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TREE-PLANTING.

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FOR ORNAMENTATION OR PROFIT, SUITABLE TO EVERY SOIL AND SITUATION.

BY

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CHAPTER I.

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THE first work known to have been written in England upon an exclusively agricultural subject, is a small tract, "whyche Mayster Groshede, sometyme Bishoppe of Lyncolne, made and translated out of Frenshe into Englyshe." There is no date attached to it, but it is supposed to have been accurately fixed as belonging to the year 1500. It is a mere translation of a work which treats chiefly upon planting and grafting; and I mention the fact because, while works on general husbandry have been multiplied

exceedingly, there are comparatively few which treat upon the planting and management of trees separately, in a popular or "handy" form.

There are many very excellent works upon trees, from the time of Evelyn downwards, but they are mostly very expensive, and out of the reach of the "million;" and the subject does not appear to have received the amount of attention, at the hands of writers who are well fitted to deal with it, which its great importance deserves.

Of late years, too, arboriculture has struck out for itself distinct paths, amongst the most remarkable of which, perhaps, is sea-side planting, which, fifty years or so ago, was looked upon as an eccentric fancy, not likely to become of any practical value to those who attempted it. But since the formation of the Earl of Leicester's woods, and those of Sir Thomas Fowell Buxton, on the northern extremity of the county of Norfolk, on the cliffs near that part known as the Yarmouth Roads, the method has become an established fact, which speaks for itself; and upon the spot where the proprietor was once told by a successful planter, "that he might as well plant his walking-stick upon it, as anything else," plantations now boldly approach the sides of the German Ocean; and the coastguard men of the district have their look-out from the midst of a sylvan bower, which before was bleak and desolate in the extreme.

I shall treat again upon this subject as I proceed, but I wish to point out in the first place, the necessity of a correct appropriation of the various kinds or description of trees to suit certain soils, and situations.

Many extensive tracts of land adjoining the sea, where the influence of the sea-spray used to prevent the profitable growth of plants, causing a great space of land to be utterly barren and unprofitable, have, by skilful treatment been rendered remunerative, by the growth of forest trees ; plantations having been formed both in England and Scotland, in soil apparently of the poorest description, which, until lately, was accounted entirely unfit for vegetation ; and are not only now of intrinsic value in themselves, but are furnishing a shelter, and consequently bestowing fertility upon adjoining lands. In a report on these plantations, by the late Mr. John Grigor, of the Norwich and Forres Nurseries, their success is chiefly attributed in the first place to careful preparation of the ground, which was trenched eighteen inches in depth ; second, to the erection of fences composed of furze and brushwood, as screens, six feet in height ; third, to the plants being of the best description, two or three years of age, transplanted into nursery lines the year before they were placed in the plantation, which consequently endowed them with bushy fibrous roots, and closely planted two and a half to three feet apart ; fourth, to cleaning, by hoeing the land, for the first two years after planting, during which period root crops were produced among the young plants. The plantations embrace an area of 114 acres. The trenching cost six pounds per acre, and the fencing, plants, and planting, upwards of four pounds ; making the net cost upwards of ten pounds per acre, exclusive of the hoeing, which amounted to less than a fourth part of the value of the crops.

"These plantations," says Mr. Grigor, to whom the

Highland and Agricultural Society awarded their gold medal, "were formed of several kinds of trees, among which the black sallow, or goat willow (*Salix caprea*), and the pinaster, are strongly recommended—trees which we have experienced to be very suitable for maritime situations. Within the last sixteen years a considerable extent of plantation has also been formed in the sands of Culbin. These sands occupy several thousand acres of the north-west corner of the county of Moray (N.B.), and are composed of small hills of sand, ranging from twenty to a hundred feet high, the surface of which is ever changing by the influence of the wind. Plantations on these sands were commenced by the proprietor of Kincorth, and the progress of the first larches in pure sand-drift was very remarkable. In 1840 and 1842 several hundred acres of plantations were successfully farmed by Mr. Grant, of Glenmorriston and Moy, on ground elevated from twelve, to thirty feet, above high tide mark, and one mile inland. These plantations are composed of native Scotch pines and larches. The Scotch pine generally appears the more vigorous tree; it affords the best shelter, and has much the advantage in appearance. Its deep green contrasts beautifully with the colour of the sand, and adds to the native plant the lustre of a Himalayan. In the formation of soil, the larch is the most valuable tree. From the shedding of its leaves, it soon forms a dark stratum of vegetable matter in the surface of the sand, which fixes it, and promotes the growth of herbage. But in all similar situations, a mixture of plants is preferable to any one sort. The plants employed in these plantations were chiefly two years old, with a few one

year transplanted plants three years old. The ground being dry, the plants were inserted in winter and early in spring, by the hand-irons, or notch-system, at the average of 9,400 per acre.

"Little or no fencing was required, the plantations being bounded by a vast extent of pure undulating sand, with a surface abandoned to desolation, and bearing only the wavy ripple of the wind, except where a clump of bent grass (*Ammophilla arundinacea*) here and there arose. The cost of plants and planting ranged from only nine to eleven shillings per imperial acre. The plants advanced vigorously, and with the exception of a few small spots where the drifting of the sand either removed or overspread the plants soon after their insertion, the plantation contains no vacancies. On lifting and examining the roots of some of the plants of both sorts, six years planted, occupying pure sand, where no surface herbage existed, it was found that they had furnished themselves with tap-roots, which strike to a great depth right underneath the plants; but the greater portion of their roots run horizontally, at a depth of four inches under the surface of the sand, and extend to a distance almost incredible—many of the plants of both sorts, during the six years, had acquired roots upwards of twenty feet in length, which ramified into numerous fibres; and where the surface had remained undisturbed, the depth of the roots was very uniform. Nature thus adapts plants for emergencies. Neither on a level nor slanting surface was there any instance of a plant having perished by drought, or been removed by the wind, after it had taken root for a few years. The annual growth of both kinds of trees in these

woods, in the purest sand, is now upwards of fourteen inches, and contrasts favourably with that of plants in apparently better soil, more solid, but overspread with a naked surface of the natural grasses; thus illustrating the advantage of planting in a loose open soil, with a clear surface, whether poor or rich. These plantations being now from six to ten feet high, many parts are fit to yield a large supply of thinnings, which are well adapted for reclaiming the sands, and limiting the encroachment of sand-drift on the more valuable soil. These thinnings, or brushwood, are valuable for the purpose of being spread over the newly-planted sands in the roughest exposures by overlapping, or spreading the brushwood in an imbricated position, which causes it to stick on the surface, and thus it affords shade and shelter to the young plants, in situations where they would otherwise perish."

These remarks of Mr. Grigor were penned upwards of twenty years ago, a few years after the time upon which experiments upon a large scale were made of sea-side planting, when the subject was comparatively a new one, and naturally excited a good deal of attention. The difficulties attending the operation have been satisfactorily solved, not only in this country, but also abroad.

Sea-side Planting at the Gulf of Gascony.—In 1811, the commission appointed by the French government reported on the pinaster forests formed by M. Bremontier, of the Administration of Forests, who in 1789 commenced his operations at the Gulf of Gascony, where the downs offered nothing to the eye but a monotonous repetition of white wavy mountains

of sand, destitute of vegetation, and agitated by the wind.

This successful example of reclaiming sand-drift, has naturally been regarded as a great triumph of arboretical skill, the commission reporting that 12,500 acres of downs had been covered with thriving plantations, by means of sowing the seeds of the pineaster, in the proportion of two pounds, mixed with four or five pounds of broom, to the acre; and immediately covering with branches of pine, or other trees with the leaves on, commencing at the side next the sea, or from whence the wind usually proceeded, in narrow zones at right angles to that of the wind; the first sown zone being protected by a line of hurdles, this zone protecting the second, the second the third, and so on. But as I before remarked I will return to the subject again, having alluded to these instances, to show under what extreme difficulties land otherwise worthless can be reclaimed, and made valuable by the judicious planting of trees.

If then, the barren sea-shore can be rendered fertile and productive by means of art, what excuse is there for leaving large bare flats which are scorched up in summer, without a particle of shade for the cattle which are upon them, when not only the beauty of the landscape could be considerably improved, but a very important element of profit added to the estate?

Many persons plant trees, but meet with no success in what they undertake, from not making choice of the right kinds to suit the situation or soil for which they are intended; or merely shift trees from other situations, when the roots have not been

prepared for the change, by previous transplantation. The proper way of dealing with spruce plants, for example, is, after allowing them to stand two years in the seed-bed, to plant them in nurseries, about six inches apart, in lines about eighteen inches distant from one another, and then allow them to stand for another two years. The effect of the transplantation is, to do away with a strong tap-root, and in its place to put a bunch of fibrous roots, which take hold of the ground in those situations where they are intended finally to stand.

There are many moist fields and districts throughout the country, which travellers come upon, entirely destitute of trees, where they might be grown to advantage. Sometimes attempts have been made, and failed from the wrong kinds having been chosen. Yet this class of land is the easiest of any to deal with, and makes a handsome show of results, sooner than in any other situation; for the fast-growing, or soft-wooded trees, thrive best in moist lands, or near to water. These are, the willow, poplar, lime, alder, and horse-chestnut. All these kinds will permanently flourish in damp situations; and in any low lands beside streams, or rivers, where the soil is moist, but not actually saturated, they will assume the highest degree of beauty of which they are capable. The weeping willow is one of the most beautiful trees, and during the latter end of March, when the goat willow (*Salix caprea*) throws out its handsome yellow catkins, it is decidedly an object of beauty, and on this account is well worthy of being cultivated as a standard in our nurseries.

These trees, planted in sandy uplands where the

soil has been well trenched, may grow and thrive for a few years, but after a while they give unmistakable signs of being out of their proper element, and display comparatively little vigour and comeliness, when compared with trees of the same kind planted in more congenial situations.

Those lands near rivers which are constantly flooded by every tide, have been converted into very valuable parts of the estate upon which they are situated, by the judicious planting of osiers. On the banks of the Severn, which is noted for its high tides, osiers perhaps grow in their greatest perfection. Some of the best osiers which are grown, and which supply the London market, where there is a very large consumption for packing-baskets, are grown in Berkshire and Oxfordshire, on the banks of the Thames and Kennet. But for size and bulk of crop, perhaps, there are none which exceed those which grow on the banks of the Thames between Chelsea and Richmond. The overflow of the Thames often does a great deal of damage to the houses and property of the residents near the river, and of late years, the subject has acquired much prominence, and various methods have been suggested for dealing with it; the embankment of the river, and the removal of old London bridge having modified the action of the flowing of the tides considerably. The soil on the banks of the Thames is naturally very rich, and it is thought that the action of the steamboats keeps the water in a constantly turbid state, which leaves upon the grounds a top-dressing of rich mud every time the tide overflows them, which is now very constantly, up to Kingston and Ditton. Above this district,

extending through Staines, Shepperton, Chertsey, Windsor, as far as Maidenhead, although the osiers grown are of large size, the qualities are inferior, and they are used only for making the coarsest packing baskets.

Osier plantations in favourable situations, will last seventy years, with a little occasional mending, and by good management can be made a source of large profit. In strong and rich soils, where they attain a height of ten, twelve, and thirteen feet, it is usual to plant them in rows two feet apart, and from sixteen or eighteen inches from each other in the rows. Eighteen inches is considered the best distance by practical men, on account of the shoots ripening better, for if planted too thickly on rich soils, there not being sufficient room for them to stand comfortably together, a few of the leading ones would be drawn up very tall, and obstruct the light from acting upon the others, which would prevent their wood from ripening, and would, in consequence, become soft and pithy, and be unfit for the purpose of basket-making.

It has been remarked that the action of light has a very peculiar effect upon the osiers. While in some seasons they will be of a yellowish brown—their proper colour—in others they will assume a dull green hue; in cloudy seasons they become of a dull mahogany colour, while in unusually clear ones, they will turn cherry-colour, or red.

But even with such a growth as osiers to deal with, it is necessary to select varieties which are the most suitable for the situation they are intended to occupy. In light soil, where there is a considerable

portion of sand, the French, Goldstone, and a variety of the Spaniard, better known in Berkshire under the *sobriquet* of Black Jack, come to tolerable perfection; but to insure their cultivation becoming a profitable occupation, a stronger staple is necessary, and also a compact subsoil. The Spaniard, French, and new kind, sometimes grow of fair quality upon light soils, when the subsoil is moist with springs, but the rods are smaller in size, and shorter in length, and the crop less bulky, than when grown on strong loam. The London clay, which is found in what is termed the London basin, and reaches about forty miles in some directions from London, is injurious as a subsoil to osiers, and when the roots come into contact with it, they invariably die off.

I have mentioned seventy years as the duration of time a healthy osier plantation will last under favourable conditions; but on the lighter soils, with an imperfect supply of moisture, they will only last from fifteen to twenty years, and will then require to be laid down afresh, while in river grounds they will last the period mentioned.

In forming an osier bed, the ground should be trenched fifteen or sixteen inches deep. The sets should be about a foot and a half long, or a little less, and be inserted in the ground about half their length. The distance at which to plant must be regulated by the quality of the land. In light soils, where the supply of moisture is imperfect, so that the shoots come thinner, and shorter, than in the more favourable situations for their growth, it is usual to plant them in rows, a foot and a half apart, and fifteen or sixteen inches asunder. If they are planted wider apart, they

are apt to grow out crooked, and thick, and clubby next the stools, with branching twigs above, instead of drawing one another up in a slender form.

For the larger sort of osiers, the sets are cut from the thick, or lower part of the rods, generally about the thickness of the little finger, for although the sets from the small ends strike quickly, and grow well, they always throw out comparatively small shoots.

On the other hand, in some parts of France, where they require small slender rods for making fine baskets, they cut the sets into small pieces, and lay them in drills a short distance apart, which causes the shoots to spring out at various points from the buried set, and an upright shoot will start from almost every eye.

In mending plantations of osiers, the usual method followed is, to select the longest, and smoothest rods of the kind required, and to cut their but-ends in a slanting direction, and stick them into the ground beside the dead stool to the depth of nine inches, but not to shorten them, as in the case of making a new plantation. The reason for this method of procedure is, that if they were shortened, they would be smothered by the shoots of the older stools, before they had time to establish themselves; but by leaving them long, they enjoy full light for a considerable part of the summer, before the others can catch them up, to shade them, but after two years they are cut back to the height of the old stools. A few of the stools die every season, so that the beds require to be constantly looked over and examined; and in exceptional seasons, when mild weather has been succeeded by very cold, in March and April, there

often occurs a great fatality amongst osiers, when it is found necessary to replant a great many; recently formed plantations being most likely to be injured by the late spring frosts.

The usual time for cutting osiers is any time between the fall of the leaf and the rising of the sap in the spring, and although some people cut them before and after this time, it is not considered advisable to do so.

The Common Osier (*Salix viminalis*) is sometimes greenish, and sometimes of a yellowish brown colour, according to the soil upon which it is grown. It is, however, coarse, brittle, and soft, and not by any means valuable to the basket-maker. There are varieties, however, which are liked by those who understand the working of them; one of which, called indifferently the blotched osier, the brindled osier, the speckled, and the snake osier, is the best kind of this variety. The next best variety of *Salix viminalis*, is the yellow-barked osier. The velvet-topped and apple-tree osier are also considered fairly good, while the long-skin is of smaller growth, and the wood heavier, firmer, and tougher, and is, indeed, a different species.

The Spaniard, or *Spaniard Rod* (*Salix triandra*), also has several varieties, some of which are of little value, as the horse Spaniard, which is very inferior, while the black-budded Spaniard is liked by basket-makers for bottoming and finishing the rims of baskets; while the gray Spaniard and the brown Spaniard come in for coarse brown baskets.

The French, French Rod, or *Real French*, which takes its name from having been imported from

France, as may readily be seen, when largely grown is an excellent kind for fine small work, and is much grown for making small baskets.

The New Kind (*Salix Forbyana*) resembles the Spaniard in being equally strong, while it is more pliable to work.

The Hollander, which may be seen in large quantities at the edges of the Maas by the traveller, and which owes its name in England from having been brought over here from the Dutch coast, though different in appearance to the new kind, resembles it very closely in quality.

The Gelster is similar to the Spaniard in quality, but the but-end is thicker, and it grows more tapering.

The Green-Leaved, Osier or *Ornard*, (*Salix rubra*) is strong and tough, and considered a very good sort for the manufacture of certain kinds of baskets.

The Brown Rod, Brownard, or *Silver Osier* (*Salix Hoffmanniana*), is silvery on the under side of the leaf, grows shortish, but is firm, and useful for special purposes.

The Bitter Ornard (*Salix purpurea*) grows slender, and is tough, and is well adapted for wet ground, like all the other ornards which grow in water.

The Blunt-leaved Ornard (*Salix Lambertiana*), *Rose Ornard* (*Salix helix*), and the *Bastard French* (*Salix lanceolata*), are considered very inferior in quality on account of their brittleness, which causes a great number of snapped ends to project in their working.

The kinds I have enumerated embrace the best known sorts, and the plantations on the Holkham estate, in Norfolk, were computed to produce thirty-four pounds, seventeen shilling per acre, the first crop

in the second year after their formation, and twenty-seven pounds ten shillings annually afterwards. Of course these are important results, when it is borne in mind that they are grown upon soils which could not be made available for any other crop. There are many strips of land by the side of open ditches, by streams, and around pools, which might be often turned to profitable account, which are now frequently lamentably neglected, which would be found to come in very useful for many purposes besides basket-making upon a farm, if osiers or willows were but grown.

CHAPTER II.

Trees which are most suited to damp Situations—The Duke of Bedford's "Salictum Woburnense"—The Goat Willow—Bark of the Willow astringent—Embanking—The White or Huntingdon Willow—Russell's, or the Bedford Willow—Johnson's Willow—Large Willow at Sion—American Weeping Willow—Kilmarnock Weeping Willow—The Alder—Wood of the Alder used in making Fish-barrels—The Alder an Agent for reclaiming Land—Planting—The Poplar—Cobbett and the Poplar Tree—Prince Pückler Muskau's Opinion—The Lombardy Poplar—Poplars on the Continent, and Poplar Fences—Black Italian Poplar—The Gray Poplar—The White Poplar—White Egyptian Poplar—The Trembling-leaved Poplar, or Aspen—The Balsam Poplar—The Ontario Poplar—The Lime, or Linden—Attempt to assassinate the German Emperor—The Horse Chestnut—Scarlet Flowering Chestnut.

I shall proceed to class those trees which succeed best in damp situations, the greatest variety of which, is to be found amongst the willow tribe, which is the type of the natural order *Salicaceæ*, the genus *Salix*, belonging to the *Diœcia diandria* of Linnæus. It comprehends many diverse species and varieties, from the osiers I have just been describing, to trees fifty feet in height, there being no genus of plants in general cultivation, whose species are so much confused as that of the willow, which arises from various causes. Some of the leading kinds have become hybridised, and yielded numerous intermediate varieties; and

partly by reason from each species containing male and female plants, and the same differing to some extent in appearance, at certain times of the year, while the old trees wear quite a different aspect from the young ones, and that variation in the soil, and climate, is greatly apt to change the outward appearance of the willow, it is not to be wondered at that a certain degree of confusion prevails at times in the genus, so that the most strongly marked kinds only are, at times, recognisable by the inexperienced, several hundred species of British and foreign willows having been mentioned in recent publications. The Duke of Bedford, who published his "Salictum Woburnense" in 1829, describes 150 species, all of which existed in the Salictum at Woburn.

In situations where there are steep declivities, through which a stream, or water-course runs, the banks may often be seen washed down, lying in ugly masses, producing an unsightly appearance from the gaps made in the broken banks. By judicious planting of the willow, the banks may be made firm, through the interlacing of the roots of the trees, the appearance of the landscape greatly beautified, and the value of the timber and loppings secured to their owner.

Besides being serviceable in fixing the banks of rivers, and preventing any aggression from the continual washing of the water, many of these make a quick return of capital, being fast-growing trees, which soon attain the size of timber-trees, and being extremely hardy, will attain a fair size in soil of almost any description, especially *Salix caprea*, *S. alba*, and *S. Russelliana*.

The Goat Willow, or Sallow (salix caprea) is found

indigenous in waste ground, particularly in cold and marshy situations; and with its various varieties, is among the broadest-leaved of the willow tribe. In rich wet ground, a seedling plant of two years old will occasionally produce several shoots three or four feet high, and under the most adverse circumstances, will generally ripen its growth to the very topmost bud. The healthy young shoots have a dark-brown glossy bark, and the buds being white and prominent present an agreeable contrast to the eye; while the male plant throws out a profusion of catkins during the early part of the season, which gives it a handsome and striking appearance, and causes it to be highly ornamental. Upon a farm where there is a demand for sheep-fences, or similar articles, the goat willow may be grown in the form of coppice, and cut down every three or four years; no other tree producing so great an amount of faggot wood. In situations best adapted for its growth, a healthy stock will sometimes, in one season, throw out a sheaf of straight clear shoots, measuring from eight to twelve feet in length; many of them are three inches in circumference at a yard from the ground. When grown in the form of timber, this species frequently attains the height of forty or fifty feet, with a trunk from one and a half to two feet in diameter.

In marshy districts, how often are there to be seen bare regions as flat and unbroken as the palm of one's hand, save where a deep drain intersects the land perhaps? For these the goat willow is eminently applicable, affording a valuable shelter in maritime situations, withstanding the influence of the sea better than most plants. The timber is soft, of course, like

all fast-growing trees, but that of the *S. caprea* is reckoned the best of any of the willow tribe.

It is easily propagated by cuttings, taking strong one-year old shoots, formed into lengths fourteen to sixteen inches long, which should be inserted in the ground to the depth of ten or twelve inches. These often strike, and grow as well as rooted plants in favourable situations, but when the ground is not particularly well-adapted for the growth of the willow, or has not been well prepared, it is best to have recourse to rooted plants.

The bark and leaves of all the willows are astringent, and can generally be used for tanning leather. Its natural home and *habitat* being near to water, it can be made to render most valuable service in resisting the encroachments of streams subject to violent floods. With this view, it is customary to cut the branches between October and April, and form them into frames for embankment. The frames are made to extend from the channel of the water to the top of the flow-bank, with a gentle slope, the larger timber being blended with the smaller branches; the whole is covered with a few inches of sand, gravel, or the ordinary soil of the banks. The branches send out a great number of fibres, which create a surface vegetation in a proper form, effectual for resisting the force of the water. By this method materials of a shifting character are made firm and consolidated, and, by being lopped every year, the willows form a permanent embankment.

The White, or *Huntingdon Willow* (*S. alba*). In soils and situations favourable for its growth, this tree frequently ranges from sixty to eighty feet in

height, with a trunk two or three feet in diameter. At twenty or thirty years of age, it often attains the height of sixty and seventy feet, when its trunk often yields one cubical foot per annum every year of its growth. On this account, it is more often planted as a timber-tree than any other willow, though it makes good coppice, and is often grown as a pollard, where the annual loppings furnish a large amount of useful wood for various purposes. For osiers, however, it is not so appropriate, for though the year-old shoots are strong and tough, they are twiggy and full of laterals, which causes them to be unsuitable for the purpose of basket-making.

The timber of willow is very useful for many agricultural purposes, for which other kinds of wood are not nearly so appropriate. Even its soft yielding nature, which causes it to be objectionable for some uses, yet makes it highly desirable for others. For lining carts and barrows, into which rough loads are flung, such as stones, the wood is very useful, as, being soft, although it may be indented, it will not splinter, and receive damage from the friction to which it may be subjected.

For rake and scythe-handles, sheep-flakes or hurdles, these are best formed out of willows, and by reason of the lightness of the wood in the case of hurdles, are easily removed from place to place, while they are not damaged by their own weight when flung hastily down, being white, soft, and light.

