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PART X.]

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A
HISTORY
OF
BRITISH FOREST-TREES,
INDIGENOUS AND INTRODUCED.

BY
PRIDEAUX JOHN SELBY, F.L.S., M.W.S., ETC.

ILLUSTRATED BY A WOODCUT OF EACH SPECIES,
AND NUMEROUS VIGNETTES.



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S. BENTLEY,

[1st June 1842.]

SHOE LANE.

PART XI., COMPLETING THE WORK, WILL BE PUBLISHED 1ST. JULY.

This day is published, price 21s., cloth,
THE HERALDRY OF FISH :

NOTICES OF THE PRINCIPAL FAMILIES BEARING FISH IN THEIR ARMS.


By THOMAS MOULE.

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. Nearly 600 families are noticed in this work : among the most conspicuous are those of Anson, Arundell, Beckford, Berkeley, Braybrooke, Brougham, Burnaby, Byron, Campbell, Cave, Colston, Courtenay, Dacre, Dormer, Drummond, Dykes, Egerton, Elwes, Frankland, Gascoigne, Godolphin, Grey, Gurney, Hacket, Harland, Harrington, Hawke, Herring, Huyshe, Irby, James, Kennedy, Kytson, Lake, Lawrence, Luttrell, Lucy, Maltravers, Neville, O'Neill, Ord, Percy, Pringle, Russell, Sambrooke, Sharp, Shelley, Sidney, Sinclair, Stourton, Sutherland, Talbot, Troutbeck, Tucker, Turbutt, Vandeput, Vernon, Way, Whalley, and Worsley.

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tree of rapid growth, becoming flat-topped and spreading to a great extent when old, and rendered highly ornamental by its thick, tufted, dark green foliage. In Austria, its timber is considered as rather superior to that of *Pinus sylvestris*, being tough, strong, and resinous, and capable of resisting to a greater extent the effects of alternate moisture and dryness.

The only drawback we have found to the cultivation of the Austrian Pine, is the liability of the young trees to the attacks of hares and rabbits, which seem to prefer it to any other species of fir, and are sure to find out the plants, however thinly they may be disseminated in mixed plantations, and, as the buds are eaten as well as the foliage, they suffer an injury that is seldom repaired. In districts where game of this description abounds, it might be advantageous and advisable to try the herbaceous grafting of the *Pinus Austriaca* upon the Common Pine, a mode now adopted with great success in propagating many of the tenderer and rarer of the *Abietinæ*. Herbaceous grafting is so named from the state of both stock and scion at the time of the operation, which is performed when the leading shoots of the fir tribe have commenced growing, and are so tender that they may be snapped off by the hand, without tearing the bark, like a piece of glass or the succulent stem of the young asparagus. Cleft grafting is the mode adopted in this operation, the shoot representing the stock being slit so as to receive the lower part of the scion, which is pared or cut into a wedge-like shape, as shown in the figure.

In performing herbaceous grafting, we are directed, in the first instance, to break over the leading shoot, when in a brittle state, in which it remains for only about ten days or a fortnight, reducing it to four or six inches in

length; the leaves, with the exception of two or three near the top, which are to be left for the purpose of drawing up the sap, are then to be removed by a sharp knife or pair of scissors, and the slit made to receive the scion, which should be taken from the extremity of the branches of the kind to be grafted when in the same succulent state, either the same day or the evening before, and kept in water or damp moss. The scion need not be more than two or two and a half inches long, and the lower half, being deprived of its leaves, is cut in the form of a thin wedge and inserted and fitted into the slit of the stock, in which it is further secured by



a ligature of soft twine, matting, or worsted twist. As the exclusion of the direct rays of the sun facilitates the junction of the scion with the stock, a cornet of paper is usually tied to the stock, so as to shade the scion from its influence. In ten or fifteen days the cornet may be removed, and a fortnight afterwards the union is sufficiently effected to allow of the removal of the ligature, after which the upper part of the stock left with the leaves on may be trimmed off, and the side shoots on the lower part of the stock removed, so as to throw the whole of the sap into the scion. By this mode of grafting, many species and varieties of the *Abietinæ* of which it is difficult to procure a supply of seeds or plants may be extensively propagated, as it is done with rapidity, a good workman, with an assistant to prepare the scion, &c., being able to graft upwards of two hundred a day. Its success, also, if done



at the proper time, is almost certain, union between the stock and scion seldom failing to take place within three weeks or a month. It is desirable, however, in this mode of grafting, that the stock and the scion should be nearly allied, or belong to the same genera or divisions of the family, and also that the stock should be of a growth and habit resembling that of the scion; for we have observed that when a scion of large and strong growth has been grafted upon a tree of less succulent or rampant habit, the graft became swelled and much larger than the stock at the point of junction, as shown in the figure, threatening, in the course of a few years' growth, to become much too heavy for the stock to support it, and liable to be broken, or blown off by winds or storms of snow. Such appeared to be the case in some instances that have come under our notice, where the *Pinus Sabiniana* had been grafted upon the *Pinus laricio*.



To the Pines already enumerated may be added the *Pinus Peyrenaica* of La Perouse, the *Pinus Hispanica* of Captain Cook,* now Widdrington, who first introduced it into Britain, and who speaks highly of its noble appearance, elegant form, and quick growth, and recommends its cultivation, as one of the most ornamental Pines for park and landscape scenery. Its timber he describes

* See Captain Cook's "Sketches in Spain," and article in vol. ii. of "Annals of Natural History," page 163.

as white, dry, and nearly without turpentine ; it may therefore be presumed, that it is better adapted for interior joiner work than for large building purposes, such as joists, rafters, &c., or for situations where it is subjected to alternate dryness and moisture. The leaves are long, slender, tufted at the extremities of the shoots, of a light grass green colour, and, therefore, contrast beautifully with the darker green of many of its congeners. When young, it bears some resemblance to *Pinus Halipensis*, but is of a much more vigorous growth, more pyramidal in form, and attains a much greater height and larger dimensions. The cones are nearly three inches long, on strong footstalks, and, though resembling those of *Pinus Halipensis* in the form of the scales, &c., instead of pointing downwards, as in that tree, are always attached to the branches in a horizontal direction. It grows in the Pyrenees at an elevation of from two to four thousand feet, and is, therefore, of a constitution hardy enough to flourish in any part of Britain. Thriving young trees of this species, raised from seed brought from Spain by Captain Widdrington, are now growing in several parts of England.





Pinus pinaster. AIT.

PINASTER, OR CLUSTER PINE.

Pinus pinaster

AIT. Hort. Kew. iii. p. 367.

LAMB. Pin. i. t. 9.

