and situation are favourable, we find that the plantations do increase in area, and we may therefore conclude that the tenants are not losing money. In the Evesham district, for example, the fruit-growing and market-gardening industry is extending every year, and the small allotment holders, instead of growing corn, are planting their land with Asparagus or other vegetables and bush-fruit, with one or perhaps two rows of Plum-trees or other standards round the outside, according to the size of their holdings.

Soil.—One of the first considerations before planting is whether the soil which it is proposed to plant is suitable for the growth of fruit. Most soils will grow fruit, a good strong deep loam being preferable. Shallow soil on gravel or on chalk is the least suitable, especially for standard or tree fruit, though Strawberries may do well in certain seasons. The same remark applies also to sandy land, for this class of land feels the drought in a very dry season, which is fatal to fruit trees and bushes.

Fruit-trees will never thrive on land which is water-logged, and a most important point is to see that the land is thoroughly drained before planting commences, though not over-drained, as the trees as they grow older will take up a great quantity of moisture from the land.

I am able to give the analysis of the soil taken from a plantation in which Plums, Apples, Pears, Strawberries, Black and Red Currants, Raspberries, and Gooseberries all grow exceedingly well, and I shall point out to you presently the great advantage to the grower of having an analysis of the soil.

ANALYSIS.

Silica or silicates insoluble in acids	74·20
Oxide of iron and alumina	15·90
Lime	·51
Magnesia	·92
Potash	·60
Soda	·40
Carbonic acid	·04
Phosphoric acid	·14
Sulphuric acid	·06
Organic matter and water of hydration	7·23
Nitrogen	·185
Including phosphoric acid, soluble in 1 per cent. solution of citric acid (*i.e.* readily available phosphoric acid)	·004

Situation.—Given a suitable soil, we must consider whether the site or situation is favourable. I think this point is the most important of all, and yet it is frequently overlooked. There are many acres of fruit-trees, planted in unfavourable situations, which year after year yield no return whatever, and it is such plantations as these which we hear of as being grubbed up. We have all noticed in the early morning of a bright spring day the mist hanging in the valleys, especially where there is a stream, and if the observer is on rising ground, on the side of the valley, he can often see over the mist to the further side; it is these mist-laden valleys that must be avoided. Why? Because it is in these low-lying situations that the frost takes most effect. The height above sea-level of the fruit plantations, some 600 acres in Gloucestershire, which I have the honour to manage, varies from 180 feet to 480 feet, and the small proportion of land which was planted at the lower level invariably suffers from the spring frosts. This season the Plums and Apples

were laden with fruit on the low-lying ground when the great frost of May 21 came, and Plums and Apples, all well set and nearly as large as beans, were completely swept off the trees, and not only was the fruit destroyed, but the young shoots on the trees were scorched as if by fire. On the higher levels the trees escaped, and from observations taken after a series of years I find that plantations that are not lower than 250 feet above sea-level as a rule escape frost, although the higher they are the better. Old plantations on elevated sites are keenly contested for in our district, if they come into the market through change of tenant or any other cause, and I would urge all who plant not to plant in the valley. It is from plantations on the higher ground, well sheltered from wind, that good annual returns are obtained, and when spring frosts cut off the blossoms or fruit in the valley the happy man on the hillside reaps his reward. Shelter can be obtained by planting belts of quick-growing trees, such as Larch, Canadian Poplars, &c., and the fruit-trees themselves soon shelter each other to a very great extent. The hedges surrounding newly planted fields may be allowed to grow up gradually to from 10 to 15 feet, and they then afford excellent shelter.

Varieties.—With soil and situation favourable, the next important step is to decide what varieties of fruit to plant. In making a selection it is best to observe which varieties do best in the district, or if not a fruit-growing district, the old orchards and gardens in the vicinity are a good guide. On no account should I advise the beginner to have all his eggs in one basket. If uncertain as to what will do best, he should try to commence with two or three kinds of bush-fruit, and, say, four or five varieties of Plums, Apples, and other tree-fruit. They will soon answer the question themselves, and those which do best can be gradually increased. On the Toddington Fruit Farm we have over forty varieties of Plums and Gages, thirty-five of Apples, seven of Cherries, and a large acreage under Black Currants, Red Currants, Raspberries, and Strawberries, and the crops vary considerably according to the seasons.

In the case of Plums and Apples, the number of different varieties at Toddington is far too great, and I should not recommend anyone to grow more than a dozen sorts of each.

Strawberries.—Taking Strawberries first, the most suitable

for market in our district are Vicomtesse Héricart de Thury, which is an early variety coming in a few days in advance of the main crop, and Sir Joseph Paxton, President, and Stirling Castle for the main crop. It is a great advantage in picking and marketing to have a certain proportion of the acreage planted with the early varieties. We plant 2 feet 6 inches row to row, and 18 inches apart in the row, which takes 11,000 plants per acre, allowing plenty of room for the horse-hoes to work. The usual method is to plant with a dibble; but I am convinced, and have proved by experience, that if more time is taken in planting, and a small 3-tine hand-fork used, the plants will make a far better start, and the extra labour will be more than repaid. Runners should be taken, if possible, from one- or two-year-old plants, and if the weather is suitable, and the ground is ready, they should be planted as soon as they are well rooted. Many acres are planted in October and November if the weather is open, and also in early spring, but on our land we find planting in August or September answers best. Plants cost from 10*s*. to 15*s*. per 1,000, and if half an acre is planted and the runners are all left, the following summer there will be a large stock of plants available. Assuming the plants are bought, the cost of planting will be about £8 to £10 per acre, exclusive of manure—that is, if the land is clean and in a good state of cultivation. The land should be well rolled before planting.

The first summer after planting it does not pay to mulch the plants; all runners should be kept carefully cut off, except, of course, where plants may be required. The second summer, if the plants have made any early runners, they should be cut after the last hoeing and before the straw is put down. We use about 10 to 15 cwt. of straw per acre for mulching; barley or oat straw is preferred, as these kinds will cover more ground than wheat straw, weight for weight. If near a town, stable manure is procurable, and is put on after hoeing in the spring; the manure is washed in and the straw acts as mulching.

As soon as the last picking is over the runners are cut, and the straw and runners are raked up together with narrow iron rakes made on purpose, and taken to the yards for litter. The runners are cut with an ordinary sickle; an old short one is best. In some seasons the straw may be raked up with a horse-rake, two or three of the teeth being removed at intervals to leave

room for the plants to pass between. On light land a moulding plough is run down the rows and the soil turned to the plants; this protects the crowns during winter, and a turn with the scuffle in the spring levels it down again. An American implement, called the "Planet horse-hoe," is most useful in Strawberry fields, or, in fact, in any fruit plantation; it can be put to so many purposes, and, although light and fragile to look at, it is in reality wonderfully strong.

The price of picking varies from 3*d.* to 6*d.* per dozen lbs., according to the crop, and the average annual returns may be taken at two tons per acre, at £20 per ton net. The beds last five to six years, after which the plants begin to fail, and should be grubbed up. Before planting the same crop again it is advisable to have one year's fallow; a crop of Turnips can be grown and fed off with sheep, or the Turnips may be ploughed in as manure. The last two seasons' fruit has sold at considerably higher prices—last year owing to the drought, and this year to the frost. The earliest crop is sent to market in punnets, the main crop in peck baskets of 12 lbs. each; or, if for jam, they are often sent in tubs, picked without the stalk. I have heard this season of 170 tons of Strawberries being bought in one district by a large jam-maker; this shows the very large demand that there is for this fruit. The foreigner has not yet been able to place fresh Strawberries on our breakfast-table, and I do not see how it will ever be possible for him to do so. Strawberries for eating must be fresh gathered, and, if possible, picked in the early morning for consumption the same day; the growers near towns have a great advantage, as they are able to do this. At latest the fruit must be on the market the day after it is picked.

Strawberries are an expensive crop to cultivate; the cultivation and manure, exclusive of picking, will amount to £10 per acre, though it must be borne in mind that if the Strawberries, or any other bush-fruit, are in a mixed plantation with tree-fruit above, the whole of the labour must not be charged against the Strawberries.

Raspberries.—Raspberries like a good friable loam; they will not thrive on a thin soil, nor do they do well on stiff clay land. Carter's Prolific, Semper Fidelis, and Superlative are all good sorts for market. The first-named is a free cropper. Semper Fidelis is more acid, a good cropper, and keeps on bearing late

in the season, and is liked by preservers. Superlative is a new variety; the fruit is large, and suitable either for dessert or preserving. The canes should be planted as soon as possible in the autumn after the leaf is off, and cut down to within 18 inches of the ground; this causes them to throw up good strong canes the following summer. About three canes should be planted together, and the distance from stool to stool should be 2 feet 6 inches in the row, and the rows 5 feet apart. Canes cost about 20*s*. per 1,000, and, assuming they have to be bought, planting will amount to about £14 per acre, exclusive of manure. Picking costs 6*d*. per dozen lbs. for an average crop, and the fruit is generally sent to market off stalk in tubs holding 56 lbs. Cultivation and manure costs about £8 per acre, exclusive of picking. If the soil is suitable Raspberries will stand ten to fourteen years, and in many cases still longer. The average crop may be taken as two tons per acre, according to the season, at an average price of £25 per ton net. For the past three or four years Raspberries have been more and more in demand, and crops being short, the price has been higher, £30 per ton being made, and at the end of the season even £40 per ton has been realised. As soon as the canes have finished bearing they should be cut out as soon as possible, which gives the young canes a better chance to ripen. The young canes, as soon as the leaf is off, should be thinned out to five or six, leaving the strongest, and these are tied together about 3 feet from the ground, and then left until the spring, when the tops are cut off, leaving the canes about 4 feet high. The later they are topped the better, as the lower buds will not start into growth so early, and they thus escape the frost.