Russell's, or *the Bedford Willow* (*S. Russelliana*), is one of the best willows in cultivation. Johnson's willow at Lichfield is of this species, the trunk of which is twelve feet, or more, in circumference. There

used to be a tree at Sion eighty-nine feet high, with a trunk upwards of twelve feet in circumference, some years ago, but the writer is unaware whether it is yet standing, as well as other large trees in different parts of the country; the remarkable point being, in the case of such trees, that they are useful in some form or other at every stage of their growth, from two years to fifty years of age, the latter in the shape of timber, the former as rods for basket-making.

For the adornment of suburban villas and gentlemen's residences, there are some very elegant willows which have lately been introduced into Britain, one of the handsomest of which is the American weeping willow. As the plant is, however, of itself but of feeble growth, it will be found the best plan to graft upon the top of a strong stem, such as that of *S. caprea*. The graceful, drooping, long slender branches have a very elegant appearance when agitated by the wind, and it possesses the recommendation of being extremely hardy.

S. Babylonica is another very ornamental willow, being a native of Asia and the north of Africa. It is very graceful in form, but somewhat tender; and it is only during the most favourable seasons, and on the best soil, that the twigs ripen at their extremities. Unlike most willows, too, it does not grow freely from cuttings, but needs to be propagated by layers. The ordinary weeping willow becomes a very handsome object, where drooping over a pond or lake. The Kilmarnock weeping willow is said to be a drooping variety of the *S. caprea*, which was originally discovered in the west of Scotland, and is now extensively cultivated in the nurseries of North Britain.

The Alder (*Alnus glutinosa*).—The glutinous, or common alder, is by no means a handsome tree, and cannot be compared to the willow, and is deficient as an ornamental object. Its proper home is near to springs, and by the margin of rivers, where it will frequently attain the height of sixty feet. One tree in Norfolk is recorded as standing sixty-five feet high, its trunk, one foot from the ground, measuring twelve feet in circumference. The alder may be regarded as the most aquatic tree known to Britain, and attains its maturity when it has reached from fifty to sixty years, at which age it should be felled, when its timber is the main object sought for. The wood is somewhat similar to that of the willow, and is useful for certain definite purposes, as for the making of shoemakers' lasts, for the use of turners and cabinetmakers, where soft wood is desirable. In Scotland, the wood is much in request in those districts where fish is cured, for making fish-barrels, when trees of twenty-five years of age are sufficiently mature to be felled for this purpose.

The alder has been made use of as a most valuable agent for reclaiming meadow-land, which has either been continually, or partially flooded. In order to effect this object, the soil is ridged up by the side of the watercourse in spring, upon which young trees are planted. In a few years, by the roots fixing themselves tenaciously in the soil, and the continued falling of the leaves, the bank will become hard and firm.

The alder also, being a rapid-growing tree, is a useful kind to plant in bare situations, where houses have been built destitute of the natural ornament of

trees; and where they are quickly needed to make a show, while perhaps others of a handsomer description are growing, and coming to maturity. In the fen districts it is valuable as a hedgerow tree, as it will accommodate itself to situations in which other trees refuse to grow, and is therefore especially useful in nursing more valuable trees which have been planted by the seaside.

The alder prefers a low situation, and delights in moist meadow ground near a river. The best times for planting are November and March, by digging a hole nine inches deep, with a common garden spade. The propagation of the alder is best done by seed, though it is not worth while any private person attempting to do so, as a thousand plants a foot high may be bought for six or seven shillings, of the nurserymen who make a business of rearing large numbers of trees for planting. These sow the seeds as thick as they can lie on the surface of the ground, without touching one another, and are then trod carefully in with the feet. At the end of the first season the plants will be nine inches high, after which they are transplanted into lines.

The Poplar comes next in natural order of succession on a damp or moist soil, which is not so wet as those I have previously referred to. A great difference of opinion exists as to the relative merit of the poplar tree, as an object of landscape adornment. Cobbett called it a great ugly tree, while Prince Pückler Muskau, who has been cited as a good authority on trees, complains of its leaves "being too fluttering." An old poplar, showing a large misshapen black-looking trunk, is certainly often an ugly object,

but on the other hand, young poplar trees are generally considered good-looking, their fresh green foliage being very gay and bright, while the young wood is not by any means bad-looking. The poplar, however, is the most useful of all trees for furnishing an effect in a bare locality, being remarkable for its rapidity of growth. The genus (*Populus*) is of the natural order *Salicaceæ*, which produces unisexual flowers, those of the two sexes being placed on separate plants, and consists of many species, natives of all countries, very diversified in foliage and form, but all remarkable for rapidity of growth. Interspersed with other kinds they make a pleasing variety, and can at all events be cut down by those who are not partial to them, after they have performed the task for which they were designed, in furnishing shelter and embellishment, while the more valued and slower-growing trees were attaining a size adapted for the purpose in view.

The Lombardy Poplar, or *Fastigiate* (*P. fastigiata*), is easily recognised by its upright growth, with its lateral branches closely gathered round about its trunk, forming a taper shape. It was introduced into Britain about the middle of the eighteenth century, and soon became common in England, being easily propagated by cuttings, in the same way as the willow. Travellers on the Continent have remarked the long spectral rows of these trees along the margins of fields, and compare them unfavourably with the hedgerow timber trees of England, consisting of the elm, and the oak. The uniformity of its growth, and the straight lines in which they are planted, added to the flatness of the country, causes it to wear a monotonous appearance,

which is wearisome to the eye. Judiciously placed in landscape gardening, it forms, however, a very elegant and striking object, when mixed with masses of round-headed forest trees, when it helps greatly to diversify the scene. As shelter the tree is unequalled. It soon attains a great height, and forms a good screen, while its shade is very harmless to crops growing near them. A few poplars planted in the neighbourhood of out-buildings very often redeem an otherwise ugly feature, and diversify the regularity of the sky line.

As a town tree it is one of the best which can be selected, as it grows in a narrow space, and will stand smoke almost better than any other tree; while growing rapidly, it soon assumes a distinct form, and attains a greater altitude than any other tree in a limited period. It will grow vigorously in any soil when young, and is therefore particularly valuable where trees are wanted to make a show in a short space of time, but to attain their fullest dimensions, the soil must be rich and deep, and water within reach of their roots. Fences are formed out of this tree on the Continent, by inserting two-year old plants, which are commonly six or seven feet in height, in a straight line, about six inches apart, connected by a horizontal rod placed at a height of about a yard from the ground, forming a fence in one season. The plants are lopped in the course of time, and eventually thinned out when they begin to attain the size of timber.

Necklace-bearing, or *Black Italian Poplar* (*P. monilifera*), sometimes called the Canadian poplar. This is a very fast-growing tree, and on wild and rocky ground even, on the margins of lakes between

Canada and Virginia, it grows to the height of seventy or eighty feet, and in good soil considerably exceeds this measurement. On rich moist land it becomes a large tree in a few years, and is readily distinguished from the Lombardy poplar, by its leaves being broader, and its young shoots being serrated, particularly towards the extremities, and is also of a much darker colour. Its habit is also much more spreading, its side shoots taking a wider and more horizontal range, which often tempts pruning, which is not a very safe experiment with poplars, as it often induces decay.

The Gray Poplar (*P. canescens*) is a native of Britain, which grows rapidly, and is a large spreading tree. In April it becomes conspicuous from the profusion of large catkins it throws out, which are two or three inches in length. It thrives best in moist soils, and is somewhat remarkable at an early age for throwing out strong lateral shoots nearly equal in length to the main shoot. When cut down young, it shoots freely, but at a later period of its growth, it springs more vigorously from the roots, and is consequently objectionable in some situations, as it fills the land with suckers. It is most readily propagated by layers, and after being one year transplanted, the plants are often six feet high, and fit for being finally planted out, in the situations in which they are intended to stand. It is considered a good tree to plant with oak and silver-fir, to act as nurse, as it furnishes a shelter which is adapted to the early growth of these trees, and as it becomes of a useful size in a few years, it can then be taken away, and its timber made use of, when the other trees are established.

Its wood is soft and light, resembling that of willow, and is seldom profitably grown after forty years, as it generally begins then to rot in the centre of the trunk. The timber is useful for making barn doors, as it does not warp, and for similar purposes as that to which willow is applied. Planted alone in rich moist soil, it rises with a straight trunk to a considerable height in a short time, and produces a large amount of timber.

The White Poplar (*P. alba*).—The general appearance of this tree somewhat resembles *P. canescens*, though not generally so vigorous, is finer, the upper surface of the leaves being of a darker green, and the under side of a brighter white, which, when agitated by the wind, presents a very striking appearance, and has a very conspicuous effect upon the margins of lakes, upon islands, or in plantations designed for effect. It is not believed to be a native of Britain, but is generally supposed to have been brought to England at an early period from Flanders.

The most beautiful variety is that known as the white Egyptian poplar, the leaves of which are the darkest green above, with the most vivid white beneath, though its growth is not nearly so vigorous as the common variety.

The Trembling-leaved Poplar (*P. tremula*), or *Aspen*, is a native of Britain, and is also indigenous in mountainous situations throughout Europe and Asia, in the Highlands of Scotland being frequently found associated with the natural birch. Unlike the tapering varieties, this is a beautiful round-headed tree, of stately and elegant appearance, tall in proportion to its bulk, growing very rapidly, and being

extremely hardy. It will grow luxuriously in almost any soil, and attain a considerable height while young, in a dry and sandy soil, as well as a moist one. Its roots spread on the surface of the ground, and there is one objection attending its cultivation, which is, that in many situations its tendency to produce suckers from the root, when the vigour of the young tree subsides in neglected grounds, causes it to form a jungle around the trees.

This is not so much objected to in the Highlands, and some parts of Germany and Sweden, as these young shoots are greedily eaten by sheep and cattle; and so form an article of food not to be despised for stock, being used both in a green and a dry state for this purpose. This species is readily propagated by cuttings from the roots, but not cuttings from the branches, as is the case with many other kinds of poplars. Plants one or two years transplanted from layers, are generally from five to six feet high, when they should be removed and planted in nursery lines. The average growth of the aspen for the first ten years is not less than three feet annually. These trees can be made to assume a very ornamental appearance in various situations. Standing by itself on a lawn, it assumes a pendulous form. On the outskirts of plantations its foliage makes a handsome contrast to those of other trees, throughout the summer being of a beautiful glaucous green, which is changed by the first frosts of autumn into a more mellowed hue, which ultimately turns to a bright yellow, and by tasteful arrangement, it forms a valuable aid in landscape embellishment. The leaves are round and smooth, and standing in long

slender foot-stalks, they are agitated by the gentlest breeze, so that their quivering is very perceptibly heard, as well as seen, during comparatively calm weather.

The Balsam Poplar (*P. balsamifera*) does not attain a very great height in Britain, though in North America it rises to eighty feet. It is solely adapted for ornament, and grows vigorously only for a few years while it is young. The trunk has an ash-coloured bark, the young wood being of a rich chestnut colour, while the buds are large, and encased in a glutinous balsam to which the tree owes its name. Its leaves are of a pale yellow, which diffuse a rich balsamic odour throughout the air, eventually changing to a rich dark green colour. The tree is readily propagated either from cuttings, or by suckers which it is in the habit of throwing out; and there are several varieties which differ in the size, shape, and colour of the leaves, also in the relative vigour of their growth, and again in the time at which they expand their foliage. All the varieties will readily grow in any description of soil, but they prefer that which is moderately sheltered, and which is soft, rich, and moist.

The Ontario Poplar (*P. candicans*).—This tree is almost useless as timber, for when it ceases to grow vigorously, the branches become brittle, and it is then comparatively worthless. It bears a strong family likeness to the balsam poplar, but is of a much more rapid and vigorous habit of growth.

From the varieties I have named, it will be seen that the poplar is one of the most useful and most

accommodating of the deciduous trees, especially valuable for planting in bare situations. It has been remarked by a writer, that when men build mansions in flat bare situations, destitute of trees, the visions they dwell on are those of the dark forest-side, and cathedral-like vista. They desire that their dwellings should be invested with the garb of antiquity. This cannot of course be done instantaneously, yet, by a proper selection of trees, kindly treated, the change may be very much hastened. The Canadian poplar twenty years planted, will reach the height of fifty feet, and this tree does not make merely height alone, but will carry with it a great burden of branches of spray, and overshadow a space four or five yards in circumference.

Poplars will make an agreeable show when even quite young, so that a belt of nice, fresh, green-looking trees may be established at once in any situation; for all sorts of poplars will grow in any kind of ground during their infancy, if it is well trenched, even on that of a sandy description, better adapted for the growth of the fir. As I have before pointed out, when they have performed their office they may be removed, in order to give place to more valued trees.

The Lime Tree, or *Linden*, or *Teil Tree*.—This beautiful tree is the *Tilia* of botanists, and belongs to *Polyandria monogynia* of the Linnæan system, the principal tree of the genus, which is divided into two species, and consist of a number of distinct varieties, being the *Tilia Europa*, or common lime.

It is unsuited for bleak situations, its chief use being to form embowering shade to an avenue. In

towns throughout the Continent they are planted in lines along the streets and public promenades, and its blossoms expanding in July diffuse an agreeable fragrance, which is the most perceptible in hot weather, the heat reflected by pavements and buildings strengthening its odour, while the shade it affords is very desirable.

It was beneath the shade of the lime trees at Berlin, that the would-be-assassin, Heinrich Max Hödel, made his attempt on the life of the Emperor William, while returning from a drive. When firing the first shot he stood on the footpath of Unter den Linden, and then ran to the other side of the street, where the trees are, threw himself on the ground, fired a second shot, and missing, again took to flight, firing twice more at the bystanders.

It is stated by Loudon that the honey produced by the lime-tree blossoms is considered to be far superior to all other kinds, on account of its delicacy, selling at three or four times the price of common honey, and is used exclusively for medicines, and in the manufacture of liqueurs.

The lime is said to be indigenous to England ; but it has been pointed out that, whether native or foreign, it does not shed its seeds and spring up in uncultivated ground, as indigenous plants invariably do, which has given rise to some doubts as to its being really a native of Britain. It is, however, a native of the north of Germany, Sweden, and Russia, and is found wild on the Alps in Switzerland, in the north of Italy, Spain, and Portugal.

It requires a good climate, and a rich alluvial or loamy soil; it being found that seeds are only

ripened in the best seasons, and on trees most favourably situated. In favourable seasons the seeds ripen in autumn, and may be sown in winter or early spring ; the plants coming up in the ensuing summer.

The lime is a vigorous, pliant, well-balanced tree, throwing out a great number of branches of a graceful lateral form, and it attains to a great size in a short period, according well with the meadows and cultivated ground with which it is often associated, not thriving in dry poor soils. Where several kinds of lime trees stand together, and throw out their blossoms at the same time, the seeds easily become hybridised, and produce various sorts, though they may be gathered from one tree. It is seldom, however, plants are raised from seed, for when they can be obtained fully ripe, which is not always, the progress of the plant is very slow when compared with that of layers, which always perpetuates the original, or parent tree, and this plan of raising plants from layers is invariably practised by nurserymen. When lopped over at the surface of the ground, the stool readily produces a number of young plants. The young shoots are then bent down into the earth to the depth of three or four inches, with their extremities placed in an upright position, which forms the young plant. The operation of laying down the shoots can be done either in winter or early spring, and the plants will become rooted and fit for removal by the November following, when the young shoots, which have been thrown out from the stool in the meantime (the produce of the preceding summer), should be inserted in the ground like the others, to create another crop of young plants, thus laying down and

removing the plants yearly. As this is a great strain upon the stool, it is desirable to furnish manure to it, and give a few inches of rich compost or vegetable mould, and when the soil is destitute of silex it will be found advisable to mix some sharp sand with it. After three years, one healthy stool will furnish about sixty plants annually, which when removed are generally about two feet high. They should then be transplanted into nursery lines, about two and a half feet asunder, the plants standing about fifteen inches apart in the rows. They will usually attain a height of six feet in two years, and are then ready for being finally planted out. They may, however, be kept in the nursery and grown to a much larger size, and afterwards be transplanted with safety, provided they are removed every second year. This removal causes the roots to assume a fibrous or bushy form, which catch hold of the soil and adapt themselves to a new situation, which a top root will not do. This is one of the chief advantages of dealing with a respectable nurseryman, from whom the true history, so to speak, of each plant may be obtained.

The ordinary progress of the growth of the lime tree in rich soil, in a sheltered situation, is about two feet per annum in height, for the first fifteen or twenty years; after which time its progress is more manifest in making addition to the bulk of the trunk, and expanse to its lateral branches; its height in Britain attaining to sixty feet, with broad spreading branches, although there are individual instances where the tree has been known to reach a height of ninety-five feet.

The timber of the lime tree is very soft and white,

or pale yellow colour, and is preferred to make blocks for cutting leather upon, for carving, and for the use of shoemakers, glovers, and saddlers. Not being subject to warp, and having a fine surface, it is used at foundries for forming moulds, and also in the manufacture of gunpowder in the form of charcoal.

The leading varieties of the common, or European, lime tree, are the small leaved (*microphylla*), the broad-leaved (*platyphylla*), the red-twigged (*rubra*), the cut-leaved (*laciniata*), the yellow-twigged (*aurea*), and the white-leaved (*alba*).

The American Lime Tree (*Tilia Americana*), like the European species, does best on a rich, loose, deep soil, and flourishes on the borders of Lake Erie and Lake Ontario. The leaves are larger, of a dark green colour, cordate, acutely pointed, and are generally smooth and shining, while it is of a more robust habit than the European description. In Britain it is a month later than the common lime tree in expanding its blossoms, its twigs being of a dark brown colour, and the branches of the young trees commonly taking a wider range. On the American continent it attains the height of eighty feet. It is not very commonly met with in England. The mode of propagation and treatment are the same as that pursued in the case of the common tree.

The Horse Chestnut is one of the handsomest trees we have, and is altogether a different variety to the *Castanea vesca*, the sweet or Spanish chestnut.

It forms a beautiful avenue of trees; those at Bushey Park, when in full blossom, constituting one of the sights of London, to which thousands of people flock in fine weather. It thrives in a rich, deep, damp

soil, is generally round-topped, having a well-balanced head during its early maturity, and is altogether a very handsome tree. It is easily propagated from the nut, which bursts out of its prickly shell when ripe, and grows very quickly. In moist and undisturbed situations, these will often strike and take root when dropped from the tree, and its cultivation is very simple and easy. The horse chestnut (*Æsculus hippocastanum*) is supposed to have been introduced into this country from the Levant (the "Orient" of the French, the "Morgenland" of the Germans, paraphrases of the "East") about the middle of the sixteenth century. As a lawn tree it forms a most beautiful object with its handsome blossoms. After the foliage begins to expand, the tree is remarkable for the rapidity with which it forms its whole season's growth, which it effects in three or four weeks. The young wood being thus matured early in the season, renders the tree well adapted to endure cold and unfavourable situations, though it will only blossom abundantly in warm and sheltered positions, a high degree of temperature being necessary to expand them.

The seedlings should be transplanted into nursery lines, at one or two years of age, and then removed every third year, increasing the space in which they stand. By this means the fibrous nature of the roots, after being frequently transplanted, allows it to be removed in safety when it has attained a larger size than most trees, by which means an avenue of fair sized trees could be obtained in very little time, or a handsome object planted upon a lawn, or wherever it might be required.

The horse chestnut sometimes attains to a considerable size. One tree in Lincolnshire is sixty feet high, possessing a circumference of foliage which measures a hundred yards.

The timber is comparatively worthless, except for those purposes where wood is required that is easily worked, a cubical foot of chestnut timber weighing when dry only from thirty-five to thirty-seven pounds. The nuts, which are bitter, are refused by pigs, and all other animals excepting the deer, which eat them.

In France I believe they make starch from the nuts, but to the best of my knowledge they are not put to any useful purpose in England.

The Scarlet-Flowering Chestnut is a handsome tree for decorative purposes, of a more dwarf habit, which flowers at an earlier age than the common horse chestnut, which causes it to be in request on that account. There are also some interesting varieties of the yellow-flowering and smooth-fruited kinds, which are of dwarf growth, of the genus termed *Pavia*. These are best propagated by being engrafted on the common horse chestnut, a profusion of stocks for such a purpose being always readily accessible.

The trees I have enumerated will all thrive and succeed well in moist situations, the same as I have described; each and all being very easy to deal with in their method of cultivation; success invariably rewarding only a very moderate amount of painstaking; in fact, in some cases, as the willow, by merely sticking a small piece of cutting into the ground in a moist situation, in the neighbourhood of water, in course of time a handsome tree will be found in its place.

CHAPTER III.

Broad-leaved Trees—Trees as Landscape Ornaments—Influence of Climate—Planting in the Sixteenth Century—Turner's "Herbal"—Gerrard's Catalogue and Physic-garden in Holborn—Sir Hans Sloane's Physic-garden at Chelsea—Doctor Compton, Bishop of London—Planting greatly stimulated—The "Hortus Kewensis"—Trees introduced by Douglas—The Ash—The Beech—Old Tree in Windsor Forest—Indisposition of English Farmers to turn their attention to Agricultural Manufactures—The Birch—The Elm—The Mountain or Wych Elm—The Huntingdon Elm—Cork-barked Elm—American Elm—Curled-leaved Elm—Variegated Elm—Weeping Elm—Aptitude of the Elm to "sport," or vary from seed—The Chestnut Tree—Valuable as Coppice—The Timber chiefly valuable when young—Derivation of its Name—Grown in Spain for its Fruit—Brought to Europe by the Greeks from Sardis—Largest and oldest Chestnut Tree in the World—Great Chestnut at Tortworth—Raising trees from Seed—Ornamental Varieties.

I WILL next speak of the varieties which are usually termed broad-leaved timber trees, which embrace the oak, elm, ash, beech, birch, plane, hornbeam, locust, sycamore, walnut, and Spanish chestnut; none of which succeed well in elevated situations, exposed to a rigorous climate, where cone-bearing, or resinous trees, succeed, such as the pine, larch, and spruce, and kindred species; nor answer in low-lying situations, such as I have been describing, that are surcharged with moisture.

As landscape ornaments, the broad-leaved timber

trees play a very important part, the umbrageous shade and canopy-like form of many studded about in park-like meadows being peculiar to Britain

The pendulous masses of the ash are gracefulness itself, when agitated by the influence of the breeze. For beauty of foliage and flower, perhaps nothing surpasses the locust, or acacia, trees. The plane is another noble tree which often excites admiration, while the birch, growing on the sides of precipitous crags, frequently redeems many an otherwise barren scene from an aspect of desolation. The oak, which has often been symbolised as a picture of sturdy strength, will, under favourable conditions for its growth, attain a height of eighty-five feet, with a trunk measuring twelve or thirteen feet in circumference. But look at the same tree under adverse circumstances! Disliking extreme heat or cold, under either condition it becomes dwarfed and stunted; and in exposed situations, where the Scotch fir would flourish, the oak becomes merely a shadow of itself when grown under conditions not favourable to its full development. Some of the American trees, such as the western plane—where the summers are hotter, and the winters more severe, in its native country than in England—need to be planted in a sunny sheltered spot, as much as possible guarded from the frosty winds of March and April; for the tender buds, exposed to ungenial blasts, exhibit a scorched appearance, and sufficiently attest the difference of climate, for in their own, the hot summers cause their leaves to expand rapidly, thus maturing the young wood, so as to enable it to withstand the severity of the winter season. And in planting trees, to cause them to be

successful, the influences of climate should be taken relatively into account as much as possible; for, where one tree will not answer, another will; and a certain amount of observation and attention will soon enable a correct estimation to be formed of the kind of trees needed for each situation, and aspect.

Although as timber trees, nearly the whole of these are very valuable in individual instances, taken collectively they cannot be grown so profitably as plantations of pine, larch, or Scotch fir, for obvious reasons; one of the principal of which is, that they would occupy valuable agricultural land, while the other kinds I have mentioned can be grown in extensive plantations, which, otherwise occupied, would yield but a trifling return.

This is well understood by the large planters who have made this subject a matter of study, but it is one which is comparatively unknown to those whose operations in this direction have been only on a very limited scale.