LAWSON'S Man. p. 341.

LOUDON'S Arb. Brit. ch cxiii. p. 2213.

Nov. du Hamel v. p. 240.

Pinus maritima

THE introduction of the Pinaster into England by Gerard so early as A.D. 1596, the extent to which it has been

cultivated in many districts, as well as its ornamental qualities, entitle it to some notice in a work like the present, though it cannot be recommended as a species valuable for its timber, or calculated to repay the planter for its occupancy, in soils capable of producing wood of more general utility. In the quality and texture of its wood it is greatly inferior to the Common Pine, as well as to the other species whose cultivation we have already recommended, and, even in its ornamental properties, it does not, we think, surpass the *Pinus laricio*, *Pinus pallasiana*, or the *Pinus Austriaca*, all of which occupy a higher zone, that is, grow in a colder climate, and are, therefore, better calculated for extensive cultivation throughout the varied surface of the British Islands. It possesses, however, a constitution and habit which render it of great importance in certain localities, being a species that bears with impunity, indeed thrives within, the influence of the sea air, at the same time that it affects a deep soil of a light sandy nature, and even grows with vigour upon tracts of pure sand. Such are those extensive woods of the Pinaster which cover so large a surface of the sandy downs along the southern coast of France, the Landes of Bordeaux, &c., in which districts its produce, consisting chiefly of the tar, resin, &c., extracted from the wood, constitutes a principal source of the riches of the inhabitants.

This predilection for a maritime situation, and a constitution sufficiently hardy to brave the vicissitudes of our climate at a low elevation, point out the Pinaster as the most appropriate, indeed, we believe, the only species of Pine that can be reared with any prospect of success within the direct influence of the sea air, and upon such tracts of our coasts as are chiefly composed of sand. For such a habitat, how-

ever, it is further adapted by the nature and character of its roots, which are less numerous, but more carrot-like in form, and descend much deeper into the earth than those of most other species of Pines, in which the roots are generally superficial and extend horizontally on every side, to a great distance around the tree, and which, upon a surface soil, gives that stability to them, which in the Pinaster, upon deep sands, is effected by a few bulky tap-formed roots, which descend deep into the stratum. This peculiarity in the root of the Pinaster, possessed also by its nearly-allied congener the *Pinus Pinea*, Stone Pine, is adverse to its cultivation upon soils of inferior depth, or where the substratum is hard or rocky, for upon such, in consequence of its inability when young to protrude to a sufficient depth a powerful root which may serve as a counterpoise to the leverage of the plant above ground, it is acted upon by the winds, becomes loosened in its socket, and inclines to one side, whence it is that few Pinasters, when planted upon such soils, are to be seen with a bole perfectly straight and upright near to the ground, a curvature being generally perceptible, even in trees of considerable age and size. This want of lateral roots, also, renders it liable, in districts subject to heavy storms of wind, to be broken off close by the crown of the root, where we have sometimes observed a kind of imperfect junction to exist between a portion of the bole and the main root, as expressed in the figure. At Twizell, during the tremendous storm of wind on the 9th of January, 1839, a luxuriant Pinaster upon the lawn, which, at about twenty-two



years' growth, had reached a height of thirty-three feet and a circumference of nearly four feet, was broken off in this manner, and the appearance of the crown of the root was similar to that represented in the figure.

To succeed and become an ornamental tree the Pinaster requires room and air on every side, and it is, therefore, in vain to place it in mixed plantations, as it either dies in its infancy, choked by its more hardy and enduring neighbours, or lingers for a few years, a feeble and unsightly object. Even when planted in masses by itself, the young trees, when first put in, ought to stand at least from eight to twelve feet apart, and should afterwards be thinned out as soon as they interfere with or touch each other.

Greatly, therefore, as we admire the Pinaster for its massive and clustered foliage, its bold form, and the rich appearance of its large nut-brown cones, we consider that, upon soils not expressly adapted to its habit, it would be more advantageous and satisfactory to substitute some of the other species of a similar character in regard to foliage and general effect, such as *Pinus laricio*, *Pinus pallasiana*, or *Pinus Austriaca*, which have the additional advantage of being more hardy in their constitution and of producing timber of a superior description, reserving the Pinaster as a tree wherewith to shelter and adorn maritime sandy tracts, upon which it is known to flourish, and where few other trees can be made to succeed.

It possesses an extensive distribution throughout the south of Europe, occupying a zone considerably lower than the *Pinus sylvestris*. In Spain it is an abundant species, and in the maritime districts of the south of France covers a large extent of surface, but it cannot be cultivated; with a view to profit, to the north of Paris. It is, also, common to Italy and Switzerland, to Greece and the western parts

of Asia, and a Pinaster from seed imported from China has been raised in the garden of the Horticultural Society, though there is some doubt whether the species had not been originally carried from Europe to that country. The growth of the Pinaster in a suitable soil is rapid and luxuriant, and in the course of fifty or sixty years it reaches a height of from forty to as much as sixty feet, with a trunk of corresponding diameter. Its leaves are from six to eight inches long, very strong and rigid, of a lighter green than those of *Pinus laricio*, and are thickly-clustered towards the ends of the branches, an appearance rendered still more striking by the bare spaces left at the bottom of each annual shoot by the decadence of the male catkins, which, when in bloom, surround the lower part of the shoots. The sheaths containing the leaves are nearly three quarters of an inch long, imbricated, and, when old, of a blackish colour. The bark of the trunk is always deeply-furrowed and of a dark brown colour, and the terminal buds are large, covered with brown, chaffy, involuted scales, and perfectly free from any resinous coating. The cones, which frequently measure five inches in length, are placed in whorls round the branches, pointing outwards in star-like clusters, from three to as many as seven or eight together; they first appear upon the shoots of the current year of a purplish colour, then change to green, and when matured, which takes place in the autumn of the second year, become of a rich and shining brown. The scales, which are an inch and a half in length, terminate in regular rhomboidal pyra-



mids, whose summits consist of a smaller pyramid of a greyish colour, hard and sharp-pointed. The seeds, a little more than a quarter of an inch long, are attached to a large membranous wing, which is upwards of an inch in length, and the cotyledons of the seedling are seven or eight in number.

Many fine examples of the Pinaster are to be met with in various parts of England; in the gardens of Fulham palace there is one upwards of eighty feet high, with a trunk more than twelve feet in circumference; at Sion House, Loudon mentions several above sixty feet high.