It is a mistake to cultivate too deeply amongst Raspberries, as they root close to the surface of the ground. If the ground must be dug 3-tine forks should be used.

Black Currants.—Black Currants like a good strong soil. Baldwin's Black, Black Naples, Lee's Prolific, and Carter's Champion are all excellent varieties. They may be planted 5 feet apart, which takes 1,750 per acre, and the bushes should be cut down to within 6 inches of the ground after planting. This makes them throw up good strong shoots the following year, on which a small crop is obtained. Black Currants bear on the young wood; they should be cut hard every year, all the

old black wood being cut out; plenty of young wood will then be thrown up.

A stock of young bushes can soon be worked up by making cuttings from the superfluous shoots, which can be thinned out of the young bushes the following winter after they are planted. Planting will cost about £12 per acre, including the purchase of the young bushes at £4 per 1,000. Picking costs for an average crop 3*s*. 6*d*. to 4*s*. per cwt., but if picked off the stalk, when they are marketed in tubs for jam, an extra 2*s*. per cwt. is paid.

Pruning is usually done by the acre. The cost depends greatly on the size and age of the trees; about 9*d*. per 100 is paid for pruning strong well-established bushes. Exclusive of picking, the cultivation, including manure, costs about £8 to £9 per acre, and an average crop may be taken as about 2 tons per acre, though I consider Black Currants uncertain croppers. The price for Black Currants varies greatly; this season they have sold at low prices, down to £14 per ton, owing to the heavy crops. The foliage being well advanced before the frost of May 21, the crop practically escaped damage. The average price may be taken at about £25 per ton net on the stalk.

Red Currants.—Scotch Red is a very good early variety with Raby Castle and Red Dutch for main crop. The bushes should be planted 5 feet apart, and are best grown on a leg. The leading shoots should be cut back to within three or four eyes at planting, care being taken to cut to an outside eye, the object being to get the tree as cup-shaped as possible. A stock of bushes can easily be obtained by taking cuttings in the same way as with Black Currants, but when the cuttings are put in the lower buds must be rubbed off in order to grow the bushes on a single stem. Young bushes may be bought at £3 per 1,000, and the cost of planting should not exceed £10 per acre. The cost of picking is from 2*s*. to 2*s*. 6*d*. per cwt., and double these amounts if picked off the stalk.

In pruning a Red Currant the leading shoots are cut back to two or three eyes, according to the strength of the shoots, and the side-shoots should be cut back as close as possible, the bush resembling the skeleton of an inverted umbrella (without the stick) when pruned. The trees should also be gone over at Midsummer, and the centres cleared out to let the sun and air into the bush, and to throw vigour into the fruit-spurs for the

next year. The price of pruning varies according to the size of the bush; 1*s.* 6*d.* per 100 for strong bushes is a fair price, and £9 per acre may be taken as the cost of cultivation, including manure. Red Currants are more regular croppers than Black, but the average crop cannot be taken at more than 2 tons per acre, although I have known 5 tons per acre grown two or three years in succession. There does not seem to be any great demand for Red Currants. Much depends on the Raspberry crop, as the two fruits are so much used together, and in a good Raspberry year Red Currants will be more sought after. The average price for the past few years cannot be taken at more than £14 per ton net on stalk.

Gooseberries.—Of the many different sorts recommended, Whinham's Industry and Berry's Early are good early varieties, with Crown Bob, Lancashire Lad, Warrington, Keepsake, and Whitesmith to follow. The early varieties are *all* picked green, and of the later sorts about one half of the fruit is picked green, while the other half is left to ripen, Warringtons being the exception; they are rather a small red berry, grown principally for jam-making, and they are all picked ripe.

Very heavy crops per acre may be grown; this season I know of one plantation of Lancashire Lads in which 5 tons per acre were grown, the price realised being £12 per ton. The cost of planting may be taken at £13 per acre, the bushes costing about £5 per 1,000. Pruning full-grown bushes costs from 2*s.* 6*d.* to 3*s.* 6*d.* per 100. There are many systems of pruning Gooseberries, some growers hardly cutting the trees at all beyond keeping the centre open; but I advocate pruning Gooseberries on much the same system as Red Currants, getting the fruit on the spurs; by this system I think we get a heavier weight per acre.

Picking costs from 1*s.* 6*d.* to 1*s.* 9*d.* per cwt., and cultivation about £10 per acre, including manure. On suitable land the yield should average at least 3 tons per acre, if not 4 tons. Gooseberries like a good soil, not too stiff, and on no account should they be planted on wet land. They will bear heavy dressings of manure. Green Gooseberries average about £14 per ton, and ripe about £9 per ton.

Nuts.—The Kentish Cobnut is the best, if not the only Nut to grow. At Toddington we have some twenty acres, planted in

1885, which have cropped well during the past two years. They will thrive on stony ground, but the better the ground the larger the bushes grow, and Nuts will pay well for good treatment. It is at least six years from the time of planting before any return worth speaking of is obtained. They are always grown on a leg, about 2 feet high, and the young bushes are usually propagated from suckers or layers taken from the old bushes. After planting, the centre of the bushes should be cut out so as to get them as cup-shaped as possible, but the main branches should not be shortened back, so that after two or three years they can be bent outwards and tied down to stakes firmly driven into the ground ; this is considered a better method than keeping the branches cut back each year, as a bigger bush is obtained in a much shorter time. It is a mistake in pruning to use a saw, as the boughs are more liable to die back to where the branch was sawn off, than they are if a clean cut is made with a knife. The small fine wood is the bearing wood, and this must only be thinned out and shortened back where necessary, always keeping the centre of the bush perfectly open. About the middle of August the trees should be gone over and the leading shoots broken off. Very great care has to be taken in pruning Nuts ; an inexperienced hand will soon ruin the bushes. About 12 feet apart is a good distance to plant, the remainder of the ground being planted with Currants, Gooseberries, or other bush-fruit, which will yield a return until the Nuts require all the ground. Young bushes cost about 30*s.* per 100, and the cost of planting Nuts only would be about £5 per acre. The average crop may be taken at 10 cwt. per acre, and the price 6*d.* per lb. The cost of cultivation with standard trees, Apples or Plums, 36 feet apart, together with bush-fruit planted among the Nut-trees, would be about £15 per acre, including manure.

General Remarks on Planting Bush Fruit.—In estimating the cost of planting bush-fruit it is assumed that the land is in good heart, clean and fit for planting ; if foul and poor the extra cost of cleaning the land and manuring must be added. The cost of cultivation does not include picking (the cost of which is given separately), packing, carriage, commission on sales, rent and rates ; the amount of these items varies considerably, and must be added. The wages of labourers in different districts

will also affect any given statistics. For the purpose of rough calculation we find 20 per cent. from the gross returns covers the cost of packing, carriage, and salesman's commission.

We now come to the planting of standard fruit-trees and mixed plantations.

Plums.—Plums, Gages, and Damsons are usually planted 15 feet apart, with two rows of bush-fruit (Currants and Gooseberries) or five rows of Strawberries between. At Toddington, out of the forty varieties of Plums I select Rivers' Early Prolific, Czar, Violet, Pershore Egg Plum, Victoria, Black Diamond, Burns, Orleans, Belgian Purple, Prince Engelbert, Cox's Emperor, Pond's Seedling, White Magnum, and Grand Duke as the most profitable varieties to plant. The Pershore Plum is the Plum of our district; by many it is considered as an inferior Plum, but as a great and regular bearer we find it very profitable. It is grown from suckers, and is one of the quickest Plums to give a return after planting that I know. The other varieties named are all excellent. Care should be taken to keep the sorts together in planting, as the picking of the fruit is then greatly simplified. A good return is obtained the seventh or eighth year after planting, and at twelve years the trees may be considered in full bearing. The following extract, taken from the *Evesham Journal*, giving the prices of Plums at Smithfield Market, Evesham, from 1886 to 1891, is interesting. Per pot of 72 lbs.:—

	1886		1887		1888		1889		1890		1891	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Pershores . .	2	3	5	9	5	9	6	8	13	8	3	9
Orleans . .	5	0	11	9	11	8	11	0	19	9	11	0
Prolifics . .	8	3	14	6	13	8	19	0	24	6	14	2
Victorias . .	5	0	11	0	7	9	19	0	23	8	6	0
Damascenes .	3	4	8	0	7	1	9	0	20	6	5	4
Damsons . .	3	2	8	6	8	2	8	6	20	6	5	4
Prunes . .	4	0	9	3	8	2	9	6	27	9	7	0

For the years 1892–3–4 the prices have been about the same as in 1891.

The picking is done by the cwt.; about 8*d.* per cwt. is given for a fair crop. I have known a plantation of Black Diamonds —twelve-year-old trees—in a good year yield 10 tons per acre, and although they only averaged £8 per ton net, the crop was, needless to say, remunerative. Two to three tons of Plums per acre may be taken as an average crop, at £10 to £12 per ton.

Gages.—These should only be planted in a nice warm sheltered situation. The Old Greengage, Oullin's Gage, Bryanstone, Denniston's, and Purple Gage are all good sorts, though preference should be given to the Old Greengage and Oullin's Gage (the latter always sells well). The other varieties named are free croppers on our soil, Denniston's especially.