During the sixteenth century plantations began to be extensively formed in Britain, for timber and for ornamental purposes, though many of the timber trees are supposed to have been introduced into England by the Romans. Turner, who published his "Herbal" about the middle of the sixteenth century, upon different occasions notices the introduction of the evergreen cypress, the common spruce fir, the stone pine, the sweet bay, and the walnut; and towards the end of the sixteenth century Gerrard published the first edition of his catalogue, which includes the pine-aster, the laburnum, and a number of the smaller trees and shrubs which he had collected in his physic

garden in Holborn. The only surviving physic-garden which now remains in London, is, I believe, the one left by Sir Hans Sloane to the Apothecaries' Company, which now abuts the Thames Embankment at Chelsea, which the writer had to inspect a couple of years or so back, in his capacity of grand juryman, upon the occasion of a difference between the Apothecaries' Company and Board of Works, which was settled amicably by arrangement, and did not finally come on for trial. To the botanists and apothecaries of London we are indebted at that period for the first accounts we have of the introduction of many of the timber trees with which we are now commonly familiar.

Doctor Compton, who was Bishop of London from 1675 to 1713, introduced a great number of exotic trees, chiefly from America. The Botanic Garden of Edinburgh was formed in 1680, and in 1683 the cedar of Lebanon was introduced into it. Parkinson, the apothecary to James I., a physician of London, recorded in 1629 the introduction of the larch and the horse chestnut, but who the introducers were is not stated.

The writings of Linnæus, Miller, Bradly, and others, and the consequent spread of botanical knowledge, was the means of exciting attention to this subject, and a taste sprang up amongst the wealthiest and best educated classes for the cultivation of plants and trees, especially by some of the chief landowners in the kingdom, and large plantations were formed at Sion, Croome, Goodwood, and Claremont. It is stated that the Countess of Haddington took such an absorbing interest in improvements by plantation,

that she sold her jewels in order to enable her to plant Binning Wood, which embraced 1,000 acres, and was formed in 1705, while a great impetus was given later on to the introduction of the tribe of *Coniferæ* by Douglas, who went to North-west America as a botanical collector.

The influence of the Highland and Agricultural Society of Scotland has given a great impetus to planting during the present century, in offering premiums for the introduction of new timber trees. From the transactions reported by that institution, it appears that the Earl of Seafield planted the enormous number of 30,000,000 of young trees upon land exceeding in space 8,000 acres. The Duke of Argyle planted very largely in Scotland, and also at Whitton, near Hounslow. The Duke of Richmond planted 1,000 cedars of Lebanon at Goodwood, five years of age, a tree which ought to be much more generally planted than it is. It will grow well and flourish in elevated positions, on rocky or stony soil, amidst a loose stone formation, whence the roots from the tree can fix itself amongst their interstices. Indeed, for the purposes of timber, the wood of the cedar is harder and more durable than when grown on the richer soil of the low lands, in which it is nearly always met with in this country, being often looked upon more as an exotic than the hardy tree which it is.

The Princess Dowager of Wales established the arboretum at Kew, which now occupies such a foremost place as a school for the attainment of practical botanical knowledge, which has served as a model for the imitation of country towns, while the taste for plantations is said to have been imbibed from these

examples by the Earl of Panmure, the Duke of Athole, Sir James Naesmyth, Sir Archibald Grant, and others in Scotland, which caused various landowners to follow their example in North Britain.

According to the "Hortus Kewensis," the most important foreign trees introduced into this country in the seventeenth century were the cedar, the larch, the silver fir, the acacia or locust tree, horse chestnut, Norway maple, scarlet maple, scarlet oak, American plane, weeping willow, Balm of Gilead fir, balsam proper, the black and white American spruce fir, the cork tree, as well as a great many of the minor trees and shrubs; while in the eighteenth century, the number of species of foreign plants introduced into Britain amounted to nearly 5,000, more than half of them being natives of North America. Of these, three-fourths were shrubs, the trees consisting chiefly of pines, oaks, poplars, maples, and thorns, fresh varieties of trees which had been introduced before.

Many of the new timber trees from North-west America, which were introduced by Douglas in the first half of the present century, from the enormous size they attain in their native country, are expected to become very valuable as timber here, but in the case of these kings of the forest, it is somewhat hard that the results cannot be judged in the case of one man's lifetime, and the introducers have to content themselves with their faith in the size they will ultimately attain; for trees are pointed out which are said to have stood from the time of the Conquest, and although there is doubtless much exaggeration in the ages of many celebrated trees in different parts of the country, there are well authenticated instances of

single specimens of historical trees which have stood for hundreds of years.

The cedars of Lebanon, which Solomon felled for the building of the Temple, only perfected themselves in the keen and biting air of their high position after a lapse of many ages, their nourishment being gathered from a sub-soil of hard, calcareous, whitish stones, standing at an elevation of about 9,500 feet above the sea.

The timber of the cedar has so deteriorated in its quality of hardness by being planted in soils not natural to it, that those familiar with the wood grown in England, from its soft and nearly worthless nature, have come to the conclusion that it could not have been this tree which was used in the building of the palace and temple at Jerusalem; where the loose, coarse, spongy texture of the timber evidently proceeds from the way in which the tree has been grown in the artificial manner practised with cedars, when everything is done to induce rapid and luxuriant growth, so that they bear no affinity, except in name, to the trees which were grown on the mountains of Syria.

I will, however, give a full description of this interesting tree, under a different heading, and in association with kindred trees of analogous species, and will now deal in detail with those varieties which are termed the "broad-leaved."

The Ash (*Fraxinus excelsior*).—The ash succeeds best in a deep hazelly loam, near the bottom of a hill, or sloping towards a river, where the soil is not too damp, for the ash does not like anything approaching a wet soil, yet likes its roots to stretch towards water

in a dry summer, and feel the influence of modified moisture. If its roots touch a wet or sour soil its progress of growth becomes arrested; on reaching a poor subsoil the wood becomes brittle, while continuous and uninterrupted growth under the most favourable circumstances develops hard and durable timber; the properties which mark the ash in perfection—strength, toughness, and elasticity—being only obtainable when they are the result of a free and unimpeded growth.

As a hedgerow tree the ash is a very bad one to have on the land, as it makes a barren circle wherever it stands, while no deciduous tree can be made so valuable on the slopes of mountainous districts, where it can have shelter. High positions it does not object to, so that it is not exposed to bleak winds.

A well-grown tree of the tall, or common, ash takes rank with the best trees near the oak; and as a landscape decoration it is one of the handsomest trees, there being no harsh or rigid outlines to mar its symmetrical appearance, what it lacks in grandeur and imposing aspect, being amply made up in gracefulness, bending and swaying to the breeze whenever agitated by the wind.

The best times for planting the ash is in October, November, March, and April. Where the land is wet it should be drained, for no tree is so much injured by stagnant water, and the situation should be carefully chosen, so that they rise in masses by themselves, and not be interfered with by any other tree. The ash being a loose-headed, open kind of tree, they do not interfere with one another during their early growth when planted in masses, and consequently they get

light and air. Nurses in the form of other trees may be sometimes useful during the first fifteen years of their growth, but in their permanent character they must not be interfered with by other trees.

The value of the ash as timber varies considerably, according to the soil upon which it is grown. Ash grown on loose boggy soils is worth about tenpence per cubic foot, but the timber which has been raised on hazelly loams, and other favourable situations, fetched one shilling and fourpence and one shilling and sixpence per cubic foot some years ago, and I doubt not but that the prices are considerably higher now.

The late Earl of Leicester planted the ash very extensively at Holkham, in different soils and in various situations, and the result illustrated, in a very forcible manner, the necessity for fixing upon a site suited to the habit and nature of this tree. Some trees at fifty years old contained only thirty cubic feet, while others at the same age, and planted at the same time. contained seventy-six.

The soil should always be trenched for the reception of the ash, and holes made with the common garden spade, three feet apart, if the situation be high, half of them being intended to act as nurses to the others, which will take 5,000 plants per acre. In a sheltered situation, however, five feet asunder will be sufficient, or 500 nurses and 1,700 principal plants per acre.

The ash is propagated by seeds, which are ripe in November, and should always be taken from the best trees. When gathered they should be lain in a pit made in a light porous soil, and left open. They

should be mixed with sand or light soil, in the proportion of two bushels of sand to one of seed, and allowed to remain in the pit for fifteen months, and turned over at least six times in that interval, which will bring them up to the end of February, when they should be sown in open dry weather.

A writer has pointed out that Loudon in his "Arboretum Britannicum," p. 1224, directs that the seeds, which are ripe in October, should be taken to the rotting heap, where they should be turned over several times in the course of the winter, "and in February they may be removed, freed from the sand by sifting, and sown in beds of any middling soil. The plants," he continues, "may be taken up at the end of the year, and planted in nursery lines." "Now," the writer in question remarks to a nurseryman, "this error is harmless enough, because he knows at the end of the year the plants will not be in existence; but an amateur expecting a crop as stated, concludes they are lost, and probably directs the soil to be dug up, in order that he may plant something else in their stead. The reason for allowing the seeds to lie exactly fifteen months is, that if sown earlier the tender plants would appear too soon, and suffer from frosts."

In planting the seeds, the soil should be first carefully dug over, and afterwards raked, and the beds marked out to the width of four feet, with an alley one foot wide between. The beds should then be uncovered for the reception of the seed, which should lie half an inch apart from one another. The covering should then be drawn on with a rake, or a small clean spade, spreading the soil with an even hand,

which should cover the seed to the extent of three-quarters of an inch. The plants should be allowed to remain two years in the seed-bed, and then removed into lines, eighteen inches apart, the plants standing six inches from one another. They should stand thus for another two years, when they will be ready to be transplanted into the permanent situations they are intended to occupy.

In setting out ash plants, the mere digging a hole for their reception is not enough. The ground should always be trenched; and the roots, and consequently the tree, will then make progress, for the rain and sunshine will operate upon the land, and show a most favourable contrast in results to those plants which have been merely placed in a hole.

Of course there is the expense of trenching, which is somewhat considerable, but the future success of the trees will amply repay this outlay, and for hop-poles, and various other uses, a good ash plantation is often very valuable.

The Beech (*Fagus sylvatica*).—The beech will grow on most dry soils, giving the preference to sand, light loams, and loams with chalky bottoms. It is one of the handsomest of British trees, and contributes greatly to the beauty of any area whereon it may be placed. Some very large specimens of this tree are to be met with in many of the parks belonging to the nobility and gentry throughout the country, some of them being historical trees.

One very large tree in Windsor Forest is said to have stood since the time of the Norman Conquest, but is now only a venerable ruin; yet the beech is not accounted so long-lived a tree as many others, it

being considered not profitable to retain it standing longer than seventy or eighty years, for the value of its timber. It is found growing in masses in the chalky districts of Kent, Surrey, Hampshire, and Sussex, as well as on the Cotswold Hills of Gloucestershire, in Buckinghamshire, and Hertfordshire.

No tree puts on such a diversified appearance as the beech. When the rays of the sun strike upon the leaves of a beech tree which have been wetted by the gentle showers of early summer, the action of the light upon the leaves has a most beautiful effect. The buds break out into soft silky folds, covering each separate spray with a coating of light green verdure, which, as the season advances, changes into a bright dark green. It puts on its best appearance, perhaps, when planted on a sandy loam, or on the slope of hills where there is a calcareous bottom, where it assumes somewhat of the graceful appearance of the birch.

The beech can be made to give a large amount of shelter, and deserves on this account to be much more generally planted than it is, where shelter is needed. Tall fences can be converted out of beech trees to stand from twenty to thirty feet high, affording shade in summer and warmth in winter; for if the soil is not naturally rich wherein the hedge of beech is planted, by manuring well, the dead leaves will be retained hanging to their stems throughout the winter. These hedges may occasionally be seen, in rare instances, close and thick, of the height of eight and ten feet where they have been regularly kept under the shears, while the topmost boughs have been allowed to take their course. In certain cases it has been

assumed that this protection during the early months of the year has had the effect of anticipating the season one month, so far as its sheltering influence has extended.

The beech is invariably propagated by its mast. The seeds ripen in October, and those which have no kernels fall first from the tree. If good and bad seeds are gathered together, they may be known, and separated, by putting them into a tub half-filled with water. The good ones will sink to the bottom, and the bad ones float on the top, when they can be poured off with the water. The good seed should be immediately taken out of the tub, and spread out to dry, and when perfectly free from damp, then put up in boxes, or bags, with twice their measurement of sand, which is the best way of disposing of them till they are wanted. The mast becomes ripe in October, and the time for sowing the seed is the end of March or beginning of April. Certain experiments have been made by planting the seeds in the autumn, but the plants are likely to be cut off by the late frosts.

The seeds should be sown in beds, covered with soil an inch in depth, and lie about an inch from each other, the earth being removed for this purpose from the top, or surface of the bed, and then replaced again ; first being patted with the back of the spade to keep them in their places.

The young plants do not like the knife, and are apt to become bark-bound when pruned too early, they ought not, therefore, to be cut until they have well established themselves. In the event of plants becoming bark-bound, when they will refuse to grow, the

best plan is to cut them down in April, to within four inches of the ground, and pick out the strongest and straightest shoots to form the future tree. This is likely to occur so, if they are allowed to stand for more than two years, without being transplanted in the nursery.

The beech has a tendency to throw out spreading branches, and where the ultimate object is to obtain a number of good straight timber trees, they should stand for the first few years in close proximity together, so as to discourage the growth of side spray, and not be allowed to waste themselves in spreading branches. As they advance in growth and age, greater freedom must be allowed to them.

The timber of the beech is not considered very valuable, except for certain purposes—as household furniture, in the form of chairs, tables, chests of drawers, and bedsteads, corn measures, etc. In the mountainous districts of France, the *sabots*, or wooden shoes, are made from beech. It also answers well for all purposes and objects where timber is needed to be constantly submerged in water, as piles, flood-gates, sluices, and the keels of vessels. In France the oily secretion of the nuts is more developed than in those produced in this climate, a considerable quantity of oil being made from them, in which a trade of some little importance is done in certain districts; but I believe nothing of the kind has been attempted in England.

Up to the present the English farmer has not turned his attention to manufactures, which could be carried out to a much larger extent than they are, in conjunction with rural occupations, which the future

will doubtless develop. Beet-sugar, for example, now that sugar-making machinery is so much cheaper, might be managed very easily by those disposed to go a little out of their way, in order to make the business of farming more remunerative. Even in planting, by a little attention, very remunerative results could be secured by growing handsome sticks for umbrellas, parasols, etc., for which there is always a large demand. I merely throw the idea out at random; but having observed, in certain instances, curiously-marked specimens of growth, which have arisen from an ash plant having been embraced, and bound round tightly with the wild white convolvulus, which has been marked in consequence in a curious manner, it would be possible to create such marks in places or positions where they might be wanted, by tying strings around them. Pliable stems might also be trained into any shape which they might be needed to grow in.

The beech is thought to be a native of Britain.

The Birch.—There are two varieties of the birch indigenous to this country, *Betula alba*, and *B. a. pendula*, the latter being by far the most ornamental. The birch is generally classed and associated with the broad-leaved trees, as rejecting on the one hand an elevated situation, and vigorous climate, and on the other, a very low one, where an undue degree of moisture prevails, though in reality it is very hardy, and only one or two other trees approach so near to the North Pole, the fact being that it adapts itself to a wider range of soil and situation than most other plants. It often springs up and becomes the successor of the Scotch pine, the *exuviæ* of which is hostile to

most plants, but which is favourable to the growth of the birch, and although, at times, found in swampy ground, few trees are so capable of resisting drought so successfully.

The *B. a. pendula* has its bark covered over with rough exudations, which causes it to be readily distinguished when a plant from the *Betula alba*, which is soft to the touch. They are frequently found intermixed, while in other districts each is found growing exclusively. Its positions are often so different and varied, that while it may be found growing in extensive coppice in the remote parts of the Highlands of Scotland, on rocky elevations, it may also be more frequently found adorning the margins of lakes and rivers, and in sheltered woodland glades. On the banks of the Findhorn, near Forres, in Morayshire, there are trees sixty feet high, with trunks six feet in circumference, the surface stratum of the soil being sandy peat earth, with gravel upon a sandstone bottom. As may be supposed from these different conditions, the tree attains its maturity at different ages, according to the nature of the soil, and the situation it occupies; but it seldom increases in size after it is seventy years old.

The common tree, where it grows wild, attains an average height of about thirty feet, and the weeping variety, which is much the handsomer of the two, an altitude of about forty feet. The tree is indigenous throughout the north, and in high situations in the south of Europe.

Plants may be purchased at a year old, and about six inches high, at four shillings or five shillings per thousand. Transplanted then into nursery lines,

where they stand for two years, and reach a height of two or three feet, fit for finally planting out, they sell at twenty-five shillings to thirty shillings per thousand, which is thought a high price, when compared with the firs which are sold by the nurserymen; but notwithstanding the disposition of the plant to grow wild, and spring up spontaneously, it is generally the most uncertain nursery crop of any hardy tree.

The seeds are ripe in September usually, when they are collected, and thinly exposed to dry in an airy situation, to prevent fermentation, and when they are quite dry, are put aside till March, when they are sown. The beds are smoothly dug over, and the seeds spread regularly on the surface, at the rate of one bushel of seed to each bed of thirty lineal yards. They want no covering, but require to be pressed closely down into the ground with the feet.

The bark of the birch is much in request for tanning, and is especially preferred by fishermen for preserving nets and cordage, being amongst the most incorruptible of vegetable substances.

The Elm.—There are two leading species of the elm. The *U. campestris*, or English elm, the tall variety, which figures so prominently in most English landscapes, and the *U. montana*, the mountain, or Wych, elm, the genus *Ulmus* being the type of the natural order *Ulmaceæ*.

There are about twenty sorts of the *U. campestris*, and botanists are unable to decide which are species and which varieties. As it rarely produces seed in England, it has been thought questionable whether it is a native of this country; but if not truly indigenous, it must have been introduced very early, and pro-

pagated by art. In France great numbers of trees are raised from seed, but in this country it is chiefly propagated by layers from stools, or suckers from old trees, the best plan being to raise from layers. This is done by lopping over a young plant which has become well established. During the following summer the root produces a number of young shoots, which are bent down, when they have completed their growth for the season, to the depth of five or six inches into the ground, leaving them firmly placed there, with their extremities in an erect position clear above ground, to form the future tree. These take root during the ensuing summer, when another crop of shoots are produced by the stool. The layers should then be taken away during open weather in winter, or early spring, so as to make room for the next crop of young shoots, in the same method which we have elsewhere described. The stool yielding a number of plants annually, it is desirable that, in order for them to become well rooted, the stool should stand in a sandy, rich, and friable soil. The young plants should be placed in nursery lines for two years, previous to being finally planted out, a foot asunder in the rows, and the lines two feet apart from each other. The young plant forms a more bushy, and fibrous root than most trees, which enables it to be moved with safety when it has attained a size and age beyond that which is common with other kinds of trees ; but they must be moved again, or more space allowed for them to grow in, if intended to stand longer than usual before removal.

The elm grows freely in soils of opposite qualities, being found in sand, as well as in strong clay, but a

rich soft soil, with a loose open bottom, is the best adapted for its vigorous growth, and in ordinary land its rate of progress is usually at the rate of twenty-five feet in ten years. Its form is tall and elegant, with an erect bole, remarkable for the uniformity of its size throughout, with dense foliage, and clustering habit of growth, which causes it to be very ornamental. As it is not of a spreading nature, it is frequently made use of as a hedgerow tree, and few trees produce timber of such equal size and value in so short a time. The wood being brown, hard, and of a fine grain, is well adapted for articles that require lateral adhesion, and in London it is used extensively for making coffins.

The tree is remarkable for its propensity to produce seedling varieties, many of which have been spread throughout the country, and are of very inferior value compared with the best specimens, some of which range from eighty to a hundred feet in height. In Hertfordshire there is one tree which measures forty-eight feet in girth at its base, and contains nearly 500 cubical feet of timber. Some few years back, elm trees were described as standing in various parks spread throughout the country, from 125 to 150 feet in height; one at Strathfieldsaye 130 feet high; one at Milbury Park, Dorsetshire, 200 years old, 125 feet high; and at Croome Abbey, in Warwickshire, a tree of 200 years of age measured in the diameter of its trunk nine feet six inches, diameter of its head seventy-four feet, standing 150 feet high, and was considered when the description was written the loftiest tree of its species in England.

The elm usually reaches its maturity in seventy or

eighty years, after which it has a tendency to become hollow in the centre. It is this liability which produces the many gaps which are to be seen at times in old avenues of elms leading up to stately mansions, when, during heavy gales of wind, these unsound trees are laid low.

The Mountain or *Wych Elm* (*U. montana*).—This tree has a shorter bole, and is more spreading in its habit than the tall English elm, but is more picturesque in appearance, and of hardier constitution, being a native of Scotland. It does not yield suckers like the English elm, but is produced from seed, which it yields freely. The blossoms appear in April, just before the leaves burst out, and the seeds are usually ripe about the middle of June, when it is customary to gather them, and sow them at once in rich fine soil.

The seeds are very unequal in their power of germinating, one-half perhaps not coming to anything, which must be borne in mind by the horticulturist who needs to raise plants, which will stand in the first place about two inches apart. The seeds should be covered with about half an inch depth of soil, and in dry weather the beds should be shaded and watered. A week after sowing the seed the plants will appear, when they will require no further care than to be kept free from weeds. In the following winter or early in spring they are generally removed into nursery lines, but this is not strictly necessary in the case of the Wych elm, for when they do not stand too close, which is often the case, resulting from inequality of the seed, they are sometimes allowed to remain two summers without being removed. Two years is

the usual time for the plants to stand in lines, for if allowed to remain longer the roots are apt to get bare, so that the plant when transplanted becomes stunted.

The tree grows rapidly, and will yield heavy timber in a rich deep soil, preferring an open subsoil. When lichen overspreads the bark, and its growth becomes feeble, this result is often traced to water stagnation near the surface. It grows slower than the English elm, and usually attains a height of fifty feet, but is often found reaching a higher altitude when interspersed with taller-growing trees. Its timber is much in request for agricultural purposes where strength and elasticity are required, such as naves, shafts, rails and frames for carts and barrows, in Scotland, and the tree is somewhat remarkable for yielding large protuberances of gnarled wood, knotted by an accumulation of growth, which are often highly valued. Pruning can often be performed to advantage with this tree, as, at from eight to fourteen years of age, it is apt to ramify near the ground, and although this sort of formation adorns the glen and mountain sides, it forms a short trunk. This can be remedied by shortening the competing shoots, and reducing the strongest of the lateral branches with the pruning-knife, by which means the bole will be lengthened, and the desired shape insured.

The Huntingdon Elm (U. s. vegeta.)—This genus does not date back further than the middle of the last century, but is a very fast-growing tree, and valuable for timber. It is propagated by layers, but oftener perhaps by grafting upon a stock of the Wych elm.

Of the Cork-barked elm (*U. suberosa*), there are several varieties, as well as the American elm, the Curled-leaved elm, and the Variegated elm. The most graceful of the entire genus is the *Ulmus pendula*, or Weeping elm, of which there are several varieties, supposed to have sprung from the Wych elm, being begun to be cultivated in nurseries about the end of the last century.

It seeds freely, but as plants raised from seed are apt to lose the peculiarities of their species, it is generally propagated by being grafted upon a stock of the common elm. In this way it grows readily, and soon forms a head of considerable size, often presenting a most striking appearance, being wild, diversified, and rugged, in the eccentricity of its growth sometimes sending out its branches upwards, downwards, horizontally, or obliquely, in a manner which is never seen in the case of any other tree. As a tree for the lawn, park, or pleasure ground, it is very desirable amongst the fast-growing trees, in effect somewhat resembling the cedar.

A species of elm very common to Britain in some parts is the *U. glabra*, being of rapid growth, and having many varieties.

The aptitude, however, of the elm, throughout all its varieties, to vary from seed, has rendered the genus very confused, and it is therefore of importance that the planter knows himself to be possessed of the best kind adapted for the purposes intended.