In Hampshire, Cornwall, and Norfolk, it has been planted extensively, and in all these counties there are Pinasters of fine growth and large dimensions. In Northumberland, we recollect a very fine and highly ornamental tree which grew in the neighbourhood of Belford, but which fell a sacrifice to the axe, being mistaken for an ancient individual of the common species. At Twizell, besides the tree blown down by the hurricane of January, 1839, there are now several, about fourteen years planted, upwards of twenty feet high; and at Howick, the seat of Earl Grey, are several thriving trees of this species.

Several varieties of the Pinaster are enumerated by Loudon, amongst which the *Pinus P. Lemonianus** is the most remarkable; for, although similar in foliage to the species, it differs in its general habit and mode of growth.

* For a further account of this variety, our readers are referred to a paper by Sir Charles Lemon, published in the "Horticultural Transactions."



In this variety, the cones, instead of being placed behind the shoots of the whorl and pointing outwards, three, four, or more together, are single, each invariably occupying the place of the leading shoot, while the side shoots are behind it, a mode of growth that necessarily deprives the tree of its regular leader. This deficiency, however, is in fact compensated by a more vigorous growth of one of the side shoots, which then becomes a leader; but as this process is repeated year after year in different directions, the stem of the tree acquires a zigzag appearance, which it always retains. In its general form, and when it has acquired age and size, it resembles a thick, bushy, round-headed Pinaster, but without any unhealthy or dwarfish aspect. At Carclew, the seat of Sir Charles Lemon, where the variety first appeared, there are many fine specimens upwards of thirty feet high. Seedlings raised from the cones mostly retain the same character, which is said to be already observable in plants of three or four years old.

Before closing the description of the Pinaster, we may briefly remark, that the *Pinus Pinea*, Stone Pine, which in Italy and other warm parts of Europe attains a noble size and picturesque form, and which enters so beautifully, and with such marked effect, into the compositions of Claude, is of too tender a constitution to thrive or attain its full dimensions in England, specimens, even in the warmer southern counties, rarely advancing beyond the character of a large bush. At Twizell, where numerous plants were raised from seed about twenty-five years ago, and afterwards treated with great care and attention, the whole are now dead, after having attained a height of about fourteen feet. When twelve or fourteen years old, they began to bear cones, and continued to do so in profusion till their death, but the nuts rarely contained a kernel so far advanced as to vegetate.



Pinus strobus. LINN.

WEYMOUTH PINE.

Pinus strobus

LINN. sp. pl. 1419.

NEWT. Eve. Sylv. p. 263.

AIT. Hort. Kew. iii. p. 369.

LAWSON'S Man. p. 360.

LOUDON'S Arb. Brit. ch. cxiii. p. 2280.

OF the Pines distinguished by having five leaves enclosed in a sheath, the *Pinus strobus* is the only species

whose introduction goes back for any number of years, or which has been cultivated to any extent within the British Islands. In tracing its history, it appears to have been first grown by the Duchess of Beaufort, at Badmington, in 1705. Soon afterwards, it was planted in considerable numbers at Longleat, in Wiltshire, by Lord Weymouth, from whom it derives the name of the Weymouth Pine. Many, also, about the same period, were planted at Mersham Hatch, in Kent, and the Duke of Argyle cultivated it extensively at Whitton. In these various situations it grew with vigour and considerable rapidity, and, in the course of sixty or seventy years, many of the trees attained a height of from seventy to eighty feet. In the northern parts of England and Scotland, however, it seldom attains so great a size, or reaches the age above-mentioned, most of the trees decaying, when about forty years old. This may, perhaps, partly be attributed to the want of the necessary degree of temperature during its period of growth; for, though subjected in its native country, during winter, to greater degrees of cold than we usually experience here, it enjoys, during the period of its activity, a temperature generally much higher than that of the northern parts of our island. This tenderness or delicacy of constitution, may likewise, we think, be partly owing to the origin of the plants, for most of the Weymouth Pines disseminated through the kingdom have been raised from the seed procured from the trees originally introduced at the places previously mentioned, or from their descendants; these, it is probable, are deteriorated by climate, difference of soil, &c., and, therefore, incapable of producing a plant with a constitution equal in strength and vigour to trees raised from seed ripened in the native habitat of the species; a case, in fact, ana-

logous to what has already been mentioned in regard to the deterioration of the Scotch Pine, when raised from seed grown in England and upon soils uncongenial to its nature.

The failure of the Weymouth Pine as a profitable tree to the planter, and the comparative neglect into which it has fallen, being now seldom planted, except for the sake of variety or ornament, is the less to be regretted, as other species have been introduced of a more hardy constitution, and producing wood much superior in quality, so far at least as regards strength, elasticity of fibre, and durability. The wood of the Weymouth Pine is white or very pale yellowish white, of a fine grain, light, and very soft, but with little strength and not calculated to withstand the effects of alternate dryness and moisture; for the interior finishing of houses and fine joiner work it is an excellent material, being easily worked, and taking a fine satiny surface under the plane; it is also, in general, very free from knots, the lower side branches being small, and, in the thick American forests, perishing at an early age. Its want of strength, however, renders it greatly inferior to the Scotch and many other species for beams, rafters, and other important parts of the woodwork of houses, added to which it is much more susceptible of, and predisposed to, the dry rot. It is, therefore, to be regretted that wood of a character so much inferior to that of the Common Pine, or, as it is usually called, Baltic timber, should, from the operation and unequal bearing of our fiscal regulations in regard to the importation of timber, be used so frequently for the main timbers of buildings, its exemption from the high duty charged upon the superior article from the Baltic enabling the merchant to sell it at a much lower price, of which advantage is taken by specu-

lating and contract builders, who feel but little interested in the durability of their erections. In consequence of its exemption from duty, the importation of the Weymouth Pine timber into Britain from our North American colonies is of immense extent, and likely so to continue, at least, as long as the present impolitic restrictions continue in force, and prevent a more abundant and adequate supply of a superior description of timber from the north of Europe.

The Weymouth Pine is a native of North America, being found in great abundance, and occupying large tracts from Canada to Virginia. According to Michaux, it attains its largest dimensions in New Hampshire, Vermont, and near the commencement of the river St. Lawrence, where the largest specimens are found growing in the soft, friable, and fertile soils of the valleys, or in the deep, black sandy loam of the banks of rivers. In such situations, it sometimes reaches a height of one hundred and eighty feet, and the above-named author mentions two trunks, felled for canoes, that he measured, one of which was one hundred and fifty-four feet long and fifty-four inches in diameter near the butt, the other one hundred and forty-two feet long and forty-four inches in diameter. In these deep, loose, and moist soils it possesses, in the highest degree, those qualities which characterize its timber; being lighter, finer in grain and texture, and softer than when grown upon more elevated and drier tracts, where the wood is coarser, but firmer and more resinous. In America, the White Pine, as the wood of this species is called, is extensively used and for a great variety of purposes. Its fine grain, soft texture, and the ease with which it is worked and cut in every direction, adapting it for the interior and decorated wood-work of

houses, such as friezes, mouldings, cornices, &c. ; it is, also, almost exclusively used, in the northern and middle states, for the masts of vessels, which are superior to any others for their lightness, but in point of strength and durability, particularly in that portion placed between decks and at the intersection of the yards, are inferior to those of the *Pinus sylvestris* and other species of the north of Europe. The clap-boards, with which the wooden walls of American houses are covered, are, also, generally sawn out of the White Pine, and the shingles, or wooden tiles, are split out of the most perfect wood, or that which is freest from knots ; these make a light and efficient covering, but require to be renewed every twelve or fifteen years.