Damsons.—Damsons form a good shelter, and do well planted round the outside of fruit plantations. The Damascene is largely grown in the Evesham district, and, like the Pershore, may be grown from suckers; it is a free cropper, and can generally be relied upon for a crop. The Blue Prolific is a good early variety, Shropshire or Prune Damson is one of the best, and the Farleigh or Crittenden is a great cropper, and is also grown from suckers. The picking varies from 10*d.* to 1*s.* per cwt., and the crop may be taken at 2 tons per acre on an average.

Apples and Pears.—Apples and Pears may be grown either as dwarfs or standards. Dwarf or pyramid trees (Apples on the Paradise stock, and Pears on the Quince stock) produce fine fruit, and come into bearing far earlier than standard trees. At five years a dwarf Apple on the Paradise stock yields a good return, while it is ten or twelve years before a standard Apple is in profitable bearing. Dwarf trees may be planted 8 feet apart while standard trees should not be less than 30 feet apart. In planting standard Apples or Pears, dwarf trees of the same variety as the standards may be planted between. These are eventually cut down when the standards want more space. In the meantime they have been yielding good returns. Pears grow best in nice sheltered spots, and do better in the Southern Counties. Foreign supplies have enormously increased, and I recommend planting good early varieties of cooking Apples, which would come in about August, at a time when the foreign supply is at its lowest. In 1882 Apples imported amounted to 2,386,805 bushels, valued at £783,906, or 6*s.* per bushel; and in 1892 to 4,514,700 bushels (nearly double the quantity imported in 1882), valued at £1,353,812, or 6*s.* per bushel. It is worthy of note that although the foreign supply has nearly doubled in the past ten years, the price remains the same, showing the increased demand. There are many excellent varieties of Apples and Pears; the following do best in our district:—

Apples (*Kitchen*).—Keswick Codlin, Lord Grosvenor, Lord Suffield, Worcester Pearmain, Ecklinville, Grenadier, Cox's Pomona, Queen Caroline, Small's Admirable, Lord Derby, Hawthornden, New Hawthornden, and Warner's King.

Apples (*Table*).—Devonshire Quarrenden, Irish Peach, Lady Sudeley, King of the Pippins, Cox's Orange, Blenheim Orange, and Ribston Pippin.

Pears.—Clapp's Favourite, Jargonelle, Williams' Bon Chrétien, Fertility, Louise Bonne of Jersey, Marie Louise, Beurré Diel, Pitmaston Duchess, Glou Morceau, Doyenné du Comice, and Easter Beurré.

Mr. Bunyard, in his excellent work "Fruit Farming for Profit," gives the average crop of Apples as 130 bushels per acre, at 2*s*. 2½*d*. per bushel net, and Pears as rather more, but the Toddington Apple orchards are too young for me to have been able to work out any statistics.

Cherries.—Cherries are usually grown as standards, though certain varieties do well on the Mahaleb stock as pyramids. Standards should be planted not less than 30 feet apart; they do well on grass land, but *high* standards should be planted in any case, as the land, if not already pasture, will in all probability be seeded down eventually. Standards are about twelve years before they come into profitable bearing, and when they reach that age they are extremely prolific. Very large returns have been, and still are, obtained from some of the old Cherry orchards. For the best varieties to grow I would refer those intending to plant to "Hints on Vegetable and Fruit Farming," by Mr. Charles Whitehead, in which a list of the best sorts is given. At Toddington we grow Bigarreau Napoléon, Kentish Red, Governor Wood, Black Cluster, Purple Grape, May Duke, Adams' Crown, Morella (bush), Wye or Wild Morella (bush); of these Bigarreau Napoléon, Kentish Red, Black Cluster, and Governor Wood succeed best.

The cost of picking varies so enormously, according to the age and size of the trees, that it would be impossible to give any reliable figures.

General Remarks on Planting Standard Trees.—When purchasing trees for planting I should recommend the buyer to go to a first-class nurseryman; he can then rely on the trees being true to name and worked on suitable stocks. Cheap trees may

be picked up at sales, but they do not pay in the long run. It is impossible to be too particular in selecting good stocks for planting, and growers seldom realise the loss they sustain by the death of even one tree after it has been planted four or five years, and should be by that time well established and just coming into profit. Half-standard Plum-trees are undoubtedly the best—*i.e.* with stems about 3 to 4 feet high; they require no stakes, are easily pruned, and the fruit can be gathered without long ladders. In fact, in big seasons we employ a large number of women to pick the fruit from the half-standards and low trees; this is an enormous advantage. If it is intended not to lay down the land to pasture, half-standards of Apples and Pears are also preferable. As soon as the trees arrive from the nurseryman they should be carefully heeled in for fear of frost, great care being taken that the different sorts are kept separate. Good-sized holes, at least 3 feet in diameter, should have been dug ready for the trees before they arrive. In planting care must be taken not to plant too deep, and the collar of the tree should be kept just above ground, some of the top soil being used to fill in round the roots. On no account should a lot of manure be put into the holes with the trees, as this only encourages rank growth. If half-standards are planted, no stakes will be necessary, which saves a heavy item in expense. In staking standard trees the stakes should be driven in 9 inches from the tree, straw bands made of wheat straw being used to secure the tree to the stake. The straw bands can be made in wet weather in the sheds; the straw is drawn out and twisted by taking an end in each hand; after it is twisted tightly in this way it will remain twisted and ready for use. In putting it on, it is first put round the tree, then round the stake, the two ends being brought back towards the tree, all being tightly bound round between the tree and the stake with cocoa-nut fibre string. This method of tying the tree to the stakes is the best, and the trees never get rubbed. The bands should either be renewed each year, or moved a few inches up or down the stem of the tree; if this is not done injury will result. If possible, the stakes should be creosoted at the bottom (say $2\frac{1}{2}$ feet up); a great number can be done at a time by standing them upright in the tank, and they will then last for years. Many trees are killed by bad staking, and too much care cannot be taken to keep the

trees well away from the stakes, so that injury from rubbing is impossible.

In selecting trees, choose nice young stocks; they will get established and go on much more quickly than older ones. The cost of planting varies considerably, owing to the different distances apart at which the trees are planted. Standard and half-standard trees may be bought at from £5 to £6 per 100, according to size.

The baskets in which the fruit is sent to market are the pot (72 lbs.), bushel (56 lbs.), half-bushel (28 lbs.), and peck (14 lbs.). Choice fruit should always be sent in pecks, and the commoner varieties and Damsons in larger kinds. We might take a lesson from the French in packing and sorting our fruit; a little extra trouble in this way well repays us. I have observed over and over again that the same quality of fruit will realise a better price if sent in a small package than if sent in pots and bushels.

Plantations of Bush and Tree Fruit.—It may be useful to give a few examples of the way in which mixed plantations are planted:—

1. Half-standard Plum-trees 15 feet apart (planted in triangles), with Strawberries $2\frac{1}{2}$ feet row to row and $1\frac{1}{2}$ feet in the row; or with two Currants or Gooseberries between each tree, two rows of the same 5 feet apart between the tree rows, and one row of Strawberry-plants $1\frac{1}{2}$ feet apart between the rows of bushes, and two plants between each bush in the tree row. As soon as the bushes want the room the Strawberries are hoed up, but two or three crops can generally be taken. Raspberries may be planted instead of the bushes, two rows 5 feet apart and $2\frac{1}{2}$ feet apart in the row, with five stools $2\frac{1}{2}$ feet apart in the tree rows; if Raspberries are planted it hardly pays to plant the Strawberries as well—the canes the second year after planting make such strong growth that the Strawberry-plants would be smothered. Instead of planting bush-fruit in the tree row, pyramids of the same varieties as the standards can be planted one between each standard.

2. Half-standard Plums and half-standard or standard Apple-trees planted alternately 15 feet apart; the Plum-trees are pruned back as the Apples begin to encroach upon them, and are cut down when the Apples want all the space. Cherries may

take the place of the Apple-trees, in which case they eventually form the main crop. Bush-fruit may be planted as in No. 1.

3. Standard Plums, Apples, or Cherries, 36 feet apart, with two Nut-bushes between each, and two rows of Nut-bushes 12 feet apart between the standard rows. Between the Nut-bushes bush-fruit as in No. 1 may be planted (allowing for the difference in distance of the standard trees), but care must be taken not to let the Nut-bushes be overcrowded. It is best to plant standards over Nuts, as the Nuts when full-grown are about 5 feet high.

When pyramids are planted it is necessary to put up wire netting round the field to keep off hares and rabbits. Indeed, it is cheaper in the end to put up netting round all plantations where there are standard trees, though hares and rabbits may be prevented gnawing the trees by painting the stems with a mixture of clay, lime, soot, and cow-dung. This has to be renewed three or four times during the winter, and especially in hard weather, or if snow is on the ground. There are a number of mixtures advertised for dressing the trees with to keep off ground-game, and there is no doubt many of them will do so, and probably kill the trees. Any mixtures containing tar or tar oils is fatal to the trees, and it is far better to use a home-made preparation such as I have given above. The netting should be 5 feet wide, $1\frac{1}{4}$-inch mesh, and 17 gauge, the cost of it being about £2 per 100 yards. In putting up the netting let it into the ground 4 inches, and turn it 6 inches at the bottom outwards, it should also be turned 6 inches outwards at the top ; the rabbits will then be unable to scratch under or run up it and get over.