The Chestnut Tree (*Castanea vesca*).—Linnæus has united the genus *Castanea* with *Fagus*, the beech, which has not however been done by previous botanists, nor has his example been followed by many

since, deservedly high as an authority as he has always been ranked. It has been pointed out that the chestnut has male flowers on very long catkins, with farinaceous seed, while the beech, on the contrary, has male flowers in globular catkins, with oily seeds, which marks the distinctive characters of the true genera.

Only in the warmest counties of England, such as Devonshire, as well as some of the south-western counties, does the fruit ripen, and is therefore not held in much estimation as a fruit tree in England, but is chiefly held in value on account of its rapid growth and dense foliage, which well adapts it for a screen or shelter, and is valuable as coppice. Full-grown chestnut timber is generally brittle, and only ranks about half in value with that of oak; a singular characteristic of the tree being that the wood is more valuable when young than when it becomes old. Full-grown chestnut timber is apt to be shaky and brittle, the annual layers, or rings which mark the yearly growth of trees, having a tendency to divide from one another, and fall into laths; but this is only the case at times, and when the timber has attained perhaps the age of fifty or sixty years.

Young chestnut wood, on the other hand, soon changes its sap, or outer wood, into heart wood; and hence its great value when young for posts, fences, and any similar purposes where timber comes into contact with the ground, where it may be alternately exposed to wet or dry. As coppice-wood, it is extremely valuable, as it springs freely when lopped over, and forms capital underwood.

The name of the Sweet, or Spanish, chestnut is said

to have been derived from Kastanea, a city in Pontus in Asia, from whence it originally came. In Spain it is grown chiefly for its fruit, which not only forms a very principal item in the food of the peasantry of that country, but is an article which is exported to a considerable extent. At the time when a duty of two shillings per bushel was imposed upon chestnuts, the sum taken by the excise office, according to McCulloch, during the three years ending 1831, showed that the annual consumption in England amounted to 20,948 bushels, and in 1842, 23,216 bushels, which were eaten as dessert.

The tree is called Spanish chestnut, and the fruit sweet, because the best chestnuts sold for table use come from Spain, and to distinguish it from the fruit of the horse chestnut, which is exceedingly bitter.

It is said to have been brought to Europe by the Greeks, from Sardis in Asia Minor, about 500 B.C., and considered most likely that it was introduced into Britain by the Romans, who performed a good deal in this way for our island, and who were not the mere conquerors they are often supposed, but were civilisers. The tree being of great duration, and ripening its fruit in favourable situations, became a permanent inhabitant of England.

The chestnut prefers a deep sandy loam, or rich gravelly soil, when the subsoil is open and dry.

As a park or lawn tree, though forming an important element for picturesque effect, it is more tender, and does not arrive at the height or diameter of the oak. Its leaves are broad and long, of a serrated appearance, dark-green and glossy, which change into a mellow hue under the ripening influences of autumn.

While in exposed situations, and on retentive subsoils, it ramifies near the surface of the ground, and seldom ripens its shoots sufficiently to resist frost. On favourable soils in a close plantation, it rises with a straight clean trunk to a height of from fifty to sixty feet, and forms one of the most ornamental of our large-growing trees.

An account has been given of what was supposed to be the largest and oldest chestnut tree in the world, which used to stand, if it stands there no longer, on Mount Etna. Kircher, about the year 1670, states that a whole flock of sheep might be enclosed in it, as in a fold. While Brydone, who records his tour through Sicily in 1770, just a hundred years later, says that the decayed trunk of this tree measured 204 feet in circumference. M. Houet, in his "Voyage en Sicile," also relates that he visited it, and found it in a state of decay, having lost the greater part of its branches, and its trunk being quite hollow. A house was erected in the interior, in which some country people were living, and they had set up an oven, in which, according to the custom of the country, they dried chestnuts, filberts, and other fruits which they wanted to preserve for winter use; and worse than all, using for fuel, when they could find no other, pieces of wood cut with a hatchet from the interior of the tree. Nothing is more curious than the different accounts given at various periods of time as to the condition and fortunes of these hoary old woodland patriarchs in different parts of the world—wayside inns, and houses of refreshment for the traveller having been extemporised from out of them in several instances.

Evelyn describes the great chestnut of Tortworth, which is said to have been remarkable for its magnitude in the reign of King Stephen (1135), from which it has been argued, that it may reasonably be presumed to have existed before the Conquest. It stands in a soft loamy soil, on a north-west declivity of a hill, in a position eminently suited for its growth. Strutt, who describes it in his "Sylva Britannica," in 1820, gives its measurement at five feet from the ground, as fifty-two feet in circumference, and its cubical contents, according to the usual method of measuring timber, to be 1,965 feet. The tree, when described, ramified at the height of ten feet from the ground into three limbs, one of which, at the distance of fifty feet from the main trunk, was stated at that time to have been twenty-eight feet in girth. The tree has subsequently been described as of smaller circumference (not having seen it myself)—no uncommon result in the case of ancient trees, which becoming ruins, are often carried away piecemeal.

The tree is usually propagated from seeds of English growth, foreign seeds being frequently kiln-dried, to adapt them for travelling in packages. They are sometimes sown in October and November, the plants generally coming through the ground in April, when they need protection, as they are likely to receive injury from frost.

In districts where late frosts prevail, the nurserymen who are in the habit of raising chestnut trees preserve the seeds during winter in a dry airy place, such as a loft floor, upon which they are spread, and sow them early in spring, so that the plants do not make a start above ground until the middle or end of

May, when they may be supposed to be out of danger from frosts. In sowing, it is generally customary to prepare beds four feet wide. One bushel of seed will plant a bed of thirty yards in length, four feet wide. They are sometimes sown in drills sixteen or eighteen inches apart, the seed being placed about three inches from each other, and covered up with one inch of soil. In very rich land the plants will continue to grow to a late season. When this is the case, they fail to ripen their wood before the frosts set in, which will cause them to lose their tops, and they then will become branchy and bushy. The plants are removed from the seed-bed at one or two years of age, and transplanted in lines. When they are lifted, they should be assorted in sizes, and have the extremities of their tap-roots cut off, so as to make the root grow more fibrous. The lines should not stand more than sixteen inches asunder, and the plants six inches from one another. If a more liberal space is allowed, the plants are apt to become crooked, and stand in need of pruning. After having stood two years in nursery lines, the plants will be from two to three feet high generally speaking, which is the size and age best adapted for forest planting. If they are wanted of a larger size, they must be transplanted again every second year, increasing the space between them in which they are to grow. They can be removed any time in open weather, between October and March.

Many writers have asserted that the chestnut tree is a native of Britain, but it has been pointed out on the other hand, that although the tree is remarkably free from disease, yet all who are familiar with its growth and cultivation, are aware that it is affected

by unfavourable seasons to a degree which would not be felt by any tree which was a native of this country.

There are several ornamental varieties of the chestnut: *C. varicgata*, variegated with yellow and white streaks; *C. Americana*, which has broader leaves than the common tree; *C. glauca*; *C. glabra*; and *C. asplenifolia*. Those cultivated in France for the sake of their fruit are styled *les marrons*, which when roasted emit an aromatic odour.

CHAPTER IV.

Broad-leaved Trees continued—The Hornbeam—The Locust Tree—Cobbett and the Locust Tree—The Oak—Acorns all bear a Family Likeness—The Oak succeeds in various Soils—Roots of the Oak penetrate the Ground deeply—The Oak in exposed Situations—Lammas Shoots of the Oak—Sowing Acorns—The Site of Felled Oaks good for Coppice—Larch and Oak grow well together—The Parliament Oak—The Mossy-cupped or Turkey Oak—The Fulham Oak—Turner's Evergreen Oak—The common Evergreen Oak—The Cork Tree—Large Tree at Mamhead—Nut Galls—Red, White, and Black American Oaks—The Plane Tree—The Eastern Plane—The Western Plane—The Maple, *Acer Pseudo-platanus*—The Mock Plane or Sycamore—The Sugar Maple—The Norway Maple—The Striped-barked Maple—The Red or Scarlet Maple—The Walnut Tree—Royal or Common Walnut—The Black Walnut of America—The Gray Walnut.

The Hornbeam (*Carpinus*).—The Hornbeam is less cultivated, perhaps, than any other timber tree suited to the climate of Great Britain, though in a few places they are to be met with in considerable numbers. It is most useful as a hedge plant, as it will grow in confined spaces, will stand almost any amount of pruning, and is less subject than most trees to atmospheric influence and disease when confined within a narrow compass. The tree belongs to the natural order *Corylaceæ*. The genus includes only about four species, which are all deciduous trees. The flowers of the tree are unisexual, being in distinct catkins on

the same plant. The common Hornbeam, which is the principal tree in this small division *C. Betula*, is met with in England, Ireland, the south of Scotland, and in many parts of central Europe, avoiding climates which are either extremely hot or very cold, being indigenous to the countries I have named.

In appearance it bears a strong family likeness to the beech, but its leaves are not so bright and shining as those of the latter tree. It does not attain a large size, and is neither valuable as an ornamental tree nor for timber, standing between the birch and the elm as regards size. It grows close and twiggy, retaining its leaves a long while, like the beech, the qualities which mark it rendering it undesirable as a timber tree, causing it to be most useful as a screen, or protection, when planted thickly round a homestead or garden ; or to shelter exposed fields, as it will not be injured in exposed situations, and will stand the effect of rough winds well. As a hedge plant it is better than beech in some respects, for its roots deriving nourishment at a greater depth from the surface of the soil, it is less injurious to neighbouring growing crops. Although it readily springs when lopped over at the surface, or at any height from the root, it does not form so compact and bushy a hedge as the beech perhaps, though it attains a greater height during the first six or eight years of its growth, its leaves do not hang so uniformly throughout the winter as do those of the beech—a very important consideration when shelter is needed, especially in the form of a hedge. These are its leading features, which may be weighed and balanced, pro and con. Abutting a lane or highroad, in the shape of a hedge,

the beech perhaps is to be preferred, but when the hedge is placed in the centre of fertile land, which is continually being cropped, the hornbeam perhaps would be considered most desirable.

Its wood has special qualities, Linnæus describing it as being harder than hawthorn, and capable of supporting great weights, while Loudon in testing the relative strength of wood, records that, a piece of quartering, two inches square and seven feet eight inches long of hornbeam, supported a weight of 228 pounds, while a similar piece of ash broke under a pressure of 200 pounds, the same of birch under 190 pounds, of oak under 185 pounds, of beech under 165 pounds, and of other woods which were made trial of at the same time, at a less weight. The experiment showed the hornbeam to be possessed but of comparatively little flexibility, bending before it broke only ten degrees, while ash bent twenty-one degrees, birch nineteen degrees, and oak twelve degrees.

Being white, tough, and durable, the wood of the hornbeam is well adapted for handles and stocks of tools, wheelwright's work, milk-vessels, yokes for cattle and other agricultural purposes. Evelyn says, "that for milk vessels it excels either yew or crab," but since Evelyn's day, the form of vessels used in the dairy has changed considerably, earthenware, glass, and metal milk-pans, or skimming dishes, being most commonly met with, to the loss perhaps of the appearance of certain dairy utensils, which used to present such a handsome and taking aspect when composed of well-scoured white wood, bound with shining bands of metal, which glistened like silver.

It makes good firewood, throwing out great heat, and burning brightly, and its charcoal is considered the best for cooking purposes when charcoal needs to be used, and is also used in the manufacture of gunpowder.

The seeds are usually ripe at the end of autumn, and are contained in a small nut. Upon being sown immediately they attain ripeness, they spring up in an irregular manner, a few coming up during the first spring, but the principal part of the crop in the second year. It is therefore the usual custom to sow the seeds in the spring, at the rate of one bushel of seed to a bed fifty yards long and four feet wide, covering them over with earth half an inch deep. The seeds give no sign the first year after being sown, but vegetate in the succeeding spring. They are allowed to remain in the seed-bed till they are two years old, if they do not stand too thickly. If they are too crowded they are transplanted at a year old. At two years of age they should be lifted, and the extremities of their roots taken off, and then planted out into nursery lines, sixteen inches asunder, the plants four or five inches from each other. After standing two years in lines, the plants are fit for hedges, but if they are allowed to stand longer, and a larger space is left for them to grow in, they are likely to become tall and bare near the surface, which renders them unfit for hedge plants, until they are made bushy by being cut close down to the ground. The plant is hardy and only requires to be kept clear of weeds.

Although in extreme instances the hornbeam has been known to attain a height of eighty or ninety

feet, yet fifty feet is considered a tall tree in average situations, the trunk being often of a flat and irregular figure, not by any means ornamental.

The Locust Tree (*Robinia Pscud-acacia*). — The common Robinia, or False acacia. In this country the tree does not thrive, unless planted in the earliest and best sheltered situations. A leguminous tree, it belongs to *Diadelphia decandria* in the Linnæan system. Although it grows rapidly, and becomes a tree of considerable height in its native country (North America), when in rich, dry, well-sheltered situations, as an ornament in this country it is very precarious, being much influenced by the seasons, and seldom blooming abundantly for a few years in succession. It is generally late in coming into leaf, and wears a bare appearance when other trees are decked out with leaves of verdant green.

It is usually ranked with trees of low stature, though Loudon speaks of one, the first plant of the species that was brought to Europe, and planted in the Jardin des Plantes at Paris, in 1635, which still existed two centuries later, namely, in 1835, when it had attained a height of seventy-eight feet.

It produces shoots of great vigour during its early life, but it is only in the best situations most favourable for its development that its branches, which are thrown out luxuriantly, will ripen sufficiently to stand the frost, it being not an uncommon circumstance for from a third to a half of the extremities of the branches of young trees to be cut off. In after-life the tree acquires a more spreading habit, when its growth is less prolific, and better calculated to stand the winter in consequence, although as it continues to grow late in

the year, a longer summer than we get in Britain is required for the most favourable conditions of its growth.

No tree perhaps has been so much praised by certain authors, Cobbett especially, and as they grow very rapidly during their infancy, they have frequently raised the belief that they would outstrip every other timber tree, but this early promise is not kept up, two-year old plants being often from five to six feet in height.

The tree can be raised from cuttings of the roots, but it is usually produced from seeds, which get ripe about the end of October. It is generally customary to steep the seeds in water, and sow them in early spring. A light, pliable, well-drained soil is necessary, in an open situation where plenty of sunshine is to be obtained, and the seeds sown about two inches apart. The best seeds are procured from America. They should be covered with about half an inch of soil, when the plants will make their appearance early in the summer, and growing quickly, will attain a height of one and a half to two feet during the first season. If they exceed this rate of growth they seldom ripen their tops sufficiently. The soil should be well drained, and only when the climate is of the best and most suitable description should it be made rich for seedling plants, which grow very rapidly without being stimulated, and they should be transplanted when one year old, into nursery lines two feet apart, the plants standing about a foot asunder in the rows. Sometimes in one year after this, and sometimes in two years, according to soil and situation, the plants will commonly attain a height of from five

to eight feet high, and can be removed to the places where they are intended to stand. Those who raise the common Robinia, sometimes thin out the one-year old seedling plants, leaving the remainder standing in the seed-bed six or eight inches apart till they become two years old. In this period they often attain an altitude of five or six feet, and are fit for being permanently planted out without being previously transplanted into nursery lines. Its rapid growth during infancy, as I have before stated, often leads to erroneous calculations as to its after-growth as a timber tree, the young branches being cut off by frosts reduces its scale of annual growth very often to that of most ordinary trees. This circumstance tends to make the plant branchy, yet nevertheless it still retains its natural inclination to grow erect. As it grows older it assumes a more spreading habit, and growing less vigorously, is better adapted to endure the winter, and it is after the tree has attained the age of ten or twelve years that it wears its most beautiful form, throwing out handsome white and yellowish racemes, which possess great fragrance, though it seldom blooms abundantly for successive seasons.

As timber trees, the trunk has a tendency to get hollow, like all other trees which have an inclination to spread their roots near the surface of the ground.

At Claremont there is a tree nearly seventy feet high, the top having a diameter of fifty feet.

In France it is grown extensively as coppice as well as in the form of pollards, the wood being in demand as props for vineyards, but in England in the form of coppice it does not thrive as underwood, where it cannot receive the full influence of the sun,

air, and light; nor is it adapted to situations of great exposure, as its branches being brittle are apt to be broken by the wind. Its timber is remarkably durable, being especially valuable as posts, bearing a high reputation for strength and solidity, possessing a great power in resisting fracture, which is said to exceed that of the oak, being extensively manufactured into tree-nails in America, where it is used for ship-building.

Cobbett was the means of giving a great impetus to the cultivation of this tree in England, which he praised extravagantly, describing the timber as being "absolutely indestructible by the power of earth, air, and water, so the time will come when the locust tree will be more common in England than the oak." The locust tree being the popular name in America, many bought it under the impression they were obtaining something different in the form of a recent importation, but in reality it was one of the first American trees which was introduced into Britain, and was not thought to be identical with the *Robinia Pseudacacia*.

It is never now planted for the sake of its timber, which Cobbett said would one day supersede the oak in this country.

The Oak (*Quercus*).—There are about one hundred and fifty different species of oak indigenous to the temperate portions of the northern hemisphere, and about a hundred of them have been introduced into Britain, the leading varieties of which it will be only necessary for us to name. The oak has been classed as belonging to the genus *Quercus* of *Monœcia polyandria* in the Linnæan system, and to *Corylaceæ* or

Cupuliferæ in the Natural order of plants. The hundred species or so known in this country branch into an endless number of varieties, most of which are trees of large size, while certain varieties only attain medium dimensions, and others are quite of a dwarf kind, some being evergreen, others sub-evergreen, but mostly being of the deciduous order. However much the various kinds differ in outward appearance they are all alike in producing the well-known acorn, which is remarkable for its uniformity of size and shape upon every kind of oak tree. Loudon has recorded that upon one occasion he saw a plant of *Quercus lanata*, a native of Nepaul, growing in a pot, which was three or four years old only, bearing acorns; but several kinds do not have fruit till they attain the age of twenty years.

The timber of the oak is very valuable, but the common deciduous kind of oak, as well, makes excellent coppice, springing up freely after it has been cut down. The most widely known oak is the variety *Q. robur*. which is indigenous to this country and to most countries of Europe. There are two distinct varieties, which some botanists rank as species, *Q. r. pedunculata*, which yields acorns on fruit stalks, and *Q. r. sessiliflora*, in the case of the latter the acorns being sessile, yielding flowers and acorns close to the branches without fruit-stalks. The best timber is produced from the first named, that from the latter resembling the Spanish chestnut more in its characteristics. The tree, too, is more apt to retain its withered leaves on its branches during the winter, and its greatest recommendation is, that it grows more freely in indifferent soils and situations when young.

The oak frequently succeeds well on soils that would often not be considered appropriate for it, did it not furnish proof to the contrary at times, being often found to luxuriate on soil of opposite qualities, which is too poor to produce good specimens of elm or ash. This, doubtless, arises from the fact that its roots penetrate into the ground to a greater depth than those of almost any other tree, finding its pabulum, or food, in under stratifications of the soil.

It is generally supposed to affect a strong deep soil, free from the presence of any stagnant water, but it attains to a good size very often in sandy or gravelly ground, particularly when there is clay mixed with it. It is however in rich sheltered valleys, when associated with other trees, that the oak succeeds best, assuming a lofty altitude, with a tall trunk, when the same variety would become stunted and dwarfed in an exposed situation. When the oak is planted in bleak spots, it is necessary to find a shelter for the young plantation in other trees of faster growth, as Scotch-fir, larch, beech, or spruce-fir; it being usual in bleak situations, for those who understand what they are doing, to have firs planted a few years previously, which have attained a height of three or four feet at the time the oak plants are inserted in the ground.

The young oak soon takes a firm grip of the soil, and being very tenacious of life is rarely smothered, or killed by confinement. This shelter is very necessary, for although it expands into leaf at a comparatively late period of the season, the slightest touch of frost has a very visible effect upon its foliage. After being closely sheltered, and then relieved, it often advances

with rapidity, and frequently produces summer and autumn shoots—these Lammas growths, as they are called, are peculiar to the oak and a few other trees when young and vigorous.

During its infancy, in plantations, the oak is generally erect and pliant, but as it grows older its character becomes altered. Its roots may be seen forming a basis on the surface of the ground, while the form of the tree becomes developed into grander outline, throwing out ponderous horizontal limbs, which, sometimes gnarled, display an elegance in their twisted shapes which is often much admired.

The acorns generally become ripe, and drop from the tree, at the end of autumn, and they can be sown any time after that up till the beginning of March. Care should be taken to use none but seed of the first quality, chosen from the best and most approved tree. They will strike in any kind of soil, but a light friable soil is the best to rear oak plants in. The smallest acorns produce the smallest and weakest plants, which are of feebler growth during the first few years of their lives than plants which spring from the largest acorns. This fact is so well known to planters, that a sieve or riddle is used, through which the smallest acorns drop.

Nurserymen usually sow the acorns in beds four feet wide, in the proportion of one bushel of good sound acorns to a bed twenty-five yards long of that width. The soil is taken off the top of the beds, and the seed fixed in it by rolling, or by being beaten down with the back of a spade. The soil should then be cast on roughly, but taking care that all the acorns be properly hid, or covered to the depth of half

an inch in heavy soil, and one inch in light land, and allowed to remain in this rough condition till April comes round, when the surface of the beds should be raked, and made smooth and equal. The object of this method of proceeding is to expose the covering to the pulverising influences of the winter's frost. The seeds of weeds will have vegetated, which can be removed in the process of raking, and the surface of the soil will be made soft, through which the young oaks can force their way early in May.

Being at this period of their infant growth very tender, as they are sometimes injured by late frosts, a slight covering of evergreens, leaves, or any light covering, is found a useful protection till May is past. After that, all that is wanted is to keep the beds clear of weeds.

The seedling plants are removed into nursery lines sometimes at one year old, but more commonly at two years of age, during the winter or spring. The ends of their tap-roots should be cut off, and they should be placed in lines sixteen or eighteen inches asunder, and the plants six inches apart. In lifting them from the seed-bed, care should be taken not to injure or break off the lateral fibres of the roots—breaking off the end of the tap-root is of no consequence. After standing two years in the nursery lines they will generally attain two or three feet high, when they are fit to be placed out and become denizens of the forest. The rule however I have laid down before must be observed, if larger plants are required, of transplanting into a wider space, where they may remain two or three years longer, according to the circumstances of their growth and

general progress. For a hedgerow, plants of a more mature kind, like the latter, are needed, as the smaller and the younger oak plants frequently suffer from vermin. The oak sending its tap-root deep down into the ground, if it is not transplanted, but allowed to stand in the same situation for more than two years, that bushiness of root is not created which is necessary; for though they may appear strong and healthy, they will be of very little use for planting out.

Although the oak in its infancy does not advance so rapidly as many other trees, it is by no means an unprofitable one to grow. Being usually planted with other trees, which act as nurses, and cause it to assume form and shape, these generally have acquired a certain value when it becomes necessary to remove them, and when the oak gets to twenty years old, it will grow as fast as most hard-wooded trees. Also, when the timber of an oak plantation is felled, the roots rapidly spring again, and for ten years generally grow twice as fast as plantations newly formed, an advantage which must also be favourably compared against the difficulty there frequently is of establishing another plantation upon any site which has recently produced timber; though there is a striking instance to the contrary in that of birch following fir. Oak coppice has indeed been found more profitable than growing timber in some situations, the bark of which there is always a market for. Where large oak trees are grown, and the heaviest felled for certain purposes, the vacancies thus occasioned soon disappear, and by constant succession an oak forest may be said to be never exhausted. Larch grows well with the oak; for while

the latter sends its roots deep down into the earth in search of sustenance, the roots of the larch ramify, and draw their provision chiefly from the surface soil. On this account the two trees do not interfere with each other, as is the case with many other kinds.

Almost every county in England has its historical oak of large size, several of which have stood for many hundreds of years, such as the Parliament Oak in Clipston Park, the property of the Duke of Portland, which takes its name from the fact of a Parliament having been held under its umbrageous shade, by Edward I., in 1290.