The figure here introduced represents a Weymouth Pine, of remarkable form, in the grounds of Strathfieldsaye.

The *Pinus strobus* is stiff and formal in its appearance, retaining its pyramidal growth, even when old and full grown ; its foliage, also, is thin and meagre, and destitute

of that tufted or massive richness which is seen in the Common Pine, the Pinaster, and other two-leaved species ; hence, as an ornamental tree, it is greatly inferior to many of its congeners ; and, possessing no picturesque beauty in itself, it is only desirable where the direct effect of contrast is required, as where its smooth and polished grey-green bark is opposed to the rougher and more richly-coloured trunks of the *Pinus sylvestris*, or its light and scanty foliage relieves the heavier masses of surrounding trees.

Specifically, it is distinguished by having the leaves in fives, with little or no surrounding sheath at their base, slender, from three to three and a half inches long, of a light bluish green, with longitudinal silver lines, scabrous, and finely serrated on the margin. In summer they hang free and loose, but in winter, and during frost, they contract and lie close to the branches. The buds are ovate, pointed, and partially covered with resin. The male catkins are short and elliptic, on long footstalks, their colour a pale purple mixed with yellow. The crest of the anthers is small and composed of two short erect bristles. The cones are of an ovate cylindrical shape, erect when young, but as they reach maturity become pendulous ; they are from four to six inches long, slightly curved, and composed of smooth scales rounded at the base, with the apex thickened and partly covered with white resin. The seeds ripen and are shed from the cones in the October of the second year.

There is another species belonging to the five-leaved section, to which it is desirable to direct the attention of planters, particularly of those who possess extensive tracts of land of a hilly or mountainous description, this is the *Pinus cembra*, Linn., Cembran Pine, a tree of the hardest constitution, naturally growing in the Alpine regions of many

parts of Europe, as well as those of Tartary and Siberia, at a high elevation, and occupying a zone even above that of the *Pinus sylvestris*. It is, therefore, a tree, as Mr. Lawson remarks in his "Manual," "well adapted to clothe the tops of many hitherto almost barren mountains in Scot-



S. WILLIAMS.

land, not only with fresh and luxuriant vegetation, but with valuable timber." In the latter respect, it is said to yield to none of the genus, its wood being not only remarkable for its durability in all situations, but for its agreeable perfume, fineness of grain, and the ease with which it is worked. In Switzerland, it is in great repute with the

turners, and is also much used for the wainscoting of apartments, both on account of its agreeable colour and of the sweet odour which it always retains. From the ease with which it is cut and moulded into form, it is, also, the material from which the various figures of men, women, animals, &c., are carved by the shepherds of the Swiss and Tyrol Alps during their hours of leisure. Hitherto its cultivation in Britain has been very limited, and mostly confined to a few places in England, and in situations, we believe, not congenial to its nature, and where it is not likely to attain its full developement. To give it a fair trial and test its value it ought to be planted in our mountainous districts, at different elevations and in different exposures, upon the open face of the hill, as well as in the gullies and deep hollows, where the soil is generally the best, and, from the free percolation of moisture, especially congenial to the growth of trees. To an extended cultivation of the Cembra Pine, it may, perhaps, be objected, that its growth is too slow to repay the planter for its occupancy; but when we consider the elevated situations on which it is proposed to try it, the comparatively trifling value of the land in such mountainous districts, and the great advantages to be derived from the shelter alone that plantations of this species would afford to flocks depastured on the hills, it seems to be an experiment well worth trying by those who are owners of mountainous property, without taking into account the satisfaction of adding to the interest and beauty of their country, as well as the prospect, though it may appear distant, of benefiting their posterity by the growth of a valuable timber in districts otherwise barren and unprofitable.

For the first four or five years, the growth of the *Pinus cembra* is slow, the annual shoots seldom exceeding two

or three inches in length ; but after this age, and when it has obtained possession of the ground, it is much more rapid, its annual shoots, at least in the Swiss variety, or *Pinus c. Helvetica*, in tolerable soil of a dry quality, averaging about fourteen inches, and at Twizell, plants put out from the pot when about six inches high, are, after ten years' growth, nearly thirteen feet high. In some parts of England, as at Dropmore, it has attained a height of about fifty feet in as many years, and some of those at Walcot Hall, in Shropshire, planted towards the close of the last century, are about fifty feet high.

In its growth it is very erect and pyramidal, the branches, which are slender, growing in regular whorls from the base to the summit, and retained during life, where the trees have room and air. The leaves are from three and half to four inches long, with three longitudinal ribs, two of which are opaque and white, the other green and shining, thus producing a glaucous green foliage ; they are in thick masses towards the ends of the branches, and in winter incline towards, or embrace the shoots, those nearest the buds being usually twisted around the tip, as if to defend those important parts from frost or the lodgment of snow, which, in consequence of this arrangement and the comparative slenderness of the branches, can rarely take place to any hurtful extent, a beautiful provision for the preservation of a tree that naturally grows in such high Alpine regions.



The cones are about three inches long and two and a quarter broad, the scales nearly as wide as long; the seeds are large, being about two-thirds the size of those of the nut Pine, *Pinus pinea*, and destitute of wings. They contain a sweet oily kernel, grateful to the taste, and used in some parts as food. An excellent oil, fit when fresh for the table, or to burn in lamps, is expressed from them in the Tyrol; and in Siberia, when the crop is abundant, they are said to form almost the sole winter food of the peasantry. When sown they lie long in the ground before they vegetate, the young plants not appearing till the spring of the second year.

To this section, also, belongs the *Pinus excelsa*, Wallick, Bhotan Pine, a native of the mountains of Nepaul, also *Pinus Lambertiana*, first discovered by Douglass, near the head-waters of the Multonal river, to the west of the range of the rocky mountains. Both of these species seem of hardy temperament, and are likely to prove important additions to our ornamental coniferæ.