Cost of Planting Mixed Plantations.—The cost of planting depends on the state of the land, and also on what description of trees or bushes it is proposed to plant. If the land is foul it has first to be thoroughly cleaned. Nothing is more fatal than to plant trees on foul ground ; it is impossible to clean it after the bushes are planted. We assume, then, that the land is clean and in good heart, and the cost of planting a mixed plantation, such as I have described above, may be taken approximately at £24 per acre ; but if Strawberries are planted between the bushes a further sum of £5 per acre must be added, and again if pyramids are planted between the standards, instead of bush-fruit, £10 per acre must be added. This does not include

manure nor the unexhausted value of any corn or cake which may have been consumed on the land, and which would have to be paid for on taking the land over from an outgoing tenant. If the field is fenced in with wire netting, the cost of this would also have to be added.

Cost of Cultivation.—The cost of cultivating the different crops of *bush*-fruit has already been given. In mixed plantations labour will amount to £12 per acre, and £20 to £30 per acre should cover labour, picking, manure, rent, rates and taxes, marketing, interest on capital, and proportionate amount of capital to be written off each year. If £30 per acre is the capital expenditure, with a twenty-one years' lease, after the first five years £2 per acre should be written off each year, so that at the termination of the lease the capital account is wiped off.

Pruning.—In pruning Plum, Apple, and Pear trees the great object should be to get a well-balanced head, and to let plenty of light and air into the trees. Trees, when they are planted, are best cut back in the spring to five or six eyes, care being taken to cut to an outside eye. After the first year the trees do not require cutting back so hard, though the leading shoots will require shortening each year, and all cross-shoots must be removed. As the trees grow older some of the larger branches will have to be cut out to prevent overcrowding. By judicious pruning finer fruit is obtained and the tree is kept in a more healthy state. In pruning pyramid trees the same remarks apply; this class of tree, as soon as it commences bearing, requires less pruning than the standards.

Cherries will not bear pruning, and all that is necessary is to cut the trees back the year after they are planted, and afterwards to remove the cross-shoots each year.

A useful instrument for pruning standard trees is the Standard Tree Pruner (price 7*s.* 6*d.* with 8-foot handle), to which a longer handle may be fixed, enabling very tall trees to be pruned from the ground.

If the trees make too luxuriant a growth they should be root-pruned. This should be done with great care, and the fibrous roots round the stem of the tree should not be disturbed. A trench should be cut from 3 to 6 feet from the tree according to its size, and the coarser or wood-forming roots cut through.

Manuring.—Of all manures good farmyard manure is the best; but as this is not always obtainable, especially for a large acreage, artificial manure has to be used. If possible, farmyard or stable manure should be put on once in three years, and about £5 worth of artificial per acre should be used on plantations in full bearing the other years, and so on year after year. It is here that we find an analysis of the soil so useful. For example, if you refer to the analysis of the soil of a plantation, which I have already given (made by Dr. Bernard Dyer), you will observe that there is a fair amount of potash, but poverty in lime. On this soil Dr. Bernard Dyer points out that very acid manures should not be used. Bone-meal, guano, or superphosphate neutralised by mixing with an equal weight of bone-meal would answer well, and a dressing of lime would do good. It is better, if possible, to purchase all artificial manures with a guarantee, and to have a sample analysed. In young plantations it is a mistake to manure too heavily, as it only causes the young trees to run to wood. In determining what manures to use on the different crops, refer to the analysis of the soil and note what particular properties are wanting; then consider the mineral constituents of the crop, and manure accordingly. Shoddy, fish guano, leather dust, damaged decorticated cotton-cake, dissolved bones mixed with superphosphate, dried blood, horn and hoof, soot and Peruvian guano are all excellent manures for fruit.

Picking and Packing.—In picking choice fruit care must be taken with Apples and Pears not to bruise the fruit, and with Plums to keep the bloom on; also to pick all fruit for market when dry, and keeping the seconds as far as possible separate. It is better to have all the fruit brought to one central packing shed where the baskets are stored, and where a number of men can be kept constantly employed in packing, and women in sorting. Apples and Pears are usually sent to market in bushels, but the choice Pears should be packed in half-bushels and pecks. Plums are sent in half-bushels and pecks, choice Plums in the latter. Firsts and seconds should be distinguished by packing with different coloured paper—say firsts with blue and seconds with pink; this is a great assistance to the salesman when he has some hundreds of packages to dispose of and handle in a short space of time. As I have already said, we might take a

lesson from the French in the way they pack and send their stuff to market. It is a mistake to top up with selected fruit; let the fruit be the same sample all through. Buyers will soon find out those who pack fairly, and will always ask for their goods. For this reason it is better for a large grower to use his own empties entirely; his mark is soon known on the market, and his fruit, if packed fairly, will always be in request. A paper is to be read to-morrow on packing, grading, and marketing, and it is therefore unnecesary for me to say much on the subject.

Markets.—In nearly all the large towns there is now a fruit market, and as the fruit-growing industry and the demand increase no doubt more markets will be opened up. A grower will soon find out in which market the different varieties of fruit are most wanted. As an instance of this, I sold Pond's Seedling Plums this season for exactly twice as much in one market as I did in two or three others. A grower in sending to a market should endeavour to keep up a regular supply, so that the salesman knows he can rely on a certain quantity daily; he is then prepared to dispose of it, and has his customers ready. More might no doubt be done in supplying shops direct, but this is a trade of itself and requires much working up, and it takes some years to get a good connection.

Injurious Insects.—There are many insects injurious to fruit-trees; in fact there is not a single fruit tree or bush which has not its enemy, and as soon as the enemy appears let it be war to the knife. The more fruit-trees we plant the more food do we give to the insects which prey upon them, and we make it the more difficult for Nature to assist us in keeping them down. Artificial means must therefore be resorted to. It would take up too much space in this paper to refer to all the pests in detail which fruit-trees suffer from, and growers cannot do better than refer to Miss Ormerod's "Manual on Insects Injurious to Fruit Trees," and some useful hints may also be obtained from the "Report of the Evesham Committee on their Experiments to Counteract the Ravages of Insect Pests," to be obtained from Messrs. W. & H. Smith, Bridge Street, Evesham, price 6*d.*

Returns.—We will assume a mixed plantation is planted this next winter. Next summer the returns will be *nil*; the summer following (1896), if Strawberries only have been planted with the tree-fruit, they should pay expenses. Other bush-fruits which do

not come so quickly into bearing will not pay expenses until 1897, when bush-fruit of all kinds should give a good profit. From a field planted with half-standard or standard trees, Black Currants and Strawberries, the net return should be £20 per acre, and the average annual return for mixed plantations may be taken at that amount, though in some seasons it would be far more.

General Remarks.—I have now, as far as time and space will permit, touched briefly on some of the main points connected with fruit-growing on a large scale, though I have omitted the subjects of Bees, and Osier-growing. Both of these should be adjuncts to a large fruit-farm. Nature requires assistance in the fertilisation of blossom where large tracts of fruit are planted; the Bees will do this, and a profit should also be made from the honey. Osiers can be grown on the damp wet spots, and will come in for basket-making, and the grower will find that it is far cheaper to grow his own Osiers and make them into baskets than to buy baskets.

If we turn to the Statistical Abstract for the United Kingdom, we find that the acreage of orchards, arable or grass land used also for fruit-trees, in Great Britain, was in 1878, 165,415 acres; in 1892, 208,950 acres. Market gardens, in 1878, 37,273 acres; in 1892, 83,081 acres.

Again, if we refer to the Trade Returns, we find that the imports of fruit from foreign countries increase each year. Take, for example, the imports of Apples and Plums in August 1893 and August 1894:—

	August 1893	August 1894
Apples . .	223,923 bushels	338,310 bushels
Plums . .	263,972 „	422,866 „

The Apple crop in this country being short this year, the increase in the import of Apples is not to be wondered at; but when we see the enormous increase in the total quantity of Plums imported, in spite of the heavy crop in this country, with low prices, how can it pay the foreigner to ship them at a profit? The answer is, because the railway companies favour the foreigner to such an extent that he can put his goods on the English market at less expense than the home grower can. A *Times* correspondent gives excellent proof of the systematic manner in which the railway companies foster the Continental

fruit trade at the expense of the British grower :—" The rate on fruit in one-ton lots from Folkestone and intermediate stations up to London is 25*s.* 7*d.*, with an extra charge for returning the empties. Should, however, the fruit be of French growth, and the point from which it is despatched Boulogne, the rate is 12*s.* 5*d.*—less than one-half of what is squeezed out of the home grower—and the empties are returned free. It is these preferential rates, and the oppressive manner in which they bear upon the fruit-growers, that crush the heart out of whole districts, and help to create the statistics quoted with wearisome but necessary iteration against the food-producing capacity of this country." * The present preferential rates favouring the foreigner is a question of vital importance, and growers should unite and do all in their power to induce the railway companies to meet them and to re-adjust the rates.

Assuming that during the next twenty years the acreage under fruit in Great Britain, and the imports, increase as rapidly as during the past twenty years, the question arises as to whether or no the supply will exceed the demand. If we look at the enormous increase in the consumption of fresh fruit, and also of jam, throughout the country (the number of jam factories with their trade increasing each year), and the increase in the population, it hardly seems possible that, at all events for many years to come, fruit-growing can be overdone.

Jam is now within the reach of all classes, and if only fresh fruit could be distributed as easily, there would be no fear of markets being glutted. In almost all the large towns throughout the country there are fruit markets, and there are many towns with no fruit market in which one might be advantageously held say once or twice a week. This season we have heard of Plums

* Extract from the *Evesham Journal*.—[Editor's note :—The Secretary of the South-Eastern Railway, refering to the above, writes to us : " The paragraph quoted from the *Evesham Journal* is absolutely incorrect. The rates from Folkestone to London (station to station) are 15*s.* 1*d.*, 18*s.* 3*d.*, and 21*s.* 4*d.* per ton, according to the kind of fruits. From intermediate stations between Folkestone and London the rates are relatively lower.