It has been recorded of an oak forest in Scotland —that of Darnaway in Morayshire—that between the years 1830 and 1840, the sales of timber and bark averaged from £4,000 to £5,000 per annum. The oak timber usually sold from two shillings, to three shillings per cubical foot, its age varying from thirty to eighty years. After paying every expense during the growth of the timber, the revenue of the forest per acre amounted to double that of the finest arable land in the county.

The Mossy-cupped or *Turkey Oak* (*Q. cerris*).—The seed of this species is remarkable for producing a great number of different varieties, which vary considerably in the size and shape of their leaves, being much inclined to hybridise with the evergreen oak, so that frequently, in a seed-bed of young oak plants of this description, a considerable number of sub-evergreen specimens may be selected. The leaves are of a glossy green above, inclining to a whitish hue beneath; being lobed and serrated. They die in autumn, but, like those of the young beech, they hang on

to the tree during the winter. The tree is said to have been introduced into Britain in 1735, being a native of the middle and south of Europe, and the west of Asia. It is of elegant appearance, and as hardy as the common oak, growing vigorously in even poor soil. In good land the tree attains a height of forty feet in twenty years, its girth being in proportion, but its more common altitude is about thirty feet in that period. It is destitute of the grandeur of outline and ramification of branches peculiar to the British oak, generally growing with a straight trunk, like the larch, large in proportion to its lateral branches. Its timber is less durable than that of the common oak, but it is beautifully veined, and takes a good polish.

Its acorns ripen like those of the British oak, and the mode of propagation is the same. As the Turkey oak seedlings, however, are generally taller than the other, it is the better course to transplant them at one year of age, rather than to allow them to remain two years in the seed-bed.

The Fulham Oak.—This tree is commonly supposed to be a hybrid between the Turkey oak and the cork tree, having been first grown in a nursery ground at Fulham, from whence it derives its name. It was described some years back as standing eighty feet high, with a girth of trunk, a foot from the ground, of thirteen feet. It has been freely grafted on stocks of the common, or Turkey, oak, while the acorns of the original tree have produced many interesting varieties, so that seedlings from the original tree cannot be depended upon as being the true Fulham oak. Grafting is therefore the method of propagation resorted to, and as they spring freely on stocks which are vigorous, they frequently

attain a height of three or four feet during the first summer.

Turner's Evergreen Oak.—This is a hybrid, between the common British oak and the evergreen oak, originally raised by a person named Turner, at the end of the last century. It is one of the fastest-growing broad-leaved evergreen trees we have, which, like other hybrids, is propagated by grafting. Inserted in healthy stocks of the common species, they attain the height of four or five feet in two years, and afterwards make equal progress with the common oak. In summer the tree has very much the appearance of the common British oak, but in autumn its foliage appears more massive, darker green, and glossier. It is considered a better evergreen than any other hybrid, and healthy specimens are found to retain the leaves of the former year throughout the summer, its handsome foliage recommending it as a tree of highly ornamental appearance.

The Common Evergreen Oak (*Q. ilex*).—This is the commonest evergreen tree to be met with in the neighbourhood of Rome and Florence; the ilex trees in the celebrated gardens near Rome being considered extremely beautiful. It has an abundant foliage of a rich dark-green colour, the leaves having a fine polish, with a downy tinge beneath. This species bears sea exposure better than any other kind of European oak, while, as it is not injured by a smoky atmosphere, it is more suited for the embellishment of large towns and cities than most other kinds of evergreen trees. It commonly rises to the height of forty feet, but trees of this description, favourably placed for the development of their growth, have been known to attain

a height of eighty feet. The tree is a slow grower, but it is of great duration. Although tender while young, when it is once firmly established in the soil it stands the severest weather without injury, provided the land be well drained. Its strong tap-root has doubtless much to do with this result; and as when a seedling plant its tendency is to form a bare tap-root, which renders transplantation difficult to perform with safety, this species of oak is generally grown by nurserymen in pots. An acorn is put into a small flowerpot first, and then changed into a larger pot, according to its growth. Thus treated, they take to the ground naturally upon being planted out, and grow freely wherever they are placed, in almost any kind of common soil. They are benefited by a slight protection from frost during the first four winters of their lives.

The tree forms a very handsome evergreen, and blossoms in May and June. Its male flowers or catkins, which are produced on the shoots of the former year, are from one to two inches long, while the female flowers, on the contrary, are produced on the newly-formed twigs, the acorns coming to maturity during the second year.

There is no tree perhaps which differs so much in its growth and progress in different situations; soil and position, without doubt, have much to do with this; but a good deal also depends upon variety, for some kinds are known to vary as much in luxuriance of growth as they do in the appearance of the foliage, and all the varieties are not equally hardy.

When space enough is allowed to the tree it commonly forms a gigantic trunk, which it conceals with

foliage down to the surface of the ground. It is said this species will retain its vigour for a thousand years, and it is not subject to disease. Its timber is tough, strong, and heavy. Trees of the evergreen oak have been recorded standing in Britain in the one case, eighty-five feet in height, and eleven feet in circumference, another fifty-five feet high and twenty-two feet round; while in another instance the tree measured forty-five feet high with a trunk upwards of thirteen feet in circumference. It is a native of the south of Europe and the north of Africa.

The Cork Tree (*Q. suber*).—A native of the same countries as the common evergreen oak, it is not so hardy where it abounds on hilly and dry situations, seldom attaining a height above forty feet. Loudon, describing what he considers may probably be the largest cork tree in the world, at Mamhead in Devonshire, says: "The head of the tree is oval and compact, and its grand massive branches, each of which would form a tree of noble dimensions, are covered with ragged corky bark, resembling richly-chased frosted silver, which is finely contrasted with the dark-green luxuriant foliage;" the tree being about sixty feet high with a trunk twelve feet in circumference from the swell of the roots, standing alone in a soil of fine, rich, red loam, on a sub-stratum of red-stone conglomerate, 150 feet above the level of the sea.

It is propagated exactly in the same way in this country as the evergreen oak, the outer bark of the tree being the cork of commerce, which is by far its most important product. The cork is obtained in the following manner: When the tree is young the trunk

is cleared of its branches to the height of eight or ten feet, and when it is from twenty to thirty years of age its bark, or outer coating, is a formation of coarse porous cork, mixed with woody matter. This cork is of very inferior quality to that produced subsequently, and is generally stripped off in July or August. Eight or ten years is then allowed to elapse before the cork is stripped off again, which is found of superior quality to the first; it is not, however, till another eight years has expired, that the cork is found in its proper purity, which is only relied upon in the third disbarking, the operation being constantly repeated at the same interval of time. Strange to say, this treatment by no means impedes the growth of the tree, but rather has a contrary effect, the older the tree grows the cork is said to improve in quality, and the tree will stand for centuries. Care must be taken in stripping off the cork, not to cut into the inner bark or wood of the tree.

In concluding this brief notice of the oak, I must make mention of the oak galls, which are sometimes produced in great profusion on the common British oak, which it is said, detracts from the growth of the tree. In medicine they form the most powerful astringents, and are much used in the manufacture of ink, and in dyeing; their chief products being tannic and gallic acid. The galls of commerce grow in the *Quercus infectoria*, a dwarf oak indigenous to Persia, Syria, and Asia Minor, a shrubby plant, which sheds its leaves, and seldom exceeds the height of six feet. Galls are produced in various species of the oak, by insects of the genus *Cynipidæ*. The flies puncture the tender leaves, or shoots, and deposit

their eggs, around which the gall accumulates, the most remarkable being those formed in the male blossoms of the English oak. These ordinarily drop from the tree in June, but if they have been fastened on by the insects while in a growing state, and premature, they remain attached to the tree until the galls are perfected.

The red, white, and black American oaks each comprehends several species, some of which become large spreading trees, but they are not profitably cultivated for timber, the wood being generally soft and porous. The red kinds are exceedingly ornamental, *Q. coccinea*, or scarlet oak, being especially so. It is a native of Pennsylvania, New Jersey, and Georgia, and was introduced into Britain about the end of the seventeenth century, and grows very often quicker than the common oak in certain situations. The treatment of these varieties is similar to that of other oaks, a principal point to be borne in mind, being that the tree has a tendency to make a strong main tap-root, which occasions a stunted growth when removed, unless counteracting precautions are taken; these consisting in removing them early into nursery lines, and planting them in their ultimate situations, before the roots, which have a tendency to get bare, acquire great strength. The leaves are oblong, deeply sinuated, and of a beautiful shining green, varying very much in size and shape on different trees, and even on the same tree, at different stages of its growth. They are all produced on long leaf-stalks, and are remarkably handsome, some luxuriant trees yielding leaves of a foot in length, and six inches broad, which the first frost of autumn or winter mostly changes into yellow

or red, which, as the season advances, assumes a crimson or scarlet hue of the brightest intensity. These dotted about in ornamental shrubberies have a very beautiful effect.

The Plane Tree (*Platanus*), of the Natural order *Platanacea*, and of *Monœcia polyandria* of the Linnæan system.—This is quite a different tree to the great maple or sycamore, which is commonly termed the plane tree in Scotland, of which I shall speak in a few pages following. The genus includes only two species, the Eastern and Western plane, which are considered the most ornamental of all the broad-leaved trees which are grown in England. The seeds are contained in round balls, suspended by slender threads from the branches of the tree, where they hang all the year round, and which give a certain air of individuality to the species, while perhaps there is no tree which possesses more beautiful foliage. Our English summers are, unfortunately, too brief to allow of the young wood being matured, so as to stand the frosts of winter; the great objection to their more general cultivation being the changeability of the weather, which, when severe at the commencement of the season, is apt to destroy the leaves after their expansion from the buds, and they only do well when the soil is warm and the situation early. Both species attain to a very great size in their native countries, and in the most favourable spots suited to their growth in this country, no tree can surpass them in magnitude, or beauty.

The Eastern Plane (*P. orientalis*) is said to have been introduced into England about the middle of the sixteenth century, being a native of the east of

Europe and west of Asia, the area where it is found extending southward as far as Cashmere, being found on the margins of Grecian streams or rivulets, many of which appear to be now fast drying up, and on the coast of Asia Minor. Herodotus sings its praises in Grecian history, and it was invariably planted near the public buildings—Plato delivering his discourses in the groves of Academus, which were formed of the plane tree.

The tree blossoms in May, and in favourable seasons its seed ripens in October. The branches of the tree are wide-spreading, bearing leaves which are five-lobed, palmate, with the divisions lanceolate. On strong, young, vigorous shoots these are frequently upwards of a foot broad and ten inches long, but in old trees only attain about half these dimensions. The round balls containing the seeds should be broken, and the seeds sifted, in order to separate them from the cottony substance with which they are mixed, and sown in March. They require only the very slightest covering of soil, but should be pressed into the ground, so as to be kept firmly in their places, and kept moist, the ground being covered with boughs of trees. The surest and most speedy method of propagating is, however, by layers, in the same way which has been recommended before. The young plants grow very rapidly, being frequently four or five feet high, when only one year old, transplanted from layers; when they can be planted out; or kept another year, and then removed as occasion demands. It must have a deep rich soil, and in those cases where the tree has attained to a very large size, it is found the case that the roots have access to water. It must not

be confined by other trees, but does best in alluvial valleys, near the margins of streams. Its timber when young is of a yellowish-white colour, but when old it assumes a brownish hue, with a fine grain which takes a high polish, and is thus esteemed for certain purposes in cabinet-making.

The tree frequently attains a height of from seventy, to ninety feet in favourable situations, and grows rapidly.

The Western Plane (*P. occidentalis*).—This tree also grows to a great height and makes rapid progress, a tree of this species in the garden of Lambeth Palace being recorded to have grown where it was placed near a pond, to the height of eighty feet in twenty years; while one has been described situated in Chelsea Hospital Gardens, extending its roots towards the Thames, whose height was 115 feet, and girth, a foot from the ground, fifteen feet.

It is a native of North America, being found on the banks of the great rivers of Virginia, and Pennsylvania, and the Ohio and its tributaries, having been introduced into Britain about the year 1630. It readily grows from cuttings, but is best propagated by layers, the treatment being the same as previously recommended. It resembles very much the appearance of the Eastern plane, the leaves being large, thin, angled, and lobed, but the fruit balls are smaller than those of the other species. Its shoots also grow in the same manner, and they are equally affected by cold weather, wearing a scathed or scorched look when pinched by frost or cold, which it loses as the summer advances, and becomes clothed in richest green. It grows with greater rapidity than *P. orientalis*,

but is even less hardy, seldom maturing its vigorous shoots to their extremities, so that they commonly die back a certain distance from the effects of frost. The finest specimens of the plane to be seen in Britain are, however, of this species, and of the broad-leaved deciduous trees which succeed in this climate the plane must be reckoned amongst the handsomest, the motion of its large leaves when agitated by a breeze, producing that flickering light and shade during sunshine which is so much admired.

The Maple (Natural order *Aceraceæ*).—There are about twenty hardy species of this tree cultivated in Britain, comprising natives of Europe, America, and India, besides many others which are too tender to be reared successfully in this country.

The largest and most common kind, though it is far from being the most ornamental, is the *Acer pseudo-platanus*, the Mock plane tree, or sycamore. In Switzerland, Germany, Austria, and Italy, it is found associated with other trees in hilly situations, and few deciduous trees are found better adapted to stand singly in rough and exposed situations. It generally carries a large well-balanced head, and is well suited to stand the injurious effects of sea-spray. It is regardless of rough winds, and from affording a deep shade, it has been recommended to be planted on the south sides of dairies, in order to temper the heats of summer, and it affords good shelter for cattle. It is said to have been introduced into Britain about three centuries or more ago, and became one of our earliest cultivated timber trees, when tree cultivation first began to be taken up on a large scale.

It blossoms in spring, and the seeds become ripe

early in the following autumn, when they are collected and mixed up with sand, and put into a pit, and kept till the following spring, when they are sown. If planted in autumn when the seeds are gathered, the young plants make their appearance so early that they seldom escape being cut off by the frost. The ground should be well pulverised for the reception of the seed, but it must not be too rich, so as to stimulate the growth of the young plants unduly, for if grown too quickly they do not mature their wood sufficiently to stand the effects of frost, which is likely to prove injurious to them. One bushel of seed is considered sufficient to sow a bed four feet wide and twenty-four yards long. The seeds should be covered with about half an inch depth of soil. After standing in the seed-bed a year, the young plants should be placed out in nursery lines two feet asunder, the plants standing six or eight inches from each other. In two years they will generally attain a height of from four to six feet, and are ready for planting out.

The sycamore will succeed in soils of very opposite qualities, but a dry soil, which is soft and deep, is the most congenial for its development, where it will attain a height of twenty feet in ten years, and forty feet sometimes in less than twenty years.

Although it comes into leaf early in the season, presenting a bright green appearance, which is very attractive in the early spring, there is one great drawback to it, in its leaves exuding a gummy kind of substance, to which dust and all the roving impurities of the atmosphere adhere, so that the foliage soon becomes dingy, and loses its look of freshness. For this reason it is a bad tree to plant near a dusty road,

when decorative appearance is a principal object in view.

There are other species of the maple, which are very distinct and interesting varieties, some attaining the full size of timber trees; while others range down to the stature of shrubs only. Some of these flower very early, and grow rapidly in almost any kind of soil, throwing out fine, green, smooth shoots, with elegantly-lobed leaves of the finest texture, which in autumn change into varied tints of yellow and scarlet, which cause them to be highly appreciated in ornamental plantations, the whole genus being remarkably handsome.

The Sugar Maple (*A saccharinum*).—This tree seldom attains a height of more than forty feet in Britain, where it has been cultivated for about 130 years, though in its native districts it grows to sixty or seventy feet, forming extensive forests in some parts of North America, New Brunswick, and Nova Scotia, and some parts of Canada, though the diameter of the trunk is but small, seldom exceeding a foot and a half, and often less. It is ornamental in appearance, its leaves being of a whitish hue underneath, and in autumn they assume a rosy tint, which adds considerably to the beauty of any sylvan scene wherein they may be placed.

In its native country, the tree when pierced yields a copious flow of sap, which is easily converted into sugar, and although this has been done in Britain, it has never been cultivated for this purpose beyond mere experimentalising.

It is generally propagated by imported seeds, which are treated in the same way as those of the

sycamore, but the plant is much more tender, and requires a drier and more sheltered situation.

The Norway Maple (*A. platanoides*).—This is a capital hardy tree, and when young grows very rapidly, exceeding in its rate of progress that of the sycamore, though it ultimately does not attain to the large size of that tree. It thrives best in a deep well-drained soil, producing foliage of fine form and texture, bearing a glossy polish, which retains its lively green throughout the summer. When autumn approaches its leaves assume various tints, in which yellow predominates. It is propagated in the same way as the sycamore also. This species includes several distinct varieties, foremost amongst which is the Cut-leaved or Eagle's-claw maple, which is of a highly ornamental description, readily propagated, by grafts or buds, on the common sycamore stock.

The Striped-barked or *Snake-barked Maple* (*A. striatum*).—This is a somewhat peculiar species, though very ornamental at all seasons, the bark being longitudinally marked with black and white stripes. It is indigenous to North America, its height being generally twenty to thirty feet. It is mostly grafted on a stock of the common sycamore, but sometimes is raised from imported seeds.

The Large-leaved Maple (*A. macrophyllum*).—This is a hardy tree of rapid growth, which attains to a great size, and is a native of North America. It was only introduced into Britain in 1812, and is not yet widely known or cultivated as a timber tree. Its appearance is highly ornamental, and the timber is handsomely veined, and valuable for cabinet-making purposes. It is easily propagated by layers.

Another recently introduced maple comes from Oregon (*A. circinatum*), where it forms impenetrable thickets, rising to the height of from twenty to forty feet, having pendulous branches, whose leaves in autumn surpass the brilliancy of the finest scarlet oaks.

The Red or *Scarlet Maple* (*A. rubrum*).—This tree takes its name from the ornamental development of red blossoms which it throws out late in spring, or early in summer. It is a native of North America, a low-growing tree in its habit, luxuriating in a rich soil, and standing excess of moisture better than any other species. It is commonly propagated by layers, as it is very difficult to raise it from seed. When old it sometimes produces very valuable timber, owing to its curled and undulating fibre, being handsomely shaded. Another hardy maple (*A. villosum*) has been introduced from the Himalayas, where it is said to attain a great size, very much excelling the sycamore in appearance.

There are also other species of this genus of a smaller growth, and new specimens are constantly being introduced, and it is said that there are many other kinds yet to come, which flourish on the lofty mountains of India, Japan, and China.

The Walnut Tree (*Juglans*).—I shall conclude this division of my subject,—that of broad-leaved timber trees,—with the walnut, which, though in one sense a fruit tree, and a capital one too, yet must be ranked with the timber-producing species, as it attains to a great size in Britain, and its wood is very much in request by the cabinet-maker; as it neither cracks nor warps, and is reckoned the most ornamental of

European timber, much used for gun-stocks and other purposes. When young the wood of the common walnut is white and soft, but as it advances in age it alters, and is darker and more solid; ultimately getting shaded, and veined, of a light brown and black colour. The most ornamental portions are generally found towards the root. The roots of the tree by boiling yield a valuable dark brown dye, which becomes fixed in wool, hair, or wood, without the aid of alum.

The walnut tree belongs to *Monœcia polyandria* in the Linnæan system, and to *Juglandaccæ* in the Natural order of plants. The flowers of the genus are unisexual, both sexes being produced by one plant.

The Royal or *Common Walnut* (*J. regia*).—The walnut was first introduced into England from Persia, about the middle of the sixteenth century. It is much esteemed on account both of its fruit and timber, forming a large, spreading, handsome tree. It blossoms in May, and its fruit ripens during the succeeding autumn.

It is, when well grown, a handsome object in park-like meadows, and attains to a large size when grown in sufficient space. It lives to a great age, when it presents even then a picturesque and elegant form, somewhat resembling the growth of an oak. It likes a deep sandy loam, but it is necessary to rear the young trees in a dry early soil, otherwise they will not mature their roots sufficiently to stand the frost. As it sends its roots deep down into the ground, it may more often be seen as a hedge fruit tree, than any other upon the Continent, as they do not obstruct the cultivation of the fields, or interfere with their

productiveness, the same as many other sorts of trees do.

It is propagated by the nuts, or seed, which separate from the outer husk on becoming ripe and falling from the tree. They may be sown in winter or early spring, and vegetate during the first season. It is usual to plant in drills a few inches asunder, and then cover with soil to the depth of two inches. As the slightest frost injures the young plants after they appear above the surface of the ground, the drills should be protected by a covering of spruce-fir branches, or those of the silver fir, or some such cover. A dry sandy soil is more preferable to rear young trees in than soils of a more fertile description ; for though the latter will produce the most vigorous and strongest *looking* plants, the first winter in all probability will deprive them of their tips, while in a dry early soil they will mature what shoots they make better, and are so able to withstand the frost.

I have pointed out the necessity of transplantation to promote bushiness of root fibres ; in the case of the walnut also, the seedling plants form strong tap-roots, and to adapt them for removal it is necessary to lift them at one year old, or at most two, and to prune the extremities of their tap-roots, and promote the growth of fibrous roots. Transplantation should be continued every second or third year, increasing the space each time in which the plants are to stand, according to their size, till they are finally placed out in the situations they are destined to occupy.

In a good climate, with a dry deep soil, the tree grows rapidly during its youth. It will attain the

height of twenty feet in twelve years, if its progress is not checked by transplantation. It is all the better, however, for the production of fruit, that they be transplanted, for trees that have never been removed seldom ripen their fruit so early in the season as those whose growth has been checked by transplantation, which has been attributed by some to result from the roots of the moved trees ranging nearer the surface of the ground, and so getting the benefit of showers and sunshine. At twelve years of age the walnut tree generally begins to bear fruit, when its branches begin to ramify, and its upward growth is more slow.

There are some kinds of soil for which the walnut tree is eminently fitted. Those with poor surface soils, but where there is a subsoil of good quality, suit the walnut better than almost any other tree. Its strong tap-root dives deep down into the ground, its propensity in this way even exceeding that of the oak, and it thus finds nutriment for the maintenance of its growth in situations where other trees would be unable to procure it. In the roughest situations it maintains a well-balanced head, and when raised from seed, and not transplanted, it is less likely to be uprooted by the wind than any other tree. Old trees in a late climate ripen their fruit better than young trees in the same situation.

There are many varieties of the common walnut which are cultivated for certain qualities which distinguish them specially, as early maturity, size of the tree, thinness of shell, or some other quality peculiar to the fruit, which in a green state is frequently pickled.

All the species of American hickory bear a close affinity to the walnut, and are included in the same Natural order.

The Black Walnut of America (*J. nigra*).—In its native country this tree is found attaining a great altitude, a hundred feet being no uncommon height, with a trunk of proportionate size. It was introduced into England about the middle of the seventeenth century, the tree being of robust growth, exceeding that of the common species. Its leaves are about twice as long as those of the Royal walnut, and are composed of six or eight pairs of opposite leaflets, with a single or terminal leaflet; which emit, as in the case of the common kind, a strong aromatic odour.

It is readily raised from seed, which is mostly imported for the purpose, and its method of cultivation is the same as that pursued in the instance of the ordinary species. The fruit however is of inferior quality to the common species, and is so much later in ripening that it is only adapted for being grown as a timber tree in this country, being particularly well suited for a lawn, or the adornment of park-like grounds, where it can stand singly, where it assumes a very commanding appearance, and becomes a large spreading tree of great beauty.

The Gray Walnut Tree (*J. cinerea*).—This tree is also a native of America, and bears a strong likeness to the preceding, but is less often met with, being propagated in the same manner as the other species.

CHAPTER V.