Genus *Abies*. D. DON.

Abies excelsa. DECAN.

COMMON, OR NORWAY SPRUCE FIR.

Abies excelsa

DECAN. Flor. Fr. 3.

Nov. du Hamel, vi. p. 289.

LOUDON'S Arb. Brit. ch. cxiii. p. 2293.

Pinus abies

LINN. sp. pl. 1421. Id. Flor. Suec. p. 875.

HUNT, Evel. Sylv. p. 266.

AIT. Hort. Kew. iii. p. 371.

As a species, the Common Spruce is distinguished by having the leaves scattered upon the branches, quadrangular ; cones terminal, cylindrical, and pendant ; scales naked and flat, their summits truncate ; cones from five to seven inches in length, and from one and a half to two inches broad. Seeds winged, small. Cotyledons from seven to nine.

This stately and elegant fir, for such it must be generally acknowledged, when seen in full and vigorous health, and in a soil and situation congenial to its habit, is amongst the loftiest of the European coniferæ, yielding only, in this respect, to the *A. (pineæ) pectinata*, Silver Fir, which, to a superior height, adds also a greater bulk and vastness of trunk. In its native districts, and in favourable situations, it attains a height varying from one hundred and twenty to one hundred and sixty feet, and even instances have been met with, in which it has reached the enormous altitude of one hundred and eighty feet. It grows in a spire-like pyramidal form, the trunk being perfectly straight and continuous from the base to the very summit, furnished on all sides with numerous spreading branches, disposed in regular whorls, which spring each year successively from the base of the terminal bud or leading shoot. These branches, where the tree has had sufficient air and room, are retained during life, except it may be a few of the lowermost, and those smaller shoots or abortive branches which occasionally appear between the regular whorls. In young trees the branches grow in a horizontal, or a slightly upward direction, but as they increase in size and age they become partially pendant, the extremities, however, always continuing to turn upwards, a disposition or form which gives a graceful and feathery appearance to the general contour of the tree. This pendant or droop-

ing character depends, however, greatly on the habit of the individual, as it is carried to a much greater extent in some trees than in others, although they may be similarly situated, both as to soil and situation. The trunk is covered with a thin bark, of a reddish colour and scaly surface, with occasional warts or small excrescences distributed over its surface; and the roots, which spread on all sides of the tree, run horizontally near the surface of the ground, and are so superficial, as to be partly exposed to view for some distance from the bottom of the trunk.

The leaves are scarcely an inch long, of a deep grass-green, straight, stiff, and sharp-pointed, and disposed around the shoots, though more crowded laterally, than on the upper and under sides of the branches. The male flowers, or catkins, about an inch long, are cylindrical, on long peduncles, curved, of a yellowish colour with red tips, and discharging, when expanded, a profusion of yellow pollen. The cones are produced at the ends of the branches, appearing, at first, as small-pointed purplish red catkins; after impregnation they gradually assume the cone-like form and become pendant, changing first into a green, and, as they become matured, into a reddish brown, acquiring a length of from five to seven inches, and a breadth of about two inches. The seeds, which are small and furnished with large membranous wings, are not shed or voided from the cones till the spring of the second year. The young plant appears with from seven to nine cotyledons, but makes little progress till after the third year, when it begins to put out lateral branches. Its progress from this time, till it reaches its fifth or sixth year, is at the annual rate of about six inches, after which age, if planted in a favourable soil, its average annual growth

is very rapid, the leading shoot being frequently from two to three feet in length, and this increase it continues to support with undiminished vigour for forty or fifty years, many trees within that period attaining a height of from sixty to eighty feet. Its growth after this period is slower, and the full extent or duration of the tree is considered to range between one hundred and one hundred and fifty years, though many, no doubt, attain a greater age before decay and death ensue. In full-grown trees the trunk sometimes acquires a diameter of five or six feet; but it may be stated generally, that it is a tree of more slender growth, in proportion to its height, than the Silver Fir.

Though a native of northern countries and found in similar parallels of latitude, the Spruce Fir is not considered indigenous to Britain, as no remains of ancient forests of this species are recorded as having existed in any of the mountainous districts of this island, nor have its remains been recognized amongst the other trees deposited in the peat mosses, beneath whose surfaces the Common Pine is so frequently and profusely met with. Its introduction, however, must have taken place at an early period, as it is mentioned by some of our earliest writers upon arboriculture. Turner, who published his work, entitled "Names of Herbes," in 1548, includes it in his list; Gerard, also, and Parkinson, figure and speak of it in their works.

Upon continental Europe it occupies a surface, in some of the more northern countries, scarcely inferior to that covered by the forests of the Common Pine. Thus in Norway, Sweden, Denmark, and Lapland it is the prevailing species upon all the moister description of soil, extending as high as 69° and 70° north latitude. It grows in the south of Norway at an elevation of three thousand feet above the level of the sea, and on the Lapland mountains as high

as one thousand feet, showing it to be a tree of a hardier constitution than the *Pinus sylvestris*, and capable of growing in a more elevated zone. It is also common in the north of Germany, on the Alps of Switzerland, the Tyrol, &c., and extends to Siberia and the north of Russia, even within the arctic circle, and is also indigenous on the mountains of the north of Asia. In all these different localities it affects a moister and softer description of soil than the *Pinus sylvestris*, growing most luxuriantly in what may be called springy ground, such as is frequently met with on the declivities of hilly regions or in the deep valleys and rocky glens which intersect and abound in districts of this description. In England, though its introduction may be traced to a distant period, few attempts to cultivate it upon an extensive scale, or in great masses like the Scotch Pine, appear to have been made, its use having mostly been restricted to that of an ornamental, or expected ornamental, appendage to parks and pleasure-ground scenery, as an evergreen. This effect, however, it is but ill calculated to produce throughout the greater portion of the champaign and southern parts of England, where neither the soil nor climate suits its nature, and where, to those who have seen its luxuriant growth and rich green colour, when growing in localities suited to its habit, so far from being ornamental, it invariably presents a sickly aspect and unsightly appearance. It is, therefore, a matter of surprise that it should still continue to be a principal ingredient in all the pleasure-grounds, whether large or small, in the vicinity of London, as well as in Kent, Sussex, and other districts, to the exclusion of other evergreens much more appropriate to the situation, and where, from the nature of the soil and climate it can never attain a healthy or imposing developement, a clayey

tenacious soil being no less unsuitable, than a chalky stratum, to its free and vigorous growth. Advancing northwards, and in soils suitable to its nature, the Spruce increases in the vigour and beauty of its growth. In Yorkshire, at Studley, Loudon mentions a Spruce which, at the time his valuable work was published, measured one hundred and thirty-two feet in height, and was supposed to be the largest and loftiest in England; the diameter of its trunk near the ground was then between six and seven feet, and it was regularly clothed with branches from the base to the summit. At this time it is supposed to be about one hundred years old, as it is said to have been planted by Eugene Aram towards the middle of the last century. Further to the north, and in Scotland, it delights in the moister soils of upland districts, more particularly in those deep ravines and narrow valleys which diversify the romantic scenery of the highlands. By the late Duke of Athol, distinguished as the greatest planter of his day, the Spruce was extensively cultivated and liberally introduced, wherever the soil and situation seemed favourable to its growth, as he considered it not only in the light of a nurse-plant, or secondary, in mixed plantations, but as a tree of national importance for the qualities of its timber, as it was satisfactorily proved that several of the older trees cut down upon his estate at Blair, and used as spars and topmasts, were equal in quality to those imported from Norway and the ports of the Baltic.