" The rates from Boulogne to London are 32*s.* 6*d.* and 40*s.* per ton (quay to station), the larger proportion of the fruit paying at the rate of 40*s.*

" All empties are charged for, whether to local stations or to Boulogne."

The Editors would point out that the writer of the paper is in no way answerable for what appears to be a gross misrepresentation, but the editor of the newspaper which gave publicity to the statement.]

being sold in Devonshire and other counties at 6*d*. per score, and as being difficult to get in any large quantity even at that price. Surely this points out the defects in the distribution of fruit and the difficulties in bringing the consumer in touch with the grower.

A large fruit merchant in Burnley (Lancashire) tells me that there is ten times the quantity of fruit used in that town to what was used twenty years ago. A Nottingham fruit merchant states that until within the last twelve years the business in the fruit trade was exceedingly small; in fact, that local supplies satisfied the demand, but since then there has been remarkable progress, and he now sells forty packages where he sold one twelve years ago. In Leeds, in 1823, the fruit market was held in the street; in 1854 there were only three wholesale fruit merchants; in 1877 buildings were erected, and there are now fifteen wholesale fruit merchants in the market, all doing a large trade. These three examples show the enormous strides which have taken place in recent years in the fruit trade in large towns.

It would be a great advantage to growers if they could pulp down some of their fruit in seasons of glut; this is not so difficult as some people imagine, and is quite worth consideration. At Toddington we are fortunate in having a jam factory in the centre of the fruit farm, and, practically, the whole of the bush-fruit, comprising Strawberries, Black and Red Currants, Raspberries, and Gooseberries, and the greater part of the Plums, Gages, Damsons, and Cherries, are converted into jam by Messrs. T. W. Beach & Sons, Limited. The fruit as it is picked, instead of having to travel by rail, is carried direct from the bushes and trees to the factory, where it is turned into jam. A very high-class preserve is thus made from the fresh fruit. Another great feature in Messrs. Beach's business is their bottled fruits, which are excellent.

Foreign competition (with the exception of Apples) ought not to materially affect our fruit trade. Soft fruit from abroad cannot be put on the market in as good a condition as the home-grown, and as the public taste becomes more educated, the more demand will there be for fresh fruit and pure jams. Jams made from imported fruit and pulp cannot compare with that made from fresh-gathered fruit.

Discussion.

Mr. Smith, of Loddington, near Maidstone, opened the discussion. He said that of course great allowance had to be made for different districts; as, for instance, in his district they had no market for yellow Plums, and the Pershore variety so largely grown in some places was practically worthless to him. He strongly agreed with the writer of the paper, that only the best trees should be planted. Cheap trees were the most unprofitable things that anyone could buy.

Mr. Hammond, of Pilgrim's Hatch, Brentwood, said he believed that at one time their Kentish friends imagined they had got all the good soil available, and that the rest of the country had the leavings. Whether that were so or not, he and his family had for the last fifty years held their own at Spitalfields and elsewhere. Fifteen years ago he had a dispute with his landlord. He had planted a large area with fruit, and when the lease ran out the landlord refused to renew it. After another similar experience, he decided that farming under that gentleman would not pay, so he took another farm, which he had since purchased. No one should plant under less than a twenty-one years' lease. Farming could then be carried on with greater confidence and more interest. With regard to yellow Plums, the secret with them as with all else was to grow only what there was a market for. He had every reason to be satisfied, and he was not going to throw up the sponge, despite foreign competition or preferential rates. If they produced fruit as good as they possibly could, and sent it to market in the best possible condition, and only used common sense in growing, they could hold their own.

Mr. Basham, of Bassaleg, Newport, Mon., said that he had learnt a great deal from the paper. He had taken an interest in fruit-growing for some years past. So far, he had been successful, although he was living somewhere near the mountains of Wales. Although in many parts of the country the past season had been a failure, yet he had taken sufficient Apples from trees which he planted last winter to pay for the cost of the trees, and when he saw the exhibits that day he felt sorry that he had not competed. It was not fair that the English farmer should have to compete unfairly with the foreigner, but still he saw no hope

in having protection granted, and he had come to the conclusion that if they were to beat the foreigner at all it would be by producing a better class of fruit than the foreigner was able to place upon the market. Last year at the Drill Hall he saw an exhibit from Nova Scotia. What he then saw was worthless compared with his own produce. Mr. Wise considered that five tons per acre of Gooseberries made a pretty good return, but during the past season he had himself over eight tons per acre of splendid fruit. Pears had done remarkably well, and those referred to by writers to the newspapers must have been grown on trees that had not been properly pruned and manured. From what he had seen that day he was determined to persevere.

Mr. CHEAL, of Lowfield, Crawley, Sussex, alluding to the *Times* correspondence already referred to, said they heard a very different tale from men of practical experience. It was only the disappointed who could find time to write to the papers. The successful were far too busy at this time of year to be able to spare any time for newspaper correspondence. He thought the solid facts given in Mr. Wise's paper would do a great deal of good in contradicting many erroneous statements which had so lately appeared in the daily newspapers. By exercising forethought and care in planting he had no doubt but that fruit cultivation was remunerative, but he warned novices against rushing into fruit-farming without looking to the end; because if they did not know what they were aiming at, they would not know where to begin. Markets had to be considered, soil had to be taken into consideration, and if this were done they would hear far less about failures and unprofitable plantations, and the doleful stories related in the Press. He considered that in the preserving of fruit we had one of the most important operations for the future, because up to the present in a season of glut fruit was either wasted or sold at an unremunerative price. He always endeavoured to have bottled fruit on his shelf. If the fruit were properly bottled it could not be distinguished from fresh fruit.

Mr. D. T. FISH, of Bury St. Edmunds, said that in the matter of cultivation he was sure that dealing with the tap-roots was the very centre and keynote of modern fruit-culture. The tap-roots had been the ruin of fruit-culture in thousands of gardens and orchards; indeed, he was not quite sure whether

it was not owing to the tap-roots that so many writers in the *Times* had lately been making such doleful misrepresentations. If the tap-roots of fruit-trees were allowed to make tracks for Australia (to go down into a cold or ungenial subsoil), there was no wonder that the Pears were but a little better than hard sticks. Every tree was worth a stake, or it was not worth planting. He was quite in sympathy with the meeting on the question of railway rates. The preserving of fruit was a question of immense importance. Prices varied because fruit was so perishable.

Mr. Wise, in responding to the vote of thanks, would not be drawn into the subject of tap-roots. He, however, said that he "believed that tap-roots should be stopped, and that if Mr. Fish thought he used tap-roots instead of stakes for the trees at Toddington he was greatly mistaken!"

Madame de Salis asked whether the tap-roots should be cut before or after the planting.

Mr. Fish replied that they should be cut before planting. The tap-root was antagonistic to the production of fruit, and only went to the making of timber.

A vote of thanks to the Chairman closed the second day's Conference.

On the third day of the Conference, Tuesday, October 2, the Chair was taken at 3.30 p.m. by Philip Crowley, Esq., F.L.S., Treasurer of the Royal Horticultural Society and Chairman of the Fruit and Vegetable Committee.

GRADING, PACKING, AND MARKETING FRUIT.

By Mr. George Monro, F.R.H.S.

When Mr. Wilks wrote asking whether Mr. Webber or I would contribute a paper on packing and marketing, I at first declined; but I found it was no use my doing so, for, as a great many of you have no doubt found, if our Secretary sets his mind on anything connected with the Royal Horticultural Society, it is almost

sure to come off. I quite think that it is mainly attributable to his unceasing energy that we have such a magnificent show here to-day; and when our Secretary does so much, we all feel we must help as far as lies in our power, and although Mr. Webber is not speaking here to-day, it is not for want of interest in the matter, but only because he found it impossible to be present; but he has gone over the different points of this paper with me, and his ideas agree with what I shall try to lay before you. With this introduction I will at once proceed to the subject.

1. I propose in the first place to note how we pack now compared with, say, twenty years ago.

2. To compare our methods with foreign methods, in respect of the same fruits.

3. To see if we can improve our methods, especially where we fail in comparison with foreigners.

4. The great importance of keeping pace with the times, in order to compete successfully with foreign trade.

1. Twenty years ago Grapes used to be brought to market by growers near London in punnets holding 2 lbs. to 4 lbs., or sent by rail in all sorts and sizes of boxes. But as the trade grew it was found impossible to sell the quantity in this way, and at the present time the handle basket, holding on an average 12 lbs., is found most suitable for Grapes that have to be transmitted by rail, and the "shallow" in a "flat" for those grown near London and sent in by vans. The grading is being continually improved as the quantities increase, some senders making three or four different samples of Grapes out of the same house, and this is of the greatest help to the salesmen in obtaining the best possible price, and in giving every customer the quality he requires.

Peaches used to come in punnets from local growers, and in all sorts and sizes of boxes; now we have a uniform box containing from eighteen to thirty-six fruits, according to size, and customers know how to order the sizes they want of different growers, and will often take them without even seeing them. Before I leave Peaches I should like to make one suggestion to growers for market, and that is, to bear in mind that we want colour as well as size; the proportion of pale

and small Peaches increases every year, and the result cannot possibly be satisfactory. I ought also to add that we think wood-wool a very unsuitable material for packing Peaches.