Cone-bearing or Resinous Trees, adapted for cold and elevated Districts—Eighty Years for a Scotch Pine to arrive at Perfection, but only forty for Larch—The Pine Tree—The Scotch Pine—Forest of Glenmore—Large Plank presented to the Duke of Gordon—The Corsican Pine—The Black Pine of Austria—The Cluster Pine—The Weymouth Pine—Dwarf Pines—Gigantic or Lambert Pine—Varieties of American Pine—The Heavy-wooded Pine—Long-leaved Indian Pine—The Cembrian Pine—The Lofty or Bhotan Pine—The Stone Pine—The Larch—Parkinson and Evelyn mention the Larch—Account by the Highland Society—Foster's Larch—The springing up of the natural Grasses—Spruce Firs—The Norway Spruce—Douglas's Spruce Fir—The Black Spruce Fir—The Hemlock Spruce Fir—The White American Spruce—The Khutrow Spruce—The Silver Fir—Common Silver Fir—Balm of Gilead Silver Fir—The Cedar—Elliot Warburton's visit to Lebanon—The Indian Cedar—Appropriate Trees for various Situations—Grafting Flowering Thorns.

CONTINUING the system of arrangement I have hitherto pursued, I shall now treat upon the cone-bearing or resinous trees, adapted for cold and elevated districts, where the soil is thin and poor.

It will be in this section where planting for profit can be carried out upon a large scale, and which in some instances has been done of late years, to the vast improvement of what were previously poor estates, that yielded only the most trifling annual rental. This has been especially the case with certain districts in Scotland; but upon what formerly were sandy

wastes in Surrey even, there are now growing flourishing fir plantations, which have greatly added to the beauty of certain localities, as well as bestowing a great additional value to the estates upon which they have been planted. A very large trade is carried on in pine timber, and in ship-building the Scotch pine and larch occupy a very important position, the tree which produces the longest masts being the Scotch pine, to which MacCulloch in his "Dictionary of Commerce," refers. Speaking of the mast trade, he says: "The burghers of Riga send persons who are called mast-brokers into the provinces to mark the trees, which are purchased standing. They grow mostly in the districts which border on the Dnieper, and are sent up that river to a landing-place, whence they are transported thirty versts (about twenty-three English miles), to the Dwina; where being formed into rafts of from fifty to a hundred pieces each, they descend the stream to Riga. The tree which produces the longest masts is the Scotch pine. The pieces, which are from eighteen to twenty-five inches in diameter, are called masts; and those under these dimensions, spars, or in England, Norway masts, because Norway exports no trees of more than eighteen inches in diameter. Great skill is required in distinguishing those masts which are sound from those which are in the least internally decayed. They are usually from seventy feet to eighty feet in height."

The species of trees suited to poor soils in elevated districts are the Scotch pine, pineaster, larch, spruce, silver fir, and cedar.

In Britain the Scotch pine and larch are considered first in rank, after which follows spruce, and then suc-

ceed in rotation silver fir, pineaster, and cedar. The latter tree is not valued in Britain as a timber tree, chiefly perhaps owing to the reason that it is not generally grown in those situations where its wood becomes hard, which used to be the case when cedar was worked by the ancient Greeks, and those which Solomon used to grow in Mount Lebanon, the growth of the cedar being too much stimulated by modern methods of planting and treatment, when in old times the trees were of much greater age, and the timber much harder and more durable.

In the trees I have named a great difference exists as to the time each takes to arrive at perfection, and while a period of eighty years is necessary for the Scotch pine to arrive at its full maturity, the larch can be advantageously used at half that age. This arises from the fact that the larch while young has little or no sap-wood, while the other when young is nearly entirely composed of it. Spruce makes inferior timber to larch, while that of the pineaster and silver fir will vary very much in quality according to the nature of the soil upon which they are grown.

As adornments to a wild and exposed situation, the trees I have mentioned play a very important part, as well as afford shelter to other trees, which without their aid could not be grown, while they exercise a most useful influence both as shelter for live stock, and for tempering the severity of the climate, and thus improving the quality of grain where it is grown in their neighbourhood, and which enjoys their protection.

The Pine Tree (*Pinus*).—This genus, the most important of any belonging to the order *Coniferæ*,

consists of evergreens, natives of Europe, Asia, and America, almost all producing large timber abounding in resin. In a natural state they are mostly found growing in great masses, to the exclusion of other trees, but they are made subservient by art, and used as forerunners to broad-leaved varieties of trees, which without their aid, in the first instance, could not be raised in exposed and elevated situations.

Pines generally flower in May and June, the male and female flowers being on the same tree, the cones ripening at the end of the second year, or eighteen months after the time of flowering.

The Scotch Pine (*P. sylvestris*).—The Scotch pine springs naturally in a healthy open soil, grassy or close herbage being opposed to the growth of the young tree, but in moorland with only a short heathy cover the seeds readily vegetate, and establish themselves firmly in the ground, being seen in their greatest perfection in native forests in the Highlands of Scotland. Extensive pine forests also abound in a wild state in Russia, Poland, Sweden and Norway, and Germany. There is a striking uniformity in the quality of the timber grown in native forests, it being universally red, hard, and resinous. As no tree has however been transplanted so often to various soils and situations, it has been made to assume a variety of forms and foliage, while the timber has become greatly deteriorated, and is inferior to that found in the best indigenous forests, which in Scotland are considered to be those on the Spey, or Braemar on the Dee, and in Glenmore, Duthil, Rothiemurchus, and along the slopes of the Cairngorm mountains. In these districts trees of great circumference will run up

as straight as possible for forty feet, being extremely valuable, so much so that it is said the timber of Rothiemurchus often yielded a revenue of over £18,000 per annum.

A singular record is preserved of the old forest of Glenmore, which was almost wholly felled at the end of the last and beginning of the present century.

The forest was purchased by William Osbourne of Hull, of the Duke of Gordon. When it had been entirely cut down, he presented the duke with a plank cut from the largest tree produced in the forest, which now stands (or used to stand) in the entrance-hall of Gordon Castle. It is about six feet long, and measures five feet five inches broad, having a brass plate affixed to it, on which is inscribed: "In the year 1783 William Osbourne, Esquire, Merchant of Hull, purchased of the Duke of Gordon the forest of Glenmore, the whole of which he cut down in the space of twenty-two years, and built during that time, at the mouth of the river Spey, where never vessel was built before, forty-seven sail of ships, of upwards of 19,000 tons burden. The largest of them, of 1,050 tons, and three others little inferior in size, are now in the service of His Majesty and the Honourable East India Company. This undertaking was completed at the expense (of labour only) of about £70,000. To His Grace the Duke of Gordon this plank is offered, as a specimen of the growth of one of the trees in the above forest, by His Grace's most obedient servant, William Osbourne. 1806."

In England the seeds of the Scotch pine are usually sown about the middle of April, and in Scotland somewhat later, about the end of the month or beginning

of May. A dry and sandy soil well pulverised, but one which will not harden on its surface through the alternate operation of rain and drought, is the best in which to plant the seed. When well dug and smoothly raked, beds should be formed four feet wide, and the soil removed from the top, which is usually raked into alleys formed between the beds for the purpose, which is afterwards replaced to cover the seeds. One pound of good seed is generally thought sufficient for sowing a bed a dozen yards long, of the width mentioned, which should be covered with a quarter or half an inch of soil, the less quantity if the soil is somewhat heavy, and the larger if it is quite light and sandy. Care should be taken to protect the springing plants from the ravages of birds, which are very destructive to them. They stand in these seed-beds for two years, and need no attention beyond keeping the ground clear of weeds. At the end of two years the seedlings are fit to be planted out into moorland or heath. The stems of the heath are a sufficient protection for the young plants, while open enough to prevent them dropping off through confinement.

If however the plants are needed to stand in a situation where they will have to contend with a rank surface vegetation, or any other kind of herbage than heath, they will require to be transplanted from the seed-beds into nursery lines, about nine inches asunder, the plants three inches apart from one another, if intended to stand for one year only; but twice that distance for two years, which is the longest limit at which the Scotch pine ought to be removed. If a bare, barren, exposed situation, such as a hilltop, is desired to be covered with a plantation, Scotch

pine plants which have stood but one year in a seed-bed, and one year again in nursery lines, are the best adapted for this particular end in view, for though rarely used, they are the most tenacious of life.

There is no other tree which grows so quickly and produces such valuable timber on poor soils as the Scotch pine. It succeeds on dry and gravelly heath-covered moors, while even amongst fissures and débris of rocks, its roots will penetrate recesses, and find food to sustain it in health and vigour. It cannot however put up with stagnant water, though it will do very well on top soils which have water beneath at a fair depth, as its roots generally spread near the surface of the ground. Of all waste lands, pine bog is the most uncongenial to its growth, for, although it may sometimes be found tenacious of its life even under the most adverse circumstances, and is seen to live in soil composed almost exclusively of this vegetable amalgam, it will not grow to be a timber tree. In obtaining the seed, care should be taken that only the very best is used, that of the true *Pinus sylvestris*, which has been collected from the finest trees.

The Corsican Pine (*P. laricio*).—This tree in the island of Corsica is often met with 140 feet high, but does not affect poor soils. It was introduced into England about the middle of the eighteenth century, but has never been largely cultivated except for ornamental purposes. It is a native of various countries of the south of Europe, and also the west and north of Asia. There are many varieties of the species, eight or ten being classed by nurserymen who rear the different kinds, which is chiefly appre-

ciated on account of its rapid growth, which causes the timber to be soft and easily worked.

The Black Pine of Austria (*P. L. Austriaca*).—This species produces strong resinous timber of good quality, and grows rapidly in soft soils, attaining the height of 100 feet in its native country. The seedlings of this variety should be taken from the seed-bed when a year old, and transplanted into nursery lines, to stand one or two years, according to circumstances and the soil in which they are intended to be planted.

The Cluster Pine (*P. pinaster*).—This is one of the trees which was introduced into England by Gerrard in the sixteenth century, and is indigenous throughout the south of Europe, and those countries which border on the shores of the Mediterranean, embracing a somewhat wide geographical range. On sands in the vicinity of the sea, it is found to answer well ; a deep, dry, sandy soil being indispensable for its growth, for in a rich or wet soil it does not stand the frosts of winter. It has been very successfully cultivated on poor sandy soils in various parts of the country, particularly in Norfolk, where no other species of trees would become timber. It has also been extensively used in France on drifting sands, to which I have made previous reference, in the creation of thriving forests where once only sandy wastes existed.

In raising the pineaster from seed, the same plan of procedure should be adopted as that recommended to be followed in the case of the Scotch fir, covering them over with but half an inch of soil, but removing it early to its final destination, or else transplanting it frequently in the nursery. In a loose

as open sand it strikes its roots to a great depth below the surface, and growing rapidly, often attains a height of twenty feet in thirty years. It takes its name from the way in which it produces its cones, which generally grow in groups, pointing outwards in a star-like form, hence its title of "pineaster," or star pine.

The Weymouth Pine (*P. strobus*).—This tree takes its name from having been largely cultivated by Lord Weymouth, on his estate in Wiltshire, where it succeeded remarkably well and grew vigorously. The tree is a native of America, and may be seen on the hillsides along the route from Canada to Virginia, arriving at its most complete development in the State of Vermont, where it is often met with measuring from three to five feet in diameter, and upwards of 150 feet in height. Its timber is white and soft, being in fact the white American pinewood of commerce, which is largely imported into Britain; its chief characteristics being that it is remarkable for smoothness of surface, being clean and free from knots, which allows of its being worked with ease, and is consequently in request for inner doors, boardings, mouldings, and house carpentry for the finishing of interiors, etc.

It is propagated in the same manner as the Scotch pine, but grows in a rich soft soil well, provided it is sheltered by hardier trees, or grown in masses, when it attains a large size. Its appearance is soft and delicate, and its growth somewhat formal, the foliage being silky looking. The tree when young will throw out top shoots of two feet in length during the course of one summer, and its general average rate of growth

in England for fifty or sixty years, may be estimated at one foot.

Dwarf Pines.—There are some interesting specimens of dwarf trees which bear a family likeness to each other and the Scotch pine, *P. sylvestris pumilio*; *P. S. Mugho*, and *P. s. uncinata*, which are natives of high mountains, and are found on the Alps and Pyrenees in cold and exposed situations where their growth is contracted into the compass of hardy shrubs merely, but with a little more shelter they attain the size of low bushy trees. Their foliage is thickly set, and of a dark green colour, being broad and spreading in habit, making only small annual shoots, which well adapts them for cold windy situations.

It is supposed that this habit has been acquired after ages of exposure in repeated generations, for in an opposite direction, and in the spirit of progress, some of these dwarf pines when cultivated in low and rich ground, have been known to produce female blossoms at the age of three years, and infertile cones at their fourth. These having been frequently grown in nurseries for ornamental purposes, have made a new departure at times, and by repeated propagation of seed raised in a low situation have shot up upon occasions into trees of considerable altitude, which could scarcely be distinguished from the Scotch pine.

In their native condition they all produce wood which is red, hard, and durable, and being very inflammable is often used for torches by the inhabitants of the districts in which the trees are grown.

The direct opposite to these trees is the Gigantic or Lambert pine (*P. Lambertiana*), so far as mere size is concerned, some of the imported cones measuring

a foot and a half in length. It is a native of the north-west coast of North America, being introduced into England by Douglas in the year 1827, who, describing one which had been blown down by the wind, by no means the largest tree amongst many, found that it measured 215 feet in length, or height, while its enormous trunk, at three feet from the ground, measured fifty-seven feet nine inches, and at 134 feet from the ground, seventeen feet five inches, the trunk being unusually straight and destitute of branches. Large districts in North America, about a hundred miles from the sea, in latitude 43 degrees north, and extending as far to the south as 40 degrees, are covered by this tree, which is often found growing in sand which appears incapable of sustaining vegetation. In this poor soil it attains its greatest size, and perfects its fruit in the most complete abundance.

The plant is perfectly hardy, and resists the severest seasons, but it is difficult to procure the seeds, which makes it very scarce and expensive. When only one-year old seedlings, they will sustain without injury the influence of the sharpest winters. The plant has an elegant appearance whilst growing in its earlier stages, its leaves being of a bright grassy green, four inches long, and five in a sheath. Its annual shoots are considerably shorter than those of the Weymouth pine, rarely exceeding twelve inches in length ; but as they become ripened before winter, the plant makes good progress, and when quite young is remarkable for its great girth in proportion to its height.

There are many other American pines, possessing distinguishing qualities, as *Banksiana*, *Pungens*,

Resinosa, *Rigida*, and *Sabiniana*. The latter, though a small tree in this country, is said to attain a height of 100 feet in North-west America. It has only been imported into Britain within the last fifty years, and the other four kinds I have mentioned, although of great beauty, are too feeble in growth to be cultivated as timber trees.

The Heavy-wooded Pine (*P. ponderosa*). — This is a very vigorous-growing tree, producing leading shoots which are actually an inch in diameter when only a few years old, and about two feet in length, its leaves being thickly set, and measuring from nine to twelve inches. It was first introduced into England in 1826, and is a hardy tree, but likely to receive injury from the wind.

The Long-leaved Indian Pine (*P. longifolia*).— This is perhaps the most beautiful of all the species, but it is too tender for the climate of this country, and can only be reared under glass. This is not the case with a native of Nepaul (*P. gerardiana*), which will endure the climate of Britain, though it cannot be coaxed into growing into a timber tree. Its seeds, which are eatable, are nearly an inch in length.

The Cembrian Pine (*P. cembra*).—This tree also produces edible seeds, which are consumed largely as an article of food by the peasantry of Switzerland in those districts to which the tree is indigenous. It is often found growing with the dwarf varieties of *P. sylvestris*, being a native of the Alps, Siberia, Italy, and Switzerland. It is a hardy tree, and there are several varieties, but the seeds do not vegetate until the second spring, the plants themselves also being remarkable for their slow growth. When two years

of age the seedling plants should be transplanted into nursery lines. The tree was introduced into this country over a hundred years ago, by the Duke of Argyle. Although growing very slowly at first, when young, yet, as it grows older, it makes more rapid progress, being the exact opposite in this respect to other trees I have described. It retains its lateral branches down to the surface of the ground, in a very marked manner, the trunk growing erect, with a smooth bark, its leaves being of a fine bright green colour and silvery appearance. The timber has a fragrant perfume, and the tree has been known to attain the height of forty-five feet in thirty years.

The Lofty or *Bhotan Pine* (*P. excelsa*).—This is also a very ornamental and hardy tree, young trees at ten years of age being generally twelve feet high. It bears a strong resemblance to the Weymouth pine, but is stouter and of a more robust habit of growth, its branches assuming a more drooping form, while its leaves are considerably longer. It is a native of the Himalayan mountains, where it grows from eighty to a hundred feet high, and grows readily in this country from imported seed. It was introduced in 1827.

The Stone Pine (*P. pinea*).—The Stone pine was introduced into England early in the sixteenth century, but is grown solely as an ornamental plant, being too tender to be reared successfully as a forest tree. It grows best in a dry sandy soil, near to the sea, but it needs shelter without confinement. If crowded up it does not flourish. In Italy it forms the most ornamental tree commonly met with in most landscapes, yielding seeds of a larger size than those of any other European pine, which are collected and

sold as an edible fruit, being very nutritious, and of a sweet and agreeable flavour. The seeds of the common kind are contained in a stout shell, but there is another variety, *P. p. fragilis*, which has a thin shell, easily broken, which is cultivated in Naples entirely on account of its fruit.

The resinous productions of pine trees are put to various uses, and in some instances form no inconsiderable items of commerce. From the Scotch pine and pineaster are yielded tar, pitch, and lamp-black. Spruce fir produces Burgundy pitch and the best yellow resin. From the silver fir is extracted Strasburg turpentine, the only extract from the fir and pine tribes which are used in the preparation of the best varnishes. From the larch we get Venice turpentine, which is greatly in request by veterinary surgeons for the treatment of bruises, ulcers, and old wounds, and of this tree I will now speak in detail.

The Larch (*Larix Europæa*).—The common larch was introduced into England during the early part of the seventeenth century, the account of its introduction having been given by Parkinson, an apothecary of London, who wrote in 1629. Evelyn also mentions a larch tree of ample size and flourishing habit, in 1664, which was growing at Chelmsford in Essex. No tree suffers so much for want of sufficient space whilst growing as the larch. Its leaves are tender and minute, presenting only a small surface to the influence of the sun, light, air, and moisture; and therefore in a crowded plantation, composed of trees of the same height on a level, the leaves fail to elaborate the sap necessary for the formation of timber, and the trunk becomes bark-bound, bare, and stunted.

Close planting is however necessary in rearing timber in bleak and exposed situations. On mountainous situations, where there is an inequality of surface the tree does better, as well as in those cases where forests of larch are indigenous, the trees being unequal in size and age.

The larch is the only genus of the Natural order *Coniferæ*, or cone-bearing tribe, that is composed of deciduous trees, and when young is of quicker growth than any of the others, and for that reason it is the best adapted for extirpating furze and rank herbage. For this purpose two-year transplanted plants are employed, which ought to be placed in the ground immediately after the furze has been cut down. When planted somewhat closely together, say three to four feet apart, they in most cases overtop the furze and smother it, and thus as it were clear the ground for themselves.

The common larch is the only tree that is really worth cultivating for timber, the other species being, in comparison with it, feeble and ungainly.

It is a beautiful tree in appearance, possessing an elegant conical form, which in favourable situations assumes the greatest regularity of outline at all stages of its growth. It has a straight trunk, which becomes massive when sufficient space is allotted to it to grow in, throwing out horizontal branches which assume a pendent figure as the tree advances in age, with subsidiary branches which spring from the main ones and assume a drooping habit of growth. The leaves, which are of bright green, are brought forth in the form of bundles, except on the young shoots, where they grow individually. The tree brings forth its male and

female flowers in April and May, and when arrayed in its full dress of leaves, presents a very engaging appearance.

In the seventh edition of "Miller's Dictionary," published in 1759, it is stated that the larch had become plentiful in England, being commonly found in most English nurseries, and that great numbers had been planted, with the singular result, as it then appeared, that the trees established in the worst soils and situations had turned out the best. From this time the nature of the tree became better known, and it was seen that, fertile plains were not calculated for its full development, and that it did best upon an elevated open subsoil, from whence moisture was easily discharged, and where it could receive the benefits of a clear and open atmosphere.

It was thus planted in England about a hundred years before the tree was introduced into Scotland, where it succeeds better on the whole than in England, except in elevated situations and in suitable soils. It is a native of the Alps of France and Switzerland, of the Apennines in Italy, and is indigenous in all the rocky and elevated situations in the Tyrol, and in mountain districts in Germany.

The Transactions of the Highland Society give an account of the first larches which were planted by the late Duke of Athol's trustees, which were brought from London by Mr. Menzies of Migeny, in 1738. Five plants were left at Dunkeld, and eleven at Blair Athole, presents to the Duke of Athole. The five were planted in the lawn at Dunkeld in alluvial gravelly soil, composed in a great measure of round stones, in a sheltered situation, elevated forty feet

above the Tay, and 130 above the level of the sea. Three out of the five were cut down, two of which were felled in 1809; one measured 147 cubical feet, and the other 168 cubical feet. The last was sold on the spot to a ship-building company at Leith for three shillings a foot, or £25 4*s.* the tree. The other two larches at the time the account was written were of immense size, and still continued to grow on the lawn at Dunkeld.

The larch flourishes in soils of very opposite qualities, from dry and sandy to that which is wet and clayey, but when near to springs it is necessary for its health and growth that the water have free exit. But it is on the slopes of ravines and declivities, and on shattered débris, that the tree luxuriates in the greatest vigour, in cool situations, where there is a free circulation of air. No degree of cold injures the larch during the winter, but its foliage is sensible to the least touch of frost, the leaves being remarkably fine and tender, which causes it to be unfit for planting on southern exposures, along the warm slopes of steep mountains; for the warmth which is frequently brought by the months of March and April stimulates the growth of the leaves, which are blighted by a succeeding frost, which, if it does not kill the trees, inflicts so much damage that they are long in recovering from it.

In Aberdeenshire there are many very fine specimens of the larch to be seen, especially on the banks of the Don.

In planting larches, the distance at which the trees are to stand must be regulated by the situation. In bleak and exposed moorland in the Highlands of Scotland it is usual to allow 4,000 plants to the

imperial acre, but in low sheltered situations 3,000 are accounted sufficient, and Scotch pine are mostly planted with them.

The seeds of the larch are usually sown in the southern counties of England about the middle of April, and in the more northern ones, and in Scotland about the end of that month. The seeds grow best upon ground that has been made rich for a previous crop, but if newly prepared, well rotted, old seasoned manure should be used, decayed leaves, or vegetable mould. The ground should be well pulverised and made very fine by raking, and beds marked out four feet wide. One pound of seed is generally considered sufficient for a bed of four lineal yards, the seeds merely covered to the depth of a quarter of an inch with soil. In a fortnight or three weeks, according to the weather, the plants generally make their appearance. Both the birds and the grub-worm are persistent enemies to the young larch plants, which should be guarded against them as effectually as possible, and the beds require to be carefully weeded throughout the season. The young plants complete their first year's growth by the end of September, and will stand from four to seven inches high. If there is a good crop and they stand thickly in the ground, the plants should be loosened with a fork, and thinned out during winter or spring. Those which have been thinned out should then be transplanted into lines about a foot and a half apart, or rather less, the plants standing in rows a few inches asunder; they stand thus for one year, when they become, with the others which have remained undisturbed in their bed, two-year old seedlings, and

are then fit for being planted in moorland. They should never be allowed to remain more than two years in their seed-bed.

If stronger plants are required to subdue a cover of furze, or to extirpate any other rank herbage, they should be allowed to stand two years in nursery lines. As the plant ought not to be allowed to remain for a longer term than two years in the seed-bed, the same with the transplanted plants, which must not be kept in nursery lines longer than two years additional, when they will generally stand from two to two and a half feet high, and will be strong enough for the roughest kind of forest ground. If two-year old seedlings are put into nursery lines and allowed to stand for two years they will generally reach three feet. As before stated, although the larch is deciduous, no tree is so useful in annihilating rough herbage, and on this account it is a most valuable tree.

In the best situations adapted to its growth, the larch has been known to attain a height of forty feet in twenty years, but thirty feet is about the average which must be counted upon for that period in most cases.