When grown for timber, and intended for poles, masts, spars, &c., it ought to be planted in thick masses, or in company with other trees, and allowed to be drawn up, or kept so close as to cause the gradual death of the lower tiers of branches before they become too large, or acquire

that gibbosity, at their junction with the trunk, which we see in large Spruce trees which have long retained them. These dead branches remain undecayed for a great many years, their wood being hard, matured, and of a red colour, and they may be knocked out, or cut off close by the stem, without any apprehension of the small portion remaining within the bark communicating decay to the trunk. In two or three years a deposit of new wood covers the parts previously occupied by the branch, and a clean bole, without knots or gibbosities, is thus obtained by the time the tree acquires a large scantling and becomes fit for felling.

As a nurse-plant, or intermediate occupant in mixed plantations, where the surface soil is light and suitable to its habit, the Spruce is one of the most eligible and profitable trees that can be grown, as it not only advances at a rapid rate, and produces wood of a more durable consistence than the Scotch Fir in its immatured state, but it is much better adapted, from its more regular and very pointed pyramidal form and the stiffness of its growth, to accompany, and be mixed with, deciduous trees, its arrowy or spire-like top not interfering, to any injurious extent, with the expansion of their more spreading heads, and allowing the full enjoyment of light and air, at the same time that the dense mass of foliage it carries beneath, supported by stiff unyielding branches, resists the influence, and softens the effects, of high and boisterous winds, thus preventing wind-waving, and other injurious effects to the trees in its immediate neighbourhood. Where shelter from prevailing winds, or the exclusion from view of particular objects is required, no tree is better adapted for these purposes than the Spruce, provided the soil is such as to suit its habit. In such cases, the principal object to be attended

to, is to see that the trees, as they advance in size, have sufficient room to allow of the full developement of the whole of their lower branches, as upon the retention of these its protecting qualities and use as a skreen entirely depend. It has, also, been treated successfully as a hedge-plant, in which form it affords good shelter in nursery or garden grounds. A fence of this kind is described by Mr. M'Nab, in the "Gardener's Magazine," as growing at the Whim, about fourteen miles from Edinburgh, every part of which, he remarks, is beautiful and green. When first made, the plants, about ten feet high, were put in at three feet apart, and cut down or headed to five feet; it was then cut or trimmed with the shears in the January of the following year, an operation since annually repeated in the same month, in order to keep it close and of a proper form. A figure of a portion of this hedge is given in the "Arboretum Britannicum," in which work Loudon also remarks, that hedges of Spruce are not unfrequent in Carpathia, Baden, and Bavaria, and that, in the neighbourhood of Moscow, they may be seen, in some gentlemen's grounds, trained to a height of thirty or forty feet.

In point of symmetry and regularity of form, the Spruce Fir, individually, is one of the finest of the *Abietinæ*, and, when in full and vigorous growth, must be acknowledged as forming in itself a beautiful object. Its pretensions, however, to rank as an ornamental or a picturesque tree in landscape scenery, depend upon concomitant circumstances, such as the propriety of the situation in which it is placed, and the effect it is calculated to produce, in contrast, or when grouped with other trees. Gilpin, though he could admire the Spruce individually for its feathery and floating foliage, allowed it little or no merit as an

ornamental or picturesque tree in landscape. This opinion, however, seems applicable to it only when planted in situations, or in districts foreign and unsuited to its natural habit, and where it can never be expected to attain either the dimensions or the form it bears in its native habitats, whether upon the Alps of Switzerland, or in the fir-clad regions of the north of Europe. Accordingly, we find Sir T. D. Lauder, in his valuable edition of Gilpin, expressing himself in the following terms, when speaking of the effect of the Spruce in its native regions: "The Spruce Fir is the great tree of the Alps, and, so far as our opinion of its effect in landscape may go, we can only say, that with us it is so mentally associated with the grandeur of Swiss scenery, that the sight of it never fails to touch cords in our bosom, which awaken the most pleasing recollections. What can be more sublime than to behold, opposed to the intensely blue ether, the glazed summits of Mont Blanc, or the Jungfrau, rising over the interminable forests of Spruce Firs which clothe the bases of the mountains, while some such gigantic specimens as those we have been noticing rise in groups among the rocks before us, many of them shivered, broken, and maimed by tempests, their dark forms opposed to all the brilliant prismatic hues of some immense, gorgeous glacier, which nourishes in its vast bosom a mighty river, that is doomed to fertilize and to enrich whole kingdoms!"

The timber of the Spruce is of excellent quality, being light, elastic, and durable, when grown in a soil, and in a climate, or at an elevation, suited to its nature. In colour it varies from a yellowish to a reddish white, and is less resinous than the wood of the *Pinus sylvestris*. The great height it frequently attains in proportion to its bulk, when growing in thick and crowded masses, renders it an

excellent material for the spars and masts of smaller vessels, as well as for scaffolding poles, ladders, &c., and for these purposes it is largely imported from Norway, in the form of entire trunks from thirty to sixty feet in length, but frequently with a diameter of not more than from six to eight inches at the root-end. Trees of larger scantling are sawn up into planks and deals, which are used for flooring and other interior joiner work. It is also much used by carvers and gilders, being of a fine and equal grain, and taking the tool in every direction, and, as it is a wood that glues well, it forms the lining of furniture, as well as that of musical instruments, &c.