Forced Strawberries still come in the flat punnets of ½ lb. or 1 lb., the old pottle being quite lost sight of, but with increasing quantity growers find it pays best to sort into two or three sizes, and by having uniform boxes containing so many punnets it simplifies the sale very much; and when you consider that we have to handle from half a ton to a ton of forced fruit between 8 and 11 in the morning, you will see that every facility or quick sale is necessary.

Cucumbers used to come in punnets of six each, or all sizes of boxes, but now in hampers containing two to three dozen each, and it is no exaggeration to say there are sometimes upwards of 2,000 hampers received in Covent Garden Market daily from March to July.

Tomatos were scarcely known on the market twenty years ago, but the supply now is simply enormous, those grown near London being packed in "strikes" or pecks, each containing 12 lbs. The best growers grade into three or four sizes, so that each "strike" contains as nearly as possible one uniform size; those coming by rail are packed in handle baskets. The baskets should always be lined with paper, and the stalks cut off quite close to the fruit, in order to prevent them wounding one another.

The above comprise the staple market fruits grown under glass, and I wish you especially to note that we have year by year continually improved on the packing and grading of each. We will now turn to outdoor fruits, and I will take them in rotation as they ripen.

Strawberries are sent in punnets from the smaller, and in pecks from the larger growers, and I do not think we can improve on the Kent method of a box containing sixty upright punnets each. The pecks also are suitable, as the softness of the fruit requires plenty of ventilation. In Strawberries we need have no fear of foreign competition.

Cherries, Currants, and Gooseberries come next, and the peck and the half-bushel used are to my mind the most suitable, as they, too, need ventilation; at the same time the French are far ahead of us in the neat and stylish way in which they put

theirs up, the finest Cherries being in small square baskets containing 4 lbs. to 6 lbs., the basket being given in with the fruit and their early Currants come in flat handle baskets holding about 6 lbs. each. As the foreign Cherries and Currants are naturally much earlier than ours, we do not feel the competition so much as in the later fruits.

Plums come next. They also are packed in this country in pecks or half-bushels, but as a rule with much less care than those coming from the Continent, and although a half-bushel should contain 28 lbs., it generally varies from only 24 to 26 lbs. There is an unwritten law what each package of the different fruits should weigh, but growers are very much afraid they should exceed it, and consequently seldom reach it.

Apples and Pears are next in order, and these are what I imagine we have principally to consider to-day. They are *sent* in bushels and half-bushels; I cannot say *packed*, as the bulk are simply just *thrown in*, without any grading or packing being taken into consideration at all, in some cases only a sheet of very thin paper being placed on the top, and nothing else whatever to prevent the fruit being bruised by the basket. A customer of mine suggested the other day that a sample looked as if they had been "gathered with a clothes-prop and packed with a rake." These fruits are certainly packed *worse* now, on the whole, than they were twenty years ago, and as the competition from abroad is keener every year, it is very important that we should stop to consider whether we cannot improve matters somewhat.

Having recounted our present British methods, I will now compare them with the foreign ones. The hothouse fruits are not much affected as yet by competition, mainly owing to the enterprise of our market gardeners in this branch, who have certainly up to the present led the world and kept pace with the times. But when we come to hardy fruits, such as Cherries, and more particularly Plums, Apples, and Pears, everyone, whether in the trade or not, must at once confess that the worst packed produce coming on any market is the home-grown; and although we have continually improved where there is no competition, we have degenerated to a great extent where there is, and have so far played into the foreigners' hands who study the requirements of the trade, and try in every possible way to

meet them. There are, of course, some growers who pack fairly, especially in Middlesex and Kent, but none of them, to my mind, take sufficient care, neither can the best of them compare with the foreigners. In Pears we are lamentably behind. Of course I grant that the French have a great advantage over us in climate, but, if you take an equal sample, the Frenchman would grade into sizes and pack carefully in layers, with no stint of paper, and would certainly net a far better price in consequence; and it is the same with nearly every fruit we get from abroad. Even the Oranges and Lemons, when not worth more than 2*s*. per bushel, are each wrapped up separately in paper, which not only protects the fruit from bruising, but if one goes rotten it is not so likely to affect the others. I wonder what our growers would think if they had to take such trouble with Apples at that price! Our methods did fairly well when fruit was all consumed in London, but growers do not take into consideration that, as quantity increases, a greater proportion must go by rail, and must be packed accordingly; and they also appear to ignore the fact that, ours being a damper climate, with frequent rains while the fruit is ripening, it requires more care than if it had been grown in a drier climate, where there is often no rain at all during the ripening season.

It is quite clear that in the packing, &c., of outdoor fruit we cannot compare with foreign growers. We will now see why this is so, and if anything can be done to improve our methods. I think a great deal of the bad packing is owing to the fact that fruit-growers are not practical gardeners, but generally belong to some other business, and think that no trouble or care is necessary. When we get fruit from *bonâ fide* gardeners or nurserymen there is much more care taken, as they understand the necessity of it, though they often err in letting it get too ripe to stand the journey. But as we get farther and farther afield, as we do every year, we find the packing gets worse. It almost seems as if farmers thought they had done everything when they have just planted the trees. They do not seem to imagine that there is any art or skill required in either the fruit-growing or fruit-packing; indeed, I often fancy that good packers, like poets, are born, not made.

In regard to hothouse fruit, then, I think that we have kept steadily improving. The main thing to remember is to pack

firmly, and not allow any room for oscillation, which damages the fruit every time the package is moved.

Where we most need improvement is in the packing and grading of Plums, Apples, and Pears, and I think the bushel and half-bushel baskets must in time be superseded by boxes, to be sold with the fruit. At present the bulk of growers wait until the crop is ready, and then expect their salesmen to be prepared with an unlimited number of baskets at a day's notice for each crop, and it is a very rare event for a grower to give any idea whether his crop will be a heavy one or not. This system is becoming more and more impossible every year as orchards increase. I think that growers ought themselves to be prepared, according to the crop they are likely to ripen, with suitable packages in which to market their fruit, and then we should not hear of so much fruit being wasted whenever there is any great quantity. In the case of Plums, I think that some other system should be adopted in full seasons, such as drying or bottling, to prevent the whole being put on the market in a few weeks, as at present. It is unreasonable to imagine that it can all realise a good price when it is forced upon the market in so short a space of time. It often happens that by the time the trade in them has been awakened they are already beginning to get over and scarce. Growers should also study to have a succession of popular varieties, so as to make the season as long as possible, not earlier so much as later, to avoid clashing with the foreign Plums. We are now (October 1), for instance, making 10*s*. per bushel of Victorias, while the bulk were sold at 3*s*. All other fruit-growing countries but ours are prepared with a system to save part of the crop, and, as quantities increase amongst ourselves, we too must study this question. I don't think the surplus can ever be all profitably used in the shape of jam, but there are surely other ways of keeping such fruit as Plums.

I pass on now to packages for marketing, and I say that it is impossible for salesmen to cope with the quantity, especially in baskets, and I will endeavour to show the advantages of growers finding their own unchargeable boxes.

First, they would always be able to get sufficient at a few days' notice for any crop they might have, so that no fruit need be wasted on that account. A skilled basket-maker can only make on an average eight bushel baskets a day, while boxes can

be put together by the hundred by any unskilled labourer, from wood cut into sizes by steam mills, and wood is cheaper every year, and willows dearer.

Secondly, they could brand each box with their own name or mark, and also with the name of the fruit, the particular variety, and the size, and so give customers an opportunity of seeing whose goods they were buying. This, I find, always affects sales favourably, as retailers know better than salesmen how each grower packs his goods.

Thirdly, they could obtain a cheaper rate of transit, and also a cheaper commission, salesmen having no outlay to make on baskets, and this outlay is becoming a greater expense every year, and increases in greater proportion than the mere increase of fruit, as after London is supplied all the remainder must go away, and baskets are often months before they are returned; consequently it is frequently the case that a bushel or half-bushel is only used once during the season, and then, perhaps, warehoused for years.

Fourthly, to cash buyers cases are a great inducement, as they can lay out all their money in fruit, and not, as at present, have to leave from 25 to 50 per cent. deposit on the baskets, with the trouble and expense of returning them. This is a great tax on buyers at a distance. If you consider that we have, say, 1,000 cash buyers, with an average of £10 each, which they intend to spend, at present they can only buy £6,000 to £7,000 worth of fruit, the remainder being left on the baskets; and so we lose the sale of £3,000 to £4,000 worth of fruit, besides crippling an industrious class, by compelling them to work part of their capital at a loss, while every shilling is a great object to them.

Fifthly, without this inconvenience trade would develop far more rapidly amongst the grocers, who already are a very great help in distributing fruit, but who will not take up English fruit because of the bother of returning and being responsible for chargeable packages.

Sixthly, growers would be independent of any particular market or salesman, as they could then send their fruit wherever they thought they could do best with it, which they cannot do now, owing to the difficulty of obtaining baskets.

Seventhly, Apples and Pears especially would travel much better closely packed in cases, and would open out clearer, and ot

a better colour, as they do not require so much ventilation as softer fruit.

I am fully convinced that the advantages I have shown would induce the buyers to give more money for fruit carefully graded and packed in unchargeable boxes, and each grower would have an opportunity of earning a name for packing which would half sell his crop in the succeeding year.

In grading we have very much to learn from the foreigner, and it is most important. If fruit be sent to market unsorted the buyer of best fruit cannot give full price, as the small is of no use to him; neither can the cheap buyer, because his trade does not permit him to make full value of the best; but if it be graded each customer can have the size to suit his trade, and so the crop would realize far more. The Orange-packers have screens that every fruit is put through. For instance, in Florida the boxes are uniform, and each box contains fruits that do not vary an ounce, and every buyer knows without seeing it exactly what a 200 or a 150 box will be as regards size. This system of grading and numbering is also practised by the French in packing Pears.