The larch is very subject to attacks from insects, the most obnoxious of which is the *Coccus laricis*, which infests it mostly in low-lying situations, being least injurious where there is a free circulation of the atmosphere, and also when the plantation does not consist entirely of larch trees.

It is also occasionally attacked by atmospheric blight, which occurs at different stages when the tree is in leaf, which shows its effects in the following summer by a want of foliage, and the presence of numerous dead twigs throughout the tree.

It is also subject to a disease which is called "pumping," in which case the trunk becomes hollow, and is believed to commence at the root and rise upwards, which has been found to prevail most upon land which has previously yielded timber, the fungus which accompanies decaying roots being injurious to most sorts of forest trees.

Larch is frequently planted after Scotch fir, and in those cases the timber is often found to be unsound, but it performs a very useful office in creating herbage, produced eventually, from the richness of its foliage, which it sheds annually, the deposit in a healthy plantation being very great, the leaves forming a sort of rich top-dressing, which is consumed where they drop, and is the means of causing some of the finer natural grasses to spring up, which forms choice food for dairy cattle that can be turned into it, when it has had sufficient time to be produced.

Spruce Firs (*Abies*).—This genus consists of several species of evergreen firs, natives of Europe, Asia, and America, and belongs to *Monœcia monadelphia* in the Linnæan system, and to *Coniferæ* in the Natural order of plants.

The Norway Spruce (*A. excelsa*).—This is the tree most commonly cultivated throughout Britain of this genus, which is well known for its great beauty of form and uniform growth of a conical shape. It is considered to be the loftiest tree indigenous to Europe, in its native countries having been known to reach an altitude of 180 feet. It abounds in Norway, Sweden, Denmark, Lapland, and the north of Germany, and is thought to have been introduced into Britain about the middle of the sixteenth century. In a congenial

soil it retains even in an advanced age its branches and luxuriant foliage, almost down to the surface of the ground. The tree blossoms in May and June, and the cones become ripe in the following winter.

The seeds are planted in the same way as directed for other fir trees, and when they have stood for two years in the seed-bed the plants are generally from seven to nine inches high, when they are fit to be transplanted into nursery lines. If however they are weak and stand thin, they may be allowed to stand for a third summer, and then transplanted, no other species of the *Coniferæ* admitting so well of being kept three years in the seed-bed, which is due to its roots being naturally more fibrous than any others, which better adapts it for removal. The space at which the plants stand in the lines must be regulated by the intention of their future disposal. If they are to be removed after being only one year transplanted, they can stand much thicker on the ground than when intended to remain for two years in lines. In the former case, eight inches apart in the lines, and the plants a couple of inches asunder is enough, but in the latter case the lines should be a foot from each other, and the plants four inches distant from one another. A common practice, and a very good one, adopted by some nurserymen, is to place the lines thickly as mentioned, and then lift the plants from every other one. From their naturally fibrous roots, they can stand in lines with impunity for three years without being disturbed, the tree admitting of being removed at a greater size, without injury, than any other tree of the same order.

It derives its nourishment chiefly from the surface of the ground, and prefers a soil that is cool and moist,

and so is one of the few trees which will grow, and thrive, where the subsoil is wet and retentive, a fruitful source of injury and want of success in the case of many trees. In dry sandy soils it grows well when young, and is often found of great value as a shelter or nurse to other trees, but it will not attain to the importance of a timber tree in such a soil, but assumes a sickly aspect, with scanty foliage, and compares very unfavourably with those specimens which are seen at their best, and flourishing luxuriantly in cool soil in a sheltered situation; for although so hardy as never to be affected by any degree of frost during winter, it never attains to a great size in an exposed situation.

The most vigorous spruce trees are those which have always enjoyed sufficient shelter, and yet have not been confined, which grow on a soft soil rich in alluvial deposit. In growing the spruce for ornament, it is necessary that it should have shelter, but at the same time it must not be crowded up, its growth being uniformly conical; the foliage of a good specimen is very luxuriant, and extends down to the surface of the ground; but in the growth of the tree in plantations it is not necessary that the lateral branches should be preserved when the production of timber is the object aimed at, in which case it is better attained by the trees pressing close upon one another, as the branches nearest the ground become enfeebled and drop off.

Plantations of spruce are generally considered fit to be felled at the age of seventy or eighty years. Pruning should never be resorted to with this species, which advance rapidly after being established for a few years in suitable situations. Its yearly top shoots

are two feet long, between the ages of fifteen and thirty years, in a healthy plantation which enjoys moderate shelter, and trees often attain a height of sixty feet in forty years.

The resinous production of the tree forms the Burgundy pitch of commerce, which is the congealed sap, melted and clarified by boiling it in water. Its timber is white and soft, and inferior in value to Scotch pine timber, and only free from knots when grown in a close plantation.

Douglas's Spruce Fir (*A. Douglasii*).—This tree, which bears the name of Douglas, the celebrated Scotch collector of American trees, is found on the banks of the Columbia river, in North-west America, and is a fast-growing magnificent tree. Its foliage is of the richest description, and bears a striking resemblance to that of a vigorous yew tree, and like other spruces does best in ground that is not dried up by the heat of summer. When in favourable situations, it frequently forms leading shoots three feet in length in one season, and generally assumes a bushy form in proportion to its height. There are some fine specimens of this tree now growing in England, the first plants of which were produced from seed in 1827.

Douglas describes the trunks of these trees as varying in their native forests from two feet to ten feet in diameter, and from 100 to 180 feet in height. He mentions a stump of this tree near Fort St. George, on the Columbia river, which measured, at three feet from the ground, forty-eight feet in circumference. But there has been scarcely time enough to arrive at a correct conclusion on many points of interest connected with these important trees from the north-

west continent of America, rather over half a century not being regarded as any great epoch of time when taken relatively in conjunction with the life of trees.

The Black Spruce Fir (*A. nigra*).—This tree is said to have been introduced into Britain by Bishop Compton in the end of the seventeenth century, and is also a native of North America. It is highly esteemed as a tree for decorative purposes, presenting a very ornamental appearance on account of the richness and denseness of its foliage. It is a hardy tree, thriving best in a moist soil, and has the peculiarity in favourable circumstances of its lateral branches often striking root into the ground, so forming a circle of young plants around the parent tree.

It generally attains a height of fifty feet or more in England, there being several specimens in various parts of the country even much higher, sixty and seventy feet having been reached, which is not exceeded in its native districts.

It is raised from seed in the same way as the Norway spruce, but is of much slower growth.

The Hemlock Spruce Fir (*A. Canadensis*).—This is but a slow-growing tree, a native of Canada, which is not thought worthy of cultivation for the sake of its timber, but is a highly ornamental tree, of pendulous habit, which, as before said, grows very slowly.

The White American Spruce Fir (*A. alba*).—This is another of the trees introduced by Bishop Compton in the seventeenth century, indigenous to North America, and although somewhat similar in appearance, is yet very inferior in every respect to the black spruce fir, not being nearly so ornamental in appearance, and of much slower growth.

The Khutrow or *Morinda* (*A. Smithiana*).—This tree possesses great beauty when in a condition of health, and has often been admired as a handsome plant, but it generally becomes diseased as it advances in age, and approaches the size of a timber tree.

Another tree also which has been introduced from the Himalayas, *A. bruoniana*, with pendent branches and silvery foliage, is a very ornamental plant, bearing a strong likeness to the hemlock spruce, but its growth is too feeble to cause it to be of any value as a timber tree.

Taking the whole range of spruce trees into consideration, there is none so worthy of being grown, under ordinary conditions and circumstances, as the Norway spruce.

The Silver Fir.—This is the *Abies*, or spruce fir of the ancients, but of the genus *Picea* of Linnæus. It bears a striking resemblance to the spruce fir, but the leaves are less numerous, and lie flatter on each side of the small branches, and thus, as it were, form two ranks, and the cones stand erect on the branches, in contradistinction to those of the spruce fir, which are pendent.

It is one of the most ornamental trees of the Coniferous order, and embraces several species, natives of Europe, Asia, and America, some of which have only been recently introduced into Britain.

Common Silver Fir (*Picea pectinata*).—This tree is indigenous to Central Europe, being found in France, Germany, Spain, and Italy, on the slopes of mountains and in glens, as well as being found in the north of Africa. On the Alps and the Carpathian range it is sometimes found at an elevation between 3,000 and

4,000 feet, and may perhaps be seen at its best in the narrow valleys of Germany, between the mountains of Switzerland and the Black Forest, where it attains the height of 150 feet, with a trunk from sixteen to twenty feet in girth, the soil being rich friable loam.

It is said to have been introduced from this district into England by Sergeant Newdigate, who planted two two-year old seedlings at his residence at Harefield Park in the year 1603. Evelyn describes these trees as having become "goodly masts" in 1679, the larger being eighty-one feet high and thirteen feet in circumference.

The tree has chiefly been employed for ornamental effect, seldom having been planted in masses by itself, but where this has been done, the result has shown that they admit of being stood thickly together, which tends to produce tall clean wood of a fine grain; and notwithstanding their close proximity, which causes most trees to run up in a slender form, the trunks attain a great girth, and yield valuable timber, which is seldom equalled in amount by any other tree. Several instances are recorded of single trees producing upwards of 300 cubical feet of timber.

When young, it is one of the most tender plants which grow in Britain, and it grows but slowly during the first ten or fifteen years of its life; but after it has got well established in a suitable soil, and has reached a height of eight or ten feet, it grows rapidly both in bulk and stature, and is seldom distanced by any other tree of the species of *Coniferæ*.

The best soil for producing silver fir timber is a rich deep loam, which is cool and moist, rather than dry, which is often found along the slopes of moor-

land, in valleys, and in ravines. It will also thrive in heavy clay, but not in land that is absolutely wet, being found growing in soils of various and opposite qualities, so that they are not affected by severe drought. It is a capital tree to plant amongst other timber which it is the intention shortly to remove, as the excess of shelter in such situations, which is often found fatal to many kinds of young trees, promotes the growth of the silver fir and shields it from the effect of the late spring frosts, to which it is extremely sensitive. On this account it is altogether unfit for the bare and exposed situations upon which the Scotch pine and the larch flourish. The yearly growths of the young trees are always very short, and are peculiarly exposed to injury from frosts, owing to the circumstance of the buds of the top shoots being unfolded at the same time as those of the lateral branches, which are remarkably tender and soon get nipped; and it is subject to this casualty till it gets ten or fifteen feet high, and assumes a more robust and vigorous habit, when the buds on the lower branches get first developed, leaving those on the top to shoot at a later period, by which they generally manage to escape injury.

The seeds of the silver fir should be sown in April, and the soil of the beds well pulverised and made fine. The fertility of the seeds varies considerably, but a distance of one inch to one inch and a half is enough for the young seedlings to stand in, and when the young plants appear above ground, it is expedient to protect them from the frost, as the least touch destroys them. The branches of evergreen trees are good for this purpose, or broom stuck up on end in small boughs

close enough to protect the plants, and yet not too close to admit the air, is a very good method of affording them protection. The seed-beds also are a great attraction to birds until May, when the plants appear. A covering of straight drawn straw is sometimes spread over the beds for the double purpose of keeping off the birds and frost immediately after they are sown. This furnishes a complete protection, and can be regulated with respect to openness or closeness, so as to suit the exigences of the plant at any time. The seed should be covered over with soil to the depth of half an inch, and the same method of treatment is followed as that described for the pine.

The young plants are also extremely liable to injury during their stay in the nursery, as the least frost destroys the newly-expanded foliage and young growth when the effects of the same frost cannot be seen on other young trees. It is therefore found the best and safest plan to furnish protection to the young tops by supplying boughs of evergreens till the frosts are over.

After the second year they are moved into nursery lines, but should they have suffered from the frost they had better be allowed to remain a third year in the seed-bed, in order to give them the opportunity of forming tops, which they will do more readily before than after they have been disturbed. Choice should be made of a sheltered situation when they are placed out into nursery lines, a shaded position being better adapted to produce strong young trees than even an open sunny exposure. The lines should be a foot asunder, and the plants placed at a distance of a few inches from one another.

After standing in the nursery lines for two summers

they should be carefully lifted, and planted out in the situations in which they are intended to stand, or replaced in lines standing at a wider distance, if they are required to be of larger size before being planted out.

Their slowness of growth is so remarkable when compared with the quicker growing species, that plants of the age of six years seldom exceed a foot in height, though their roots will be found to be large and bulky compared with the size of their tops, and their stems are also thick in proportion to their diminutive height, which has been a cause of disappointment very often to those who have raised them for the first time from seed, and have taken all necessary precautions during the period of their early growth. As, however, before stated, when they have once become established in favourable situations their growth becomes quick and regular.

Like most of the other species, it is very productive of resin, and yields the Strasburg turpentine, which takes its name from the forest contiguous to that place, where an extensive trade is carried on in it. Essential oil of turpentine is the production of this tree, which is resorted to for sprains and bruises, and its turpentine is also used in the preparation of clear varnishes, and artists' colours.

Balm of Gilead Silver Fir (*P. balsamea*).—This is a hardier tree than the preceding when young, and of much more rapid growth, grown in the same manner, and yielding its cones abundantly when at maturity. This tree also owes its introduction to Bishop Compton, who imported it from America at the close of the seventeenth century. Its growth is so much quicker

than the common silver fir, that at the age of five or six years it is usually twice its height at the same age, and at eight or ten years perhaps three times its height, but then its vigour ceases, and it often stops growing before it attains twenty years of age. At its best, and in soil most congenial to its growth and nature, it seldom lives beyond thirty or forty years, liking land which is deep, moist, and well sheltered, and it is considered a fine specimen which reaches forty feet in height. Its chief use, therefore, consists in its rapid growth and ornamental appearance, its foliage being closer and more dense than the silver fir, the leaves being of a brilliant dark green with a silvery hue underneath. It grows in a pyramidal form, and confers both shelter and ornament to newly-formed plantations, especially in shrubberies and belts of trees, in which trees of longer duration are being established. It will not endure in a light gravelly soil, being unable to stand drought. The bark, buds, and cones are often literally saturated in turpentine, the resinous extract, which exudes freely upon the slightest excision, being known as Balm of Gilead, or Canadian balsam, in its native country, which is highly odoriferous and of a penetrating taste, and said to be of efficacy in cases of consumption. Its tendency to early decay has been attributed to this excess of resinous fluid.

The Cedar (*Abies cedrus* or *Cedrus Libani*).—In England the cedar is commonly reckoned the least valuable of the *Coniferæ*, or cone-bearing tribe, so far as its timber is concerned, that which is grown in Britain being open in the grain and soft, falling far short of the ancient reputation which cedar used to

bear for strength and durability. This result is doubtless owing to the manner in which the trees are raised in this country, where everything is done to induce rapid growth, being naturally a slow-growing tree, extracting its nourishment from hard and calcareous formations, upon mountains of great elevation, while from the treatment they receive here they partake more of the nature of exotics than the hardy trees they are. It is a common practice in nurseries to sow the seeds in heat under glass, and pot off the young plants in June, when their cotyledons only are full grown, while others remove the plants when a year old into pots, and change them into larger ones as their growth advances.

It was in the keen biting air, after centuries of exposure, that the cedar trees of biblical and classical history perfected themselves; the continued howlings of the storms, which appear to have their birthplace in the mountains of Syria, giving rise to the description of "the violence of Lebanon," one of the most forcible illustrations which are used in the Bible.

The summit of Lebanon being nearly 10,000 feet high, many of the loftiest peaks are covered with snow, and it has been pointed out that the prophet Ezekiel, evidently a close observer of nature, had doubtless noticed that the trees were sustained by the melting snows in hot weather, and rose to a height and magnificence not attained by others differently situated, when he says: "Thus was he fair in his greatness, in the length of his branches, for his roots were by the great waters;" it being at the bottom of the highest peaks, at an altitude of nearly 8,000 feet, that the cedars are found.

Many modern travellers have recorded their visits to Lebanon, and the number left of the old trees has been the occasion of a difference of opinion. Elliot Warburton, in his entertaining book "The Crescent and the Cross," thus describes his visit to the cedars of Lebanon: "To the right lay a black amphitheatre of naked mountains, and in the recess that they surrounded stood a grove of dark trees—these were the cedars of Lebanon. I was at first disappointed in the appearance of these trees; I had expected to have seen them scattered over the mountain that they consecrated, each standing like a vegetable cathedral; but here was a snug compact little brotherhood, gathered together in the most formal group. No other tree was visible for many a mile around.

"When, however, I reached the forest after two hours' steep and difficult descent, I found my largest expectations realised, and confessed that it was the most magnificent specimen of forestry that I had ever seen. I was delighted to pass out of the glowing fiery sunshine, into the cool refreshing gloom of those wide flaky branches—that vast cedar shade, whose gnarled old stems stood round like massive pillars supporting their ponderous domes of foliage.

"One of the greatest charms of this secluded forest must have been its deep solitude; but that, alas! is gone forever: some monks obtained the ground for building, and an unsightly chapel was just being raised upon this sacred spot. I must confess it seemed to me like a desecration; the place already was 'holy ground' to all the world, and these ignorant monks had come to monopolise and claim it for the tawdry and tinselled image which they had just

'set up.' The churls had even pulled down one of the oldest trees to light their pipes and boil their rice with. I fear it was with a very bad grace that I gave a few gold pieces to their begging importunities for the erection of this sectarian chapel, and it was with a very bad grace that they received them.

"There are twelve old trees, or saints as they are called, being supposed to be coeval with those that furnished timber for Solomon's temple—yes, twelve, I will maintain it, notwithstanding all the different computations on the subject—are there standing now. It is natural that there should be a diversity of opinion, perhaps, as the forest consists of about one thousand trees, among which is a succession of all ages; nevertheless there is the apostolic number, first-rate in size and venerable appearance. The largest of these is forty-five feet in circumference, the second is forty-four. Many of them are scarred with travellers' names, among which are those of Laborde, Irby, Mangles, Lamartine, etc. I should have thought as soon of carving my name on the skin of the venerable Sheikh of Eden, who soon arrived to pay his respects to the stranger.

"That night's encampment was one to be remembered. My tent was pitched on a carpet of soft green sward, under the wide-spread arms of one of the old saints. At a little distance the watch-fire blazed up against a pale gray cliff, its red gleam playing on the branches beneath, and the silvery moon shining on them from above produced a beautiful effect as they trembled in the night breeze, and their dark green leaves seemed shot alternately with crimson and with silver; then the groupings of the servants, and the

mountaineers in their vivid dresses, and the sombre priests assembled round the fire, and the horses feeding in the background.

"Gradually the chattering ceased; one by one the inhabitants retired to their distant village; the salaams died away, and I was left alone, but for the sleeping servants. All was in fine harmony to sight and sound around me; all nature seemed in profoundest rest, yet palpitating with a quiet pleasure: the stars thrilled with intense lustre in the azure sky; the watch-fire now and then gleamed through the heavy foliage—its fragrance, for it was of cedar wood, stole gratefully over the tranced senses—

> And not a breath crept through the rosy air,
> And yet the forest leaves seemed stirred with prayer.

"The next morning before sunrise I broke up my encampment with regret. These are the most interesting trees in the world, except perhaps those of Gethsemane; they were the favourite metaphor of the 'sweet singers of Israel, and of the prophets,' and thus it comes that these few trees standing on this lonely and distant mountain are known all over the world."

The different accounts given by travellers as to the number of the old cedar trees now standing is very perplexing. In the case of the earliest travellers this is not surprising, for obvious reasons, but it is very much so in the case of recent visitors to Mount Lebanon. Thus Lamartine, who visited the cedars in 1832, says there were only seven at that time, while M. Laura, an officer of the French navy, who visited the mountain in company with the Prince de Joinville

in September, 1836, states they found fifteen out of the sixteen old trees mentioned by Maundrell. Belon, who was perhaps the first recorded visitor (his visit having been made in 1550), says the trees are supposed to amount to twenty-eight in number, it being difficult to count them correctly.

The cedar seldom produces cones until it is forty years old, and sometimes not until it attains a hundred years, it is said, no tree in a state of nature being so limited in its means for reproduction.

Seed should be sown in April, in ground that has been made fine, placed about an inch apart. In six weeks the young plants will appear, thick sowing helping them to break the ground. The same treatment followed in the case of the Scotch pine and larch is appropriate to the cedar, allowing them to stand one or two years in nursery lines, and then removing them in order to give additional fibres to the roots, which is essential for their successful removal. Although making somewhat slow progress at first, judiciously treated, they can be reared in a satisfactory manner. The tree does not like the knife applied to it either root or branch. If its top is cut off it becomes a grand rugged bush. When planted thickly together the tree rises, like other species of *Coniferæ*, with a straight bare trunk, differing very slightly from the larch in appearance, save in being evergreen. When planted by itself it commonly assumes a broad conical figure till it has attained its height, when its lateral branches begin to extend when the full-grown tree presents a head with a broad flat surface. About two feet yearly is its rate of growth until it reaches its full height.

The Indian Cedar (*C. deodara*).—This tree was first introduced into Britain in 1822, and is found growing on lofty elevations in Cashmere, Nepaul, Kamaon, and other districts. In the Himalayas it attains a height of 150 feet, and being accounted sacred by the Hindoos, is frequently met with in the neighbourhood of their ancient temples.

It bears a strong family likeness to the cedar of Lebanon, and is well adapted for a lawn tree, as it will rise in a majestic and grand form, where ample space is allotted to it. The seeds should be sown in April, and the seedlings managed in the same way as those of the cedar of Lebanon (growing more freely than the latter), the diameter of the space occupied by its spreading branches being generally equal to that of its height. The seeds lose their vitality soon, and the young plants fetch comparatively a high price, of which they are well worthy, and it will doubtless be ungrudgingly paid by those desirous of possessing this beautiful tree.

From what I have written the reader will be enabled to gather which are the most appropriate trees for different soils and situations, but it will be as well perhaps again to give a slight summary of the various kinds best adapted to particular positions.

In rich swampy ground, too wet for the ordinary timber trees, the large growing species of poplar, and the tree-willow will be found to answer. A loose deep earth will grow trees of any description. A clayey soil, or a deep clayey gravel, is suited for the oak, which it is found profitable to plant in conjunction with larch, for, as I have before stated, the oak derives its nourishment from a great depth, while

the larch obtains it more from the top surface. In low alluvial soils, which are moist, the silver fir will flourish, and these should have as nurses faster-growing trees for shelter, as willows or larch, the silver fir being better for being shaded during the first eight or ten years of its life. In dry, poor, gravelly, or chalky soils, the beech, birch, and the pine succeed best. Beech being more profitably grown alone than when mixed with other trees. In oak plantations, on the contrary, pines are planted for shelter, and are found very valuable in bare exposed ground. Ash and Scotch elm (or wych elm) grow well together, both being good hardy trees, but need deep loose soil, the ash preferring that which is inclined to be moist.

For forming plantations in elevated positions the goat willow, Scotch elm, birch, ash, alder, service tree, and mountain ash will be found to succeed. Deep-rooting trees require a soil more elevated above water than surface rooting kinds, such as the pine, etc.

In pit planting, when trees of a certain size are to be established, it is usual to excavate a space eighteen inches wide and fifteen inches deep; and where the soil is hard, to loosen the bottom of the hole with a pick, so that it can be made quite soft, and larger pits must be made when plants of greater age than two-year old transplanted trees are employed; that is, trees which have stood in nursery lines for two years. It is better that these pits be formed in summer, and half filled up again, a spadeful or two of the earth taken out at the time of planting, which is generally performed by a man and a boy, the latter holding the tree in the position it has to stand, while the man

carefully fills in the earth, *which should be made very fine*, no coarse clods being shovelled in, the roots of the tree being carefully spread in the pit (this method being termed "pit-planting"), so that each fibre is perfectly covered with soil. Most of the leading tree planters have recommended that while this operation is being performed the boy ought to move or shake the plant as the man fills in the hole, but with this I do not agree, as the roots are apt to get twisted and lie out of place, and even occasionally to be broken, by this being done. The earth should then be pressed down with the feet, the tree standing about an inch deeper in the soil than it formerly stood in the nursery, and when the earth is dry it is expedient not to pile the soil up in the shape of a little hillock, which is frequently done, round the stem of the tree, but to adopt the opposite method, and have a concavity round it which will hold rain and moisture, and tend to establish the tree in its new position. On hillsides this should especially be attended to, by forming the outer edge of the pit high enough to intercept the rain, which would otherwise run down the hillside, and the tree thus lose the benefit which it would derive from the supply of moisture. I shall, however, now take leave of this part of my subject, and proceed to that of ornamental planting.