Pontey, in his "Profitable Planter," speaks of the wood of the Spruce as being of good quality and durable, even at a young and immature age; from our own experience we find this to be the case, and that it is, even without any preparation, more durable than the Scotch Pine, at a similar age. Upon continental Europe, besides its valuable timber, various other products are obtained from it; among these, the resinous matter it exudes when wounded, and which, after undergoing a preparation by boiling in water, is known by the name of Burgundy pitch, is one of the chief, and is largely manufactured in the Vosges. Its bark is also used for tanning, and in Sweden and Norway the inner bark is made into light baskets, and the long fibrous roots are converted into a strong and durable kind of cordage, after being boiled in a ley of alkali and salt. In Norway, Laing, in his "Journal," informs us, that the deal floors of the houses are strewed over with the green tops of the Spruce or Juniper, at least once a week; these give out, when trodden on, a refreshing odour, which tends to overcome the close and unpleasant smell in rooms heated by stoves and

imperfectly ventilated. In this country, the twigs of the Spruce are often used to protect the blossom of wall-fruit trees, being inserted among the shoots of the latter previously to the expansion of the flowers, and allowed to remain till the spicula fall off and the fruit is well set; we have also found the branches excellent protectors, during winter, of half hardy shrubs and plants, either when growing against a wall or in the open borders, their close and thick foliage preventing the access and injurious effects of severe and long-continued frosts.

The propagation and culture of the Spruce in the nursery is similar to that of the *Pinus sylvestris*, the seeds procured from the long cylindrical cones being sown in fine, light, pulverized earth, so thick as to rise within a quarter of an inch of each other; here they must remain for two years, their growth being very slow; but on the third, when they begin to put out their first lateral branches, they may be taken from the seed-bed and run into nursery rows, from whence, after having stood for two or three years, they may be removed to where they are finally to remain, plants of this age succeeding better than those which have stood long, or attained a height of four or five feet in the nursery. As the roots of the young Spruce are numerous and much more fibrous than those of the Scotch Pine, they ought, unless of very small size, to be inserted by pitting, and not by the T or slit method, which might cramp and injure the delicate rootlets; and it should also be kept in mind, that success in planting depends much upon the weather, which is most propitious for this operation when mild and moist, and that the roots of the trees to be planted should remain as short a time as possible exposed to the air.

If grown for profit or as a timber tree, the Spruce, as

we have already observed, should be planted in thick masses by itself, or mixed with other trees; but where ornament is the object, and the full developement of its form is desired, it must, from the earliest age, be kept free from the contact of any other tree, and allowed scope for the full growth and elongation of its lateral branches, which, under such circumstances, become persistent during life, and upon whose retention the beauty and perfect cone-like form of the tree depends.

It seems subject to few diseases, but, from the resistance its thick close foliage and unyielding spray offer to the wind, is liable, upon light soils super-imposed upon a harder substratum, to be blown up by the roots, or even, in sudden gusts or hurricane-like storms, to have the trunk snapt right asunder at a less or greater distance from the root. The only insect which affects its health and growth in Britain is a species of aphis, whose attacks, however, seem almost confined to young trees under fifteen or twenty years old, but which, though injurious, we have never observed to prove fatal to the tree. The effect produced is easily observable in the pseudo cone-like excrescences which are so frequently seen upon the side shoots of young Spruce Firs, and which seem to originate in the following manner: in the autumn the parent aphis deposits her eggs at the base of the embryo leaves within the buds destined to produce the shoots of the following year; when these begin to burst and expand in spring, the leaves at whose bases the eggs have been deposited, instead of increasing in length, enlarge at the base and form a cell or cyst, whose mouth,



at first, is closed and protected by a red velvety-looking substance. If opened in this state, a nest of small greenish aphides is distinctly visible, and at a certain period, or when they have acquired maturity, which is towards the end of summer, the mouth of the cell opens, and the insects fly off to inflict a similar injury upon the nascent buds of the year. In some instances, the leaves of only a portion of the circumference of the shoot are affected, in which case, though a slight distortion may take place, the branch is not prevented from elongating; but in others, where the whole of the leaves around the shoot are converted into nidi, elongation is prevented and distortion to a great extent takes place. It is worthy of remark, that the leading shoot is rarely, if ever, affected, the attack being confined to the buds of the lateral branches.

At Twizell, about forty years planted, it is sixty feet high, the circumference of the trunk, at three feet from the ground, six feet six inches; and thirty years planted is about fifty feet high, circumference, at one foot above the ground, five feet two inches.

Before closing the account of the *Abies excelsa*, we may remark, that two species of the genus *Abies* have been introduced from North America, and cultivated as ornamental trees for the last fifty or sixty years; these are the *Abies alba* and *Abies nigra*, the White and the Black Spruces, so called from the colour of their respective foliage. Both of these are of inferior growth to the Common Spruce, with a close thick foliage and narrow cone-like forms. From the shoots of the *Abies nigra* is obtained the essence or extract of Spruce used in England in the making of Spruce beer, for which purpose the shoots themselves are used in America. Like *Abies excelsa*, the extremities of the lower branches of *Abies nigra*, when they touch the

ground, readily take root, and Loudon instances a tree at Sion, which is surrounded by a double circle of young trees, which have sprung from the ends of the lower side branches of the original plant, and another is described by Mr. Gorrie, in the "Magazine of Natural History," as growing in the woods of Braco Castle, Perthshire, surrounded by a similar offspring.

In America, the wood of the *Abies nigra* is esteemed for its strength, elasticity, and lightness, and is much used for spars, small masts, &c.

The Hemlock Spruce, *Abies Canadensis*, is a third North American species, first introduced about a century ago, but whose cultivation in Britain has been limited to mere ornamental purposes. In elegance of growth it surpasses either of the two above-named, the branches being symmetrically disposed and drooping gracefully at their extremities, the foliage light, and at the same time tufted and effective. Fine specimens of the Hemlock Spruce are by no means common in any part of Britain, and it seems a species very fastidious, both as to soil and situation. At Woburn there are some fine examples, also at Strathfieldsay, Claremont, &c.