The last suggestion I shall make is for the freer use of paper. To see the immense quantity of good Pears and Apples spoiled in England for lack of sufficient paper being used is perfectly heart-breaking; and yet paper is cheaper every year. When packed in sieves there should be at least two thicknesses of stout paper between the fruit and the basket, as well as between each layer, and on the top. If I spoke all day I could not mention anything more important, especially in packing Pears, than the free use of paper. I will guarantee that every Apple and Pear at this show came separately wrapped in paper, as well as gathered carefully —not with the clothes-prop. And if necessary for a show, why not to get them to the consumer, to reach whom they may have to go, not one, but several railway journeys? Every ream of paper used would earn its value ten times over. The French use old newspapers, which are much better protection than the thin miserable stuff our growers mostly use; and newspapers are surely plentiful enough now. With a more liberal use of this, and less of the damp packing so generally used, which causes the fruit to rot more quickly, better prices would be made, especially with soft fruit, such as Cherries and Currants.

In conclusion, I will say that all fruit is the better for care in

packing; but no amount of care will make bad fruit good. There is plenty of rubbish sent up to the market at present which only spoils the sample, and is never fit for human food. If these remarks of mine are taken any notice of, I am sure the fruit-grower will reap a benefit, and the salesman will have a business in which he could take an interest and pleasure, instead of, as at present, dreading the time the outdoor fruit commences; and last, not least, we should keep many hundreds of thousands of pounds in this country which now go to the foreigner.

At the conclusion of his paper Mr. Monro read the following letter, which he said he had just received from the manager of one of the finest retail fruit businesses in London:—

"The arguments now so popular on the question of British-grown fruit can hardly be said to be fairly contested without the opinions of the retailers, and at the Royal Horticultural Society's show you may have an opportunity of putting before the growers some of the difficulties we retailers have to contend with in the purchasing of home-grown fruit. There are two essentials our own growers have overlooked, the absence of which compels us to depend much on the foreign markets for our supply. It can never be doubted by those who have had much to do with the foreign (especially the French) packers that they are far in advance of our own people in this necessary art. There is so wide a difference between the packing and sorting of our own growers and that of foreigners, that English outdoor fruit in the high-class trade has actually become a by-word. I will give you an instance of a practical change having been made in this direction. Until recently one of our large growers of Apples, who could always in a fair season send to market large, handsome, well-coloured fruit, put it into the ordinary bushel baskets, heaping measure. The consequence was (and a common error too) that this fine fruit when ripe for use showed cuts and bruises unsightly for table use, thus disfiguring and destroying the beautiful appearance of fruit which otherwise would have commanded a far higher marketable price. This man has learnt his lesson, and now adopts the plan of sorting and carefully packing into the same baskets, but not with more than three layers or so of the best fruit, according to their respective sizes, thus securing a better profit to himself, and to the retailer as well. I know

another grower who always takes the trouble to sort and pack carefully his wall-fruit, with the result that, when occasionally there have been very over-abundant crops, *his* fruit has always been looked for by the retailers, and sold at as high a price as in any of the previous short-crop years. The fault, I fear, is generally due to the grower being so busy with other duties on his farm that he pays no attention to the sorting and the packing of his fruit; and so it comes to pass that though so much is grown yet we have great difficulty in purchasing any large quantities of really fine and reliable fruit. The price, if the consumer requires it, is no object, if only he can get his fruit regular in size to make up his dishes for the table. In buying parcels of high-class fruit we cannot afford to be hampered up with 75 per cent. of 'chats,' cripples, &c. The consumer little knows that what he thinks he is paying a good price for are taken from the surface only of the baskets purchased by us. Would it not be better, especially in a heavy-crop season, for the grower to send only the cream or pick of his growth, well sorted and packed, and get a fair price, and let us be without the second-rate stuff we are now compelled to buy. The grower, if he were to do this, could well afford to let his rough stuff lie upon the ground. It is want of prudence that makes our markets glutted with so much rubbish, which we know, after expenses of carriage, toll, &c., have been paid, often finds the sender actually out of pocket. It is rather humiliating for an English fruit-grower to own that fruit coming 8,000 miles arrives in this country in a more perfect condition than that sent only ten or twenty miles, but it is no less a fact. I have seen English Pears sent in single-layer trays, packed on naked straw, with the result that every single fruit bears marks upon it, as on the back of the youth whom the grower has just flogged for stealing his Apples. This, of course, is due to the lack of knowledge in the art of packing.

"Another common mistake is for the grower to suppose that he profits by 'feeling the market,' *i.e.* by sending just a few 'halves' of his picked produce, thus preventing the retailer from purchasing enough to make stacks of really choice stuff; he can never depend on running on any large parcels, he must for ever be picking up 'odd lots' to enable him to make any show at all. How long this state of things is to last rests entirely with the grower, if, at least, he can only be induced to pay greater atten-

tion to the sorting and packing. To supply the needs of the high-class consumer he must keep pace with the times, and his efforts in glass-house fruit have certainly prevented the foreigner from sending to advantage at least Peaches and Grapes. In these two importants items 'English' is now a household word. How long, then, will he blind his eyes to the fact that, in order to make any material change with regard to outdoor grown fruit, so much of which at present comes from abroad, he must take a few lessons in grading, sorting, and packing? The cultivation of the best varieties in our English orchards is no doubt an important item, but how to deal with the crops in the way of sorting and packing is a still greater one, and there can be no better school for the English grower's education in these two branches of his work than to watch his neighbours on the other side of the Channel, and learn to adopt their methods of careful and systematic grading, sorting, and packing."

FRUIT-SPRAYING.

[The following paper was picked up in the Conference Hall, and as the presumption is that the writer had intended to read it, we have given it a place in our record.—EDITOR.]

FRUIT-SPRAYING among practical growers is now acknowledged to be as essential almost as the annual pruning; in fact, those growers who have adopted one or other of the various methods of spraying with insecticides or washes, have already found the advantages to be gained, not only in the increased crops, but in the better prices obtained for their fruit in the market.

It is only during the last few years that the large growers have realised the advantages of having their orchards well cleansed, and I can say that those who have seen the effects now see the advantages of doing their trees well and often; in fact, they seem now more alive than ever to the necessity of spraying, and any improvement brought out in this direction is readily accorded a fair trial; and though there are now good

spraying machines in the market, I feel convinced that the various makers are all so keen for their own as well as their customers' interests that we shall see still further improvements upon them. One thing is certain, unless we study this thing, and quickly, we shall have our Colonial competitors cutting us out in our own markets.

In Tasmania the Government have passed a law (52 Vict. No. 16) making it a finable offence for a farmer to omit to cleanse his orchard. "The Colony of Tasmania is divided into thirty 'fruit districts,' to make better provision for the destruction of the Codlin Moth (*Carpocapsa Pomonana*). Every person who sells, or offers for sale, any fruit infected with the moth is liable to a penalty of £5.

"Bandages to be placed upon the trunks of the trees not later than December in each year.

"Farmers shall remove all rough and scaly bark from trees, and burn or otherwise effectually destroy such bark as soon as removed."

Similar methods are in use in Australia. There are persons appointed by the Agricultural Bureau in each district (I believe there are eighty odd districts in Australia, and over thirty in Tasmania) to see that the law is not evaded.

During the past summer of 1894, A. Cayley Smith, Esq., whose father is a large grower near Adelaide, has been over here studying our various methods of fruit-spraying. This gentleman also visited the orchards of California, where he informed me they are far in advance of us here. Generally speaking, Mr. Smith thought they had an advantage of us also in Australia, in the sense that over there every fruit farmer is obliged to go in for some method of washing his trees, whereas only a small percentage of the growers here have made any attempt in this direction. Of the various districts I have visited during the past year, I certainly think in the counties of Worcestershire, Hereford, Gloucestershire, and Kent the greatest advance has been made in this respect; and on the various fruit farms around Evesham and Pershore spraying now seems to be the rule, not the exception.

Some growers are prejudiced against fruit-spraying, owing to having had the misfortune to scorch the foliage or young fruit when so doing. Generally speaking, this is the result of a bad

insecticide, or the injudicious use of a good one, perhaps having mixed it too strong. But amongst growers who are regular users of insecticides one very seldom hears of this so-called scorching, even when using Paris-green or London-purple—(these two in particular should always be used with caution, and never where there is a ground crop).

Again, many farmers object to the cost of the machines; but surely this is false economy—it is better to invest in a good machine and enhance the value of your crop.

The prices of machines vary according to the size of the orchards they are required for; but, generally speaking, a washer to hold from sixteen to twenty-four gallons of liquid is about the handiest size, especially where the ground is rough. These machines will cost from about £9 up to £15.

Some growers use a small knapsack pump, a very handy machine for spraying Gooseberries or young standards, but where the trees are high it is almost impossible to reach the higher branches with them.

Many farmers mix their own washes, such as paraffin and soft soap, quassia and soft soap, &c., but there are now so many well-known and well-tried insecticides in the market, which do not cost more than home-made mixtures, that it is really quite as economical to use them, and avoid all the trouble and expense of boiling down for oneself.

Discussion.