Persons requiring only a few trees for the adornment of their gardens and dwellings can seldom afford the time to raise them for themselves from seed, from layers, or cuttings, but will find it the more satisfactory course to obtain what they require from some respectable nurseryman upon whom they can depend. Much however may be done by judiciously grafting

some of the most handsome and attractive flowering plants, such as many varieties of the thorn, much admired in the seasons of blossoms and fruit, upon common stems of strong hawthorn or quick.

CHAPTER VI.

Planting for Ornamentation—Preparation of the Soil—Trees for Shelter and Seclusion—Ornamental Trees—Grafting varieties of Thorns—Trees for Avenues—The Hazel—The Elder—The Laburnum—The Cherry Tree—The Laurel—The Sweet Bay—The Portugal Laurel—The Laurel Cherry—The Portugal Laurel Cherry—The Yew Tree—The Foliage of the Yew Tree poisonous to Cattle—Yew Timber very durable—The Upright or Irish Yew—Juniper—The Common Juniper—The Incense-bearing or Spanish Juniper—The Virginian Juniper—The Common Savin—The Bermudas Cedar—The Spindle Tree—The Common Spindle Tree—The Broad-leaved Spindle Tree—The Mountain Ash or Rowan Tree—The Service Tree—The Holly.

Planting for Ornamentation.—It is commonly supposed by unpractised people that merely digging a deep hole in which the roots of a tree can be safely deposited is enough to insure its future growth and health, and that is all which is necessary to be done.

The land, however, requires as much preparation for the reception of trees as for any other crop, if they are required to do well. The ground should always be thoroughly trenched to begin with, especially in those cases where a quick growth is looked for and desired.

It is generally considered that the growth of trees in six years, in trenched ground, will equal that of ten

years in untrenched soil. The time of planting is another important point, a great difference of opinion having been expressed on this head by writers, when there are various conditions which need to be taken into account. Some of the most practical arboriculturists think September the best time for moving shrubs and evergreens, for the reason that the plant is not then quite in a dormant state; and if steps are taken to prevent the exposure of the roots to drought when holly or other evergreens are moved at this season, they then begin to throw out a profusion of small rootlets, which are at once fitted to establish the plant in its new situation, or to render it fit for removal into another one during the ensuing winter or spring.

The most ornamental trees of a hardy description among evergreens, which are preferred on account of the shelter and seclusion they afford—especially in the form of narrow belts, or clumps to block out an unsightly object too near to be agreeable, and which requires to be permanently blinded—are laurel, holly, yew, evergreen oak, arborvitæ, juniper, rhododendron, and cedar. When needed to be placed under the shade of other trees as underwood, the best kinds for this purpose are commonly found to be the holly, yew, box, common juniper, and the privet. The latter stands the smoke of towns and cities well, and is specially useful on this account.

Amongst the deciduous trees of low growth best adapted for ornamental planting, the laburnum and lilac harmonise well together, the opposite colours of the blossoms making a beautiful change and variety, ordinarily very much admired, and usually esteemed

as favourites. The almond tree when in blossom is another beautiful object, and the hazel, willow, cherry, service tree, maple, etc., can all be tastefully arranged so as to produce the happiest effect, and as I mentioned at the conclusion of the last chapter, the varieties of thorns, such as the scarlet and double red, can be easily grafted upon strong stems of the common hawthorn, which can be readily trained to a considerable height, the kinds generally preferred being *Cratægus macracantha*, *C. prunifolia*, *C. aroma*, *C. coccinea*, *C. punctata*, *C. glandulosa*, the scarlet horse-chestnut, looking very handsome amongst its other neighbours.

For park scenery, or on capacious lawns, where they will not be crowded, and their effect destroyed by the too close proximity of other trees, the cedar of Lebanon, Indian cedar, British and scarlet American oaks, various kinds of the plane tree, the horse chestnut, common and purple beech, lime tree or linden, and various spreading elms, all carry with them a bold and imposing appearance, and each variety forms a handsome tree which will assume shape of itself.

In some situations, where from bareness of the ground, or from exposure, there is great difficulty in establishing trees, the common and scarlet elder are capital for shelter ; Scotch pine, mountain ash, service tree, sycamore, and horse chestnut will be found useful ; but climate differs, and some kinds succeed in certain situations better than others, and in this respect the would-be planter ought to exercise a certain amount of observation for himself, always bearing in mind that the success of what he does will mainly depend upon the appropriateness of soil and often shelter.

Again, as I have repeatedly pointed out in the foregoing in respect to all trees, no large shrubs or plants will ever become fine specimens of their kind, unless they have been repeatedly transplanted while in the nursery ground.

For the formation of avenues, as an approach to a residence or otherwise, the horse chestnut is perhaps one of the handsomest trees that can be fixed on. It is also a variety which under proper management will bear transplantation when it has attained a considerable size, so that an imposing line of shade may soon be formed. The lime tree, with its full well-balanced head, and delightful fragrance, proceeding from its sweetly-scented blossoms, is very difficult to excel; while beech, plane, Scotch or wych elm, and the Spanish chestnut, being all of a spreading habit, cause them to be well adapted for this purpose.

The Hazel (*Corylus avellana*).—The hazel is profitably cultivated as coppice, when lopped springing up vigorously, throwing up shoots five or six feet long in a season, and the tree is most useful for the arrangement of narrow belts or clumpings, imparting closeness and seclusion. Few trees retain their leaves so long after having become affected by frost, which turns them to a yellow colour, and remain thus ornamental a long time before the leaves are shed. The catkins too, which continue in bloom in winter and spring, have a very pretty effect.

The hazel succeeds best in a dry soil, with a sandstone or chalk subsoil, and is readily propagated by nuts, the size and vigour of the seedlings generally corresponding with the fine sample, or otherwise, of the seed used. They should be sown in winter or early

spring, in light and sandy soil, covered one inch. The young plants spring up towards the end of May, when the ground should be kept clear of weeds; during the following summer, and when the seedlings are a year old, they should be planted out into nursery lines, those which are weakly being left behind in the seed-bed for another year.

The common hazel embraces a great variety, many of which are cultivated entirely for the sake of their fruit, especially nuts or filberts, as *C. a. tubulosa*, *C. a. crispa*, *C. a. tenuis*. In rearing a filbert tree for fruit it should have but a single stem about a foot high, and all suckers removed as soon as they make their appearance; six branches should form the head, and the side shoots from them should be spurred like red currants. As this work however does not profess to treat upon fruit trees, I merely mention this to mark the distinction which must result in the treatment of a tree destined for the production of fruit, and not for shade or shelter.

The Elder. — The elder belongs to the genus *Sambucus*, Natural order *Caprifoliaceæ*, and to *Pentandria trigynia* of the Linnæan system. The common black-berried elder, *S. nigra* or bourtree, is not nearly so ornamental as *S. racemosa*, generally known as the scarlet-berried elder, which, when in full fruit, in point of beauty, has no rival amongst deciduous plants. Its panicles of fruit resemble somewhat small clusters of grapes, of a bright scarlet colour, which attain the height of their brilliancy early in autumn, but it is shy in producing its fruit, though it constantly blossoms, and it does best in those situations where from lateness of season the blossom is delayed. It is

a native of the south and middle of Europe, and of the mountains of Siberia, where it assumes a low form. The prominent buds of its young shoots are very ornamental, the young wood yielding racemes of flowers which open with the expanding leaf in spring, the foliage being of bright green, pinnate and deeply serrated.

The common black-berried elder is a native of Europe, the north of Africa, and some of the colder districts of Asia.

It is not a favourite tree, the blossoms and foliage, when grown extensively, emitting a sickening odour, which is believed to be unwholesome in hot weather. The plant has long been used medicinally, the inner bark of the tree being an active cathartic, while the flowers are used for fomentations and cooling ointments. These and similar applications were doubtless held in greater favour at a time when domestic medicines were more largely resorted to than in the present day.

As a screen in bleak exposures and maritime situations, the tree is however very useful, and it generally rises under the most adverse circumstances with a vigour that is seldom equalled by any other plant. On the other hand, it is apt to get bare at the bottom when used as a fence, and its roots, from the long range they take, impoverish the neighbouring crops.

It is easily propagated from young shoots, the buds or joints of which are usually from six to ten inches apart, and each cutting should have a joint close to its lower extremity, from which the roots will spring. These will readily take root when inserted

into the ground half the length of the slips used, which should be from eight to twelve inches. The best time for planting them is from the beginning of November till the end of March.

The Laburnum.—Two kinds of laburnum are commonly met with, *Cytisus laburnum*, the common or English, and *C. l. alpinus*, the Alpine or Scotch laburnum. It grows vigorously during the first few years of its age, and luxuriates in almost every description of ground, which causes it to be very suitable as shelter for many other young ornamental trees. It has always been highly esteemed as an embellishment along the margins of plantations, its beautiful pendulous blossoms displaying rich masses of colour in May and June. The seeds, which become ripe in the beginning of winter, and are poisonous, should be sown in light friable soil, in spring, two or three inches apart, and covered over to the depth of about one inch. One-year old seedlings are generally about a foot high, when they should be transplanted into lines two feet asunder, and the plants a foot from each other. After standing two years in nursery lines they are fit for planting out. They may stand, if desired, in lines for three years, and by frequent transplantation, and allowing additional space for them to stand in, they may be grown to a large size, and yet be fit for removal to any place which they may be required to decorate, which is a most useful feature in connection with this really capital tree.

The Cherry Tree.—The genus *Cerasus* embraces several varieties of the wild cherry, which differ considerably in the size and shape of their leaves, rapidity of growth, and ultimate bulk, *C. sylvestris* attaining

to the size of a timber tree. The tree will grow in any description of soil if it be dry, and not pure clay; that which it prefers being a sandy loam, or an open subsoil. It is hardy, and will grow in elevated situations, but attains a large size only on low sheltered ground.

Nothing hardly excels the purity and richness of its blossoms in early spring, while its foliage assumes gorgeous hues in autumn; and it is a matter of surprise that this tree is not more used for decorative arboricultural purposes than it is.

The tree is raised, like the garden cherry, from the stones of its fruit, and the plants require to be moved from the seed-bed when one year old, and transplanted into nursery lines two feet asunder, and the plants six or eight inches from each other. After being two years transplanted, they are commonly five or six feet high.

The stock is commonly used by nurserymen on which to engraft the varieties of double-blossomed cherries, and the kinds cultivated for the sake of their fruit. The other varieties best known are *C. pardus*, the bird cherry, *C. serotina*, the late flowering, or American bird cherry, and *C. Virginiana*, the Virginian bird cherry. These thrive best also on dry ground, and are considered especially fit as underwood, all being very ornamental, in their different seasons, for flowers and fruit. Those who like to encourage singing birds near their dwellings, as the blackbird and thrush, will find these varieties yield an abundant supply of fruit for them, and they can be propagated either by seed or layers.

The variety *C. mahaleb*, or perfumed cherry, is

indigenous to France, and the south of Germany; its wood being brown and hard emits a pleasant fragrance, the kernels of the fruit being employed by perfumers to scent soap. It is a very hardy plant, and will grow either in a bleak exposure, or as an underwood in any soil, however poor, if it be only dry.

The Laurel.—No tree perhaps is so generally useful for ornamental planting as the different varieties of the laurel. The *Laurens nobilis*, the noble laurel, or sweet bay, is the type of the Natural order *Lauraceæ*, that embraces hardy evergreens, which attain the stature of small trees in their native countries, as well as a few kinds of hardy deciduous trees, amongst which the sassafras of North America is conspicuous, on account of its medicinal properties.

The Sweet Bay is a native of the south of Europe and north of Africa, and is a beautiful evergreen with handsome leaves of a firm texture, remarkable for their aromatic taste and agreeable fragrance.

To succeed and flourish vigorously, it must have an open well-drained soil, to enable its young wood to stand the severity of frost. It produces numerous suckers from the roots, and can be easily propagated, either by dividing the roots or from layers. The cook finds the leaves of the sweet bay useful for flavouring custards or blancmanges, and for placing in the dish with soused mackerel, etc.

The Portugal Laurel, one of our most beautiful evergreens, does not belong to this order, which is often commonly supposed to be the case, but to that of *Cerasus*, or cherry.

The Laurel Cherry.—*Cerasus*, *Lauro-cerasus*, or common laurel, grows wild in woody and subalpine

regions, in the mountains of Persia, and west of Asia, and is considered one of our finest evergreens. It succeeds at its best in a rich, deep, free soil, in a sheltered situation, as it affects the shade, and forms a highly ornamental underwood. If planted in a wet, hard, or retentive soil, it becomes unsightly, and yields only a scanty crop of leaves, with bare twigs. It can be propagated either by berries, cuttings, or layers. The berries become ripe in Autumn, when they should be cleared from their pulp and immediately sown. Cuttings however are the simplest method to resort to for its propagation. These should be planted in September, in sandy soil partially shaded, in lengths a foot long, inserted in the ground to half their length. They should be of the same season's growth, with about an inch of the previous year's wood attached to them, from which the roots will spring in the following summer. When the plants become close to one another, they should be transplanted out into nursery lines, wide enough asunder to allow them to become bushy; after standing thus for a year or two, they will be fit either for the shrubbery, or as underwood in beltings of other trees; or to be planted out by the borders of drives in the forest, where its berries form a favourite food for pheasants. As a hedge, or ornamental screen-fence, the laurel is very desirable. The principal varieties are the variegated and the narrow leaved.

The Portugal Laurel Cherry, or common Portugal laurel, is one of the best evergreens adapted to our climate, for although not growing so fast as the common laurel, it is more hardy, and succeeds on soils

of very opposite quality. The flower-spikes appear early in June, and the blossoms are succeeded by oval-shaped berries, which change from green to a deep purple, by the end of autumn. Seeds sown in autumn generally spring up during the following March, when they are liable to suffer from the late frosts which sometimes prevail. It can be grown from cuttings in the same way as the common laurel, but the handsomest plants are those which have been produced from seeds. If the seedlings stand close in the bed, they should be transplanted at the end of the first season's growth, but if they have plenty of room they may be allowed to stand for another year, and then be transplanted into nursery lines, where room enough should be given them, so that their foliage does not touch that of each other in the progress of their growth. After standing for two years in the nursery lines, they are then fit for being planted out in the situations they are destined to occupy.

The Portugal laurel admits of pruning, and can be trimmed into any desired shape, and forms a compact ornamental hedge suitable for the boundary of a parterre. Under favourable conditions it arrives at the height of from twenty to thirty feet, and when pruned early can be made to attain the dimensions of a dwarf tree.

The Rhododendron is another capital evergreen, extremely hardy and appropriate for decorative purposes, but, belonging more to the class of flowering shrubs, scarcely comes within the province of this work to describe.

The Yew Tree (*Taxus baccata*), the common or English yew.—This is a very useful tree as underwood,

in those situations where by reason of too much cover trees are apt to become feeble, and have but scanty foliage, doing well amongst deciduous trees, if it can only have a cool moist soil. It can be trimmed and cut into any shape, hedges being formed by it of such impenetrable thickness that small birds even cannot pass readily through it.

As an ornamental tree for a lawn in a cold climate, the yew is possessed of several advantages, as it is not injured by the wind, or by frosts in winter, while its rich dark foliage offers a bold contrast to that of other trees.

The yew is remarkable for its slow growth, plants of five years of age generally not averaging more than a foot in height, while at ten years of age they seldom exceed three feet, though it will ultimately attain the dimensions of a timber tree, and range from forty to fifty feet in height.

It is found indigenous throughout Britain and in most parts of Europe, the practice of planting them in churchyards being one of great antiquity. It is propagated by its berries, that become ripe in autumn, which it is customary to wash, and clean from the pulp surrounding them. They are then mixed with three times their bulk of sand for a year or fourteen months, according to the time of sowing, and planted in winter or early spring. A rich loamy soil is necessary, but one which will not cake and become hard on its surface. The seed should be covered with about half an inch depth of soil, and sown of a thickness to insure the plants standing about two inches apart from each other, the crop coming up very irregularly. As the seedlings suffer

from frost, it is best to give them some kind of cover, such as fir twigs, or evergreen branches. After two or three years the seedlings should be moved into nursery lines, and afterwards transplanted again every third year, allowing them sufficient space upon each occasion to grow without crowding one another. From its naturally fibrous roots, the yew will bear transplanting when of a large size, and can so be reckoned upon to produce an immediate ornamental effect. Rather than receiving injury, it grows best when somewhat darkened by other trees, and its upward progress is assisted by them; when otherwise it would be inclined to branch outwards in its more natural form.

The tree is of a very poisonous nature, and fatal accidents frequently happen to horses and cattle which have eaten yew clippings, or have obtained access to the trees, off which they have browsed. The wood of the yew is more durable than that of any other European timber, while the tree itself attains to a vast age, and the venerable remains of some ancient yew trees are supposed to take their date from the Roman occupation of Britain.

The Upright or *Irish Yew* (*T. fastigiata*).—This is a handsome plant, which from a single stem at the surface of the ground throws out a number of tapering branches, clothed with foliage of the darkest green colour, assuming a shape broad at top and narrow at the bottom; being considered one of the handsomest and hardiest evergreens we have, which is striking on account of its peculiarity of shape.

It is propagated by cuttings taken in August and September, which are struck in sand, or other silicious

soil, covered with a hand-glass and shaded from the rays of the sun.

Juniper.—There are about twenty species of Juniper, which merge into a great number of varieties, and belong to the Natural order *Coniferæ*.

The Common Juniper (*J. communis*), will flourish on soils of very opposite qualities, but prefers a deep, dry, loamy situation, which is partially shaded by other trees. In a favourable situation it rises to the dimensions of a dwarf tree, but on poor gravel, and in wet situations, it only becomes a low spreading shrub, and in this form makes excellent shelter for game, its cover being the favourite resort of woodcock.

The plants are propagated by the berries, which lie dormant in the ground for a year, and sometimes for two years, before they vegetate. The berries themselves remain on the plant for two years, being mostly found on the shrub in different stages of maturity, so that while some of the fruit is ripe a younger crop is coming forward.

The Incense-bearing or *Spanish Juniper* (*J. thurifera*).—This variety forms a beautiful, low, evergreen tree, yielding large berries, which when ripe become black, and form a striking contrast to its foliage of vivid green. As a tree for the lawn, or as an addition to the shelter and variety of the foliage of a shrubbery, it is very desirable, being extremely ornamental. It was introduced into this country about a hundred and thirty years ago, and is now in general cultivation.

The Virginian Juniper (*J. Virginiana*).—This is commonly termed the red American cedar, and on

the American continent attains a height of sixty feet, being the tallest hardy tree of the genus.

It flourishes best in a deep rich soil, and will endure plenty of moisture, assuming a conical form, and expanding into a broad spreading tree, affording a great amount of shelter. Being very hardy, it is highly appreciated in the shrubbery as a nurse for more tender plants. It is propagated from seed, and during the first four or five years of its growth, its progress will be as fast as that of the Scotch pine; while no plant is more apt to produce greater seedling varieties, differing in the size and shape of their foliage, all of which are invariably handsome. The young plants should be transplanted from the seed-bed when one year, or at most two years old, into nursery lines, and transplanted again every second year, until finally planted out.

The Common Savin (*J. sabina*).—This is one of the least ornamental of the species, and when disturbed, or trod upon, emits a disagreeable odour. It is a low spreading, evergreen shrub, which is indigenous to Spain, France, and Italy, and consists of several varieties which readily take root by fixing the prostrate branches in the earth. It is said to produce abortion when eaten by pregnant domestic animals, its foliage being used in medicine as a diuretic.

The Bermudas Cedar (*J. Bermudiana*).—The wood of this tree is that employed in the manufacture of blacklead pencils, being esteemed on account of its fragrance. It is however too tender to be reared successfully in Britain generally, and in the most favoured situations seldom exceeds the stature of a shrub, and is not therefore much cultivated, except

by those who form specific collections of trees, though it has now been introduced for over two centuries into this country.

The Spindle Tree, once highly esteemed for spindles, from which it takes its name. It belongs to *Tetra-hexandria Monogynia* of the Linnæan system, and to *Celastraceæ* in the Natural order of plants. As the blossoms of the tree are produced in the beginning of the summer, and resemble the colour of the leaves, they are by no means attractive, but in autumn the seed-vessels appear in great profusion, of the most delicate shades of colour, generally pink or white, and when ripe they expand, and show the seeds of rich yellow.

The Common Spindle Tree (*E. Europæus*).—This is a hardy tree, very tenacious of life, and grows in soils of various qualities, but flourishes best in a deep rich soil, moderately sheltered, when it will attain a height of from twenty to thirty feet; though the range of the leading species of the genus may be said to occupy an intermediate station between shrubs and trees; varying from ten to thirty feet in height; producing a mass of white fibrous roots, it will stand removing well, when comparatively of large size. It is propagated freely either from layers or seed.

The Broad-leaved Spindle Tree (*E. latifolia*).—The leaves of this tree are broad and shining, its fruit being also highly ornamental, the plant seldom exceeding twelve or fifteen feet in height, and is perhaps the handsomest tree of the genus. There are also several species of dwarf evergreen shrubs which belong to this genus.

The Mountain Ash or *Rowan Tree* (*Pyrus aucu-*

paria). — This beautiful deciduous tree produces numerous fragrant white blossoms during the months of May and June, which change into a profusion of scarlet berries in October. The tree is perhaps seen to its greatest perfection in the Highlands of Scotland, with its terminal shoots bending beneath the weight of scarlet berries. Being very hardy it grows freely in cool soils at a great altitude, the exposure of which would kill many more tender trees. It grows rapidly during the first eight or ten years of its life, though it never reaches a large size. As a hedgerow tree it is highly ornamental, rising with a shapely head which is never disfigured by the wind.

It is propagated from the berries, which ripen in autumn, and are then collected and put into a pit, mixed with sand or light earth, and allowed to remain until the second winter, or early in the second spring, when they are sown, and so disposed that they strike two inches asunder. At two years they require transplanting into nursery lines, where they may remain another two years, and will then be ready to plant out permanently, or to be replanted in a greater space to become larger trees, so as to produce a more immediate effect when placed in their destined stations at a future time.

There are several varieties, one of the most beautiful of which is the weeping mountain ash, which when grafted upon an ordinary stock forms an elegant pendent tree. Peculiar kinds can only be accurately reproduced by grafting, which is the course recommended when the object in view is to secure some special variety.

The Service Tree (*Pyrus aria*).—This species is

now included by botanists in the same variety, in every respect resembling the mountain ash, excepting that its leaves are entire, light green above and downy underneath, which when agitated by the wind imparts to it a very striking appearance. There are many interesting varieties, its treatment and method of propagation being the same as that adopted for the mountain ash.

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The holly is usually propagated by seed, the berries being collected in winter, and mixed up with double their bulk of sand and turned over every month, and sown during the following winter in beds of rich dry soil of open texture, partially shaded, the seeds being covered with about half an inch depth of soil. The seeds will sometimes lie dormant for sixteen or eighteen months after the time of sowing, and if the soil is of a clayey nature, the surface becomes caked and hard, and they will perish. On this account a

close soil is objectionable to sow seeds in, as the young plants cannot force their way through. After two summers' growth, the seedlings should be transplanted into nursery lines ; the best time for performing this operation being September, during moist weather, and afterwards transplanted again every second or third year.

There are many varieties of holly, particularly of the gold and silver variegated sorts, which differ in the breadth and structure of their leaves and prickles. These are known under the popular names of gold-edged, silver-edged, gold-blotched, silver-blotched, laurel-leaved, hedgehog, etc. etc., which are mostly grafted on stocks of the common holly.

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