Mr. Cheal, who opened the discussion, said the subject was of the utmost importance to fruit-growers. Mr. Munro had not laid too much stress upon it, and if growers would only follow his advice the result would be most satisfactory. We could learn a good deal from the French in these matters. The great thing to be aimed at is to place the fruit before the consumer in the same condition as when it left the grower. They had all seen the mauling and mangling of fruit, and many growers could scarcely recognise their own produce a few hours after it had left their establishments. Some time ago he had the pleasure of listening to Mr. Monro when this question was discussed in another place, and he was very much struck by a remark made by Mr. Monro to the effect that foreign fruit, although it came

into the market before the English fruit was ripe, did not act against our own growers. It only opened the way for the consumption of the English product when it was ripe. Foreign fruit competition was not, therefore, an unmixed evil. With regard to the preservation of fruit, a lamentable waste of soft fruit occurred, and he thought we were only just beginning to wake up to the idea that it was possible to preserve fruit so that it might be useful throughout the year—not only as jam, but for other domestic purposes, to which bottled, dried, and candied fruits could be put. He knew for a fact that their Chairman (Mr. Crowley) had been most successful in drying Plums in an ordinary kitchen oven.

Mr. Archibald Weir (Ottery St. Mary, Devon) said:—I was perhaps one of the first small growers in England to use boxes for packing my fruit, and what led me to do so may possibly interest you.

The variety of Apple that I principally depend on is Cox's Orange Pippin. Of my 500 established trees, planted in 1890, about 250 bore more or less of a crop in 1893, the remainder being worked on a less precocious and prolific stock. All the more vigorous trees prospered greatly, and some of the fruit attained a size and colour which I had supposed could be reached only under glass. The fruit of a few dishes weighed 9 oz. each on an average. Of course it matured six weeks earlier than usual, owing to the hot summer, though happily it defied more successfully than most sorts the attacks of wasps and birds. The trees had their share of blight to contend with, but after a thorough washing they recovered very readily. Ultimately I succeeded in getting indoors a very fine crop of fruit; and, as the best methods of packing and marketing first quality Apples had formerly engaged much of my attention, I determined to put to the test the system that I had worked out.

At the outset I was unable to find any sort of basket fit for Apples to travel in. Apples require to be packed tightly, without risk of rubbing against an uneven surface or against each other. No basket is sufficiently rigid to obviate considerable attrition, and all baskets present only knobby projections for the fruit to press against. Boxes, on the other hand, can be made as rigid as is necessary, and, with the help of a little suitable packing material, they present a surface against which a sound Apple

can be safely and securely pressed. Boxes, too, can be fastened easily; they can, moreover, be made cheaply enough to be given away with valuable fruit, on the supposition that it pays to spend 25 per cent. of the gross return on packing and freight. This last supposition I accept unreservedly, in the belief that by no other means can foreign competition be defeated. The proportion, I imagine, would not seem extravagant to foreign growers.

As the Apples were brought into the fruit-room they were sorted into three grades, of which the medium and most numerous size ran on the average eighteen fruits to 5 lb. in weight. It is this relation of number to weight which is the basis of my packing and marketing. The box which I found cheapest to buy and most convenient to sell, when dealing with dessert fruit, is a shallow one with wire hinges, which holds eighteen Apples weighing 5 lbs., when they are set on their bases. It will also hold twenty-eight Apples of the third grade when they are set on their sides; and these, too, weigh 5 lbs. or a trifle more. The first grade includes all those Apples which are too large to be packed properly in a 5 lb. box, and which are fine enough to sell by the dozen. The packing material employed is wood wool, a layer of which is placed at the bottom of each box. The Apples are then placed on it, partially wrapped in slips of pink paper, which cover the fruit as far as the sides come in contact with one another. The paper slips, therefore, help to prevent the Apples bruising one another, and also enhance the colouring. Finally, another layer of wood wool is placed on the top of the fruit, so as to fill up the box quite tightly, when the hinged lid is tied down as firmly as possible with a single string. It is important to remember that both the boxes and the wood wool must be made of white or non-resinous woods. All the boxes are marked by stencil plates with the grower's mark and the name of the fruit, and they are tied up in bundles of five for travelling.

Now, not only are the Apples so securely packed by this method that they will remain for weeks in their boxes without damage, but the article of commerce thus produced admits of such exact definition that agreements to buy and sell can be entered into between the grower and retailers without the help of any market or salesmen. At first, negotiation must be based on a sample box; afterwards, variations as to weight, colour, ripeness, and blemishes can be specified in words.

Further, the 5-lb. boxes are well adapted for selling across the counter without breaking bulk. The fruit itself looks most attractive when packed in this style; the size of the package suits most ordinary households; and the box itself is decidedly worth having. The retail price, too, would generally keep within half-a-crown—a coin which no one would grudge for a good sample of the article, but which many housekeepers would hesitate to exceed. To the retailer himself, selling without breaking bulk saves so much trouble and loss that he can afford to encourage the system by generous prices.

The extra large selected fruits, on the other hand, should be sold by the dozen, and should be defined as being within certain limits of weight. They are packed in large boxes—otherwise used for cooking Apples—which will hold about three dozen dessert Apples, averaging 7 oz. each. Each fruit is carefully wrapped in soft paper, and abundant wood wool is placed between the layers.

Mr. Archibald Weir went on to say that he had compared a Kentish grower's transaction with his own as follows:—

Statement of Sale of 50 5-lb. boxes to Retail Trader.

	£	s.	d.
50 boxes, with complement of wood wool, paper, and string, including cost of carriage from London manufacturers to Devonshire grower .	0	14	7
Labour of grading, packing, and marking . .	0	4	0
Cartage to station . .	0	1	0
Railway freight from Devonshire to London .	0	5	5
250 lbs. Cox's Orange Pippin, at 6*s.* per 20 lbs.	3	15	0
Gross return by 50 boxes at 2*s.* per box.	£5	0	0
Net return, 6*s.* per 20 lbs.			

Kentish Grower's Statement.

	£	s.	d.
Packing and carting .	0	2	0
Commission and carriage	0	7	0
280 lbs. Cox's Orange Pippin, remarkably fine and ripe, at 3*s.* per 20lbs.	2	2	0
Gross return by 8 half-sieves at 3*s.* 9*d.*, and 6 half-sieves at 3*s.* 6*d.*	£2	11	0
Net return, 3*s.* per 20 lbs.			

The working expenses were certainly 25 per cent. of the gross returns, against the 17 per cent. of the Kentish grower, who did not trouble to pack and grade; but then the returns were so much larger, being 6*s.* for 20 lbs. of fruit, whereas the

Kent grower only got 3*s*. per 20 lbs. All the boxes should have wire hinges, as screws and nails were a great drawback to the salesman.

Mr. McINDOE, gardener to Sir J. W. Pease, Bart., confirmed all that Mr. Monro had said as to the way in which fruit was damaged. They should remember that the carriage was the same for well-packed as for badly-packed fruit, and as so much more could be got for the former, the sooner everyone adopted it the better.

Mr. S. T. WRIGHT, of Glewston Court, Ross, Herefordshire, said that during the Fruit Show at Edinburgh he had endeavoured to do a little business with some shopkeepers there, but they would have nothing to do with the English fruit owing to the way in which it was packed, preferring to get their supplies from America. He had been making £1. 1*s*. per cwt. for Ecklinville Seedlings, and 15*s*. for Worcester Pearmain; but when the foreigner could get men to work for 8*s*. per week, and had perferential railway rates, the matter became very serious.

Mr. W. ROUPELL said a friend of his once met a lad driving a cart laden with Apples close to the Crystal Palace. On being interrogated, the lad said no one at Covent Garden would take the Apples, and a bargain was struck that the lad should, on his own suggestion, sell the lot at 3*s*. 6*d*. "a whole bushel." The Apples were graded and packed by his friend, who made 100 per cent. on the transaction. The principle adopted by the lad's father seemed to be to go round the country and buy up what fruit he could on the trees. He would then gather all he could; would shake down some more, and those he could not shake down he would knock down. With regard to the preserving of fruit, it was a mistake to suppose that cider could only be made from cider Apples. Any hard, heavy Apples would do. Excellent perry, preferable to a great deal of the wine we get in this country, could be made from Pears. Mr. Roupell also mentioned the pleasing fact that he had sent Muscat of Alexandria Grapes to Chicago, and had been informed that they arrived in excellent condition.

Mr. ASSBEE spoke of the importance of grading, and said best Strawberries would fetch, say 1*s*. 6*d*. a lb., whereas if they were lumped together with all the inferior ones, the whole lot might be sold for only 4½*d*. a lb. A better return could be got for the

better fruits alone than for the whole crop together. They could therefore save time, labour, and expense, and give the worst fruit to the pigs, and yet clear more by the transaction.

Mr. COLVILE BROWN asked whether Mr. Monro could suggest any means whereby small quantities of fruit sent from small growers might be placed on the market with better advantage?

Mr. MONRO observed that small quantities had not the same opportunity as large ones on the market. Customers were always in a hurry; they had so many things to select, that they had to do it in a wholesale way; they had no time to inspect half a dozen small lots.

Mr. ROUPELL, in proposing a vote of thanks to Mr. Monro, suggested that something more should be done to bring comparatively unknown varieties of the different fruits before the London public.

The CHAIRMAN, replying to a vote of thanks, explained how he dried Plums. He placed them in the kitchen oven. The oven door was left open, and the Plums were placed on galvanized wire of $\frac{1}{2}$-inch mesh, which took the place of the ordinary oven shelf. They were kept in for about two nights and one day, and were then put into bottles and corked. They kept exceedingly well, and made an excellent fruit.

The proceedings then closed.

INDEX.

PART I.

TREE CONFERENCE.

PART II.

FRUIT CONFERENCE.