Amongst the species recently introduced the *Abies Douglasii* promises to be worthy of an extended cultivation, not only as an ornamental, but as a timber tree, since it exhibits a rapidity of growth and hardness of constitution equal to the Common Spruce, and may be expected, in this climate, to attain dimensions sufficient for every useful purpose, though perhaps far inferior to those enormous specimens seen by Douglas in the regions of which it is a native. It was discovered, in 1797, in Nootka Sound, by Menzies, who accompanied Captain Vancouver on his voyage round the world, and afterwards

by Douglas, in 1825, who found it growing in immense forests in north-west America, between 43° and 52° north latitude. Within these limits trees of ten feet in diameter, and from one hundred to one hundred and eighty feet



high, were observed, and he mentions the stump of one upon the river Columbia, which, exclusive of the bark, at three feet from the ground, was of the enormous girth of forty feet. The same traveller speaks of the wood as being firm, heavy, with few knots, of a yellow colour, and not in the least liable to warp. Our figure is from a fine thriving

young tree at Jardine Hall, Dumfriesshire, the seat of Sir William Jardine, Bart., which was planted as a seedling about fourteen years ago. It is now twenty-five feet high, the diameter of the circle covered by the lower branches fourteen feet. The girth of the stem at one foot from the ground is two feet nine inches. In one year the growth of the leading shoot measured as much as four feet, and the general average of its yearly shoot has been about two feet six inches. It is planted on a light and somewhat gravelly loam, which also seems to suit the *Pinus cembra* and *excelsa* from the Himalayas. At Hedgely, Northumberland, the seat of Ralph Carr, Esq., is another fine specimen, about the same age as that at Jardine Hall. This plant measured, in July last, twenty-eight feet in height, the circumference of the bole, at six inches above the ground, three feet, at eighteen inches, two feet one inch and a half, and the diameter of the circle covered by the branches twenty feet. This tree is planted in a moist clayey loam, which seems of too rich a quality for the nature of the tree, as the shoots of the two last years are inclined to monstrosity, being somewhat crooked, and fan-shaped or flattened. During the last year, it produced, for the first time, a large crop of its handsome cones, but, out of two or three dozen which we received, not a single perfect seed was extracted. The bark of this tree, as well as of that at Jardine Hall, is roughened by numerous cysts, filled with a clear and very fragrant turpentine. At Whitfield, Northumberland, the seat of Wil-



liam Orde, Esq., M.P., there is another specimen of *Abies Douglasii*, of dimensions, we believe, even superior to the two above-mentioned. It may be propagated by cuttings, which, if made of terminal or leading shoots, may be expected to form good trees, but, as specimens are now beginning to bear cones, seedlings are likely to become plentiful in a few years.

The *Abies Cephalonica* promises, also, to be a great acquisition to the list of our ornamental, and probably of our useful coniferæ. It was first, very recently, introduced by General Charles James Napier, from Cephalonia, of which Island it is a native, and to which, indeed, the species seems to be confined, its habitat being a ridge of mountains, the highest point of which was anciently called Enos, but now known by the name of the Black Mountain, where it occupies a zone between four and five thousand feet above the level of the sea. It differs from all the other European Firs in the form of its leaves, which approach in shape those of the *Araucarias*, to which genus, indeed, it bears a strong resemblance, and is probably the connecting link between it and the firs.

Its timber is stated to be of excellent quality, being very hard and durable, and an instance is cited by Loudon, on General Napier's authority, where the wood of *Abies Cephalonica* was found perfectly sound and as hard as oak in some old houses in the town of Agrostoli, which had been built from one hundred and fifty to three hundred years. It is still a rare tree in Britain, and plants are dear, but we may hope that exertions will be used by our nurserymen to obtain a supply of seed whenever opportunity offers.



Genus *Picea*. DON.

LINN. *Syst. Monœcia*
Monadelphica.

Picea pectinata. DON.

THE SILVER FIR.

Picea pectinata,

DON in LAMB. Pin. b. iii.

Pinus picea,

LOUDON'S Arb. Brit. ch. cxiii. p. 2329.

LINN. sp. pl. 1420.

Abies pectinata,

AIT. Hort. Kew. iii. p. 370.

Nov. du Hamel. v. p. 294.

THE trees belonging to this section or genus of the *Abietinæ*, of which the Silver Fir is considered the type, are distinguished from the Spruce Firs, or genus *Abies*, by their leaves being distributed more decidedly in two rows upon the branches, by their cones being upright and having the scales deciduous, and by the irregular form of their seeds. In other respects, as to growth and form, they greatly resemble each other, their heads being as regularly pyramidal, or cone-shaped, during their life as those of the Spruces. The general aspect of the Silver Fir is, however, stiffer and more formal than that of the Spruce, in consequence of the branches, which grow in regular candelabrum-like whorls, being at right angles, and standing out more horizontally in reference to the trunk, a disposition which also extends to all the smaller branches and spray.

In dimensions and nobleness of appearance the Silver Fir is one of the most striking of the *Abietinæ*, rising frequently to the height of one hundred and sixty or even one hundred and eighty feet, with a stem perfectly erect, and generally clothed from the base to the summit with regular tiers of horizontal branches, and when at maturity frequently measuring as much as six or eight feet in diameter. For many years the bark is smooth and of a green grey colour, but as the tree gains age it becomes rough, with chaps or small fissures; and, when very old and verging to decay, often throws off the exterior part in large flakes, leaving the newly-exposed cuticle of a deep rich brown.

A peculiar effect is produced by the colour of the leaves, which are of a deep green above, while underneath they are variegated with two silvery white lines, which run lengthwise on each side of the midrib; they are from

half an inch to an inch long, slightly turned up at the points, which increases the effect of the silvery lines, and are disposed in two rows along the branchlets, a disposition, however, that is more distinctly marked in young than in old trees.

The cones are cylindrical and large, being from six to eight inches long, and stand erect upon the branches ; when young they are green, but, as they advance towards maturity, acquire a rich purplish colour, and when quite ripe are of a deep brown ; they remain upwards of a year upon the tree, as they first appear in May, when they blossom, and do not ripen the seed till the October of the following year. The scales are large, with a long dorsal bractea, and fall from the axil or spindle of the cone in the spring of the second year. The seeds are irregular and angular in shape, with a large membranaceous wing, wider above than below.

The roots, though horizontally disposed and spreading to a great distance around the tree, are not so superficial as those of the Spruce, but run at a greater depth, and are seldom exposed to view like the main roots of that species. The seedling plant rises with five or six cotyledons, and its growth for the first six or eight years is very slow. When three years old, it is not more than as many inches in height, and at this age it makes its first lateral bud or side branch, an additional one is added for the next two or three years, or till the usual whorl of four or five is perfected. At five years old plants are seldom more than a foot high, but after this the leading shoot begins to lengthen, which it continues to do annually, till the tree is about twenty years old, at which time it often makes a shoot of three feet in length ; after this period the growth is not quite so rapid, and diminishes

gradually till the tree has attained its utmost limit of growth, which may be stated to be near two hundred years, though some individuals live much longer.

The introduction of the Silver Fir into England is supposed to have taken place about the commencement of the seventeenth century, as it is noticed both by Plot and Ray; Evelyn also speaks of two Silver Firs growing in Harefield Park, Middlesex, that were planted there in 1603, when seedlings of two years old; and he also recommends it for its beauty, and adaptation for the embellishment of avenues and public walks. Since that period, it has generally been introduced, to a greater or less extent, in ornamental plantations, and in some few instances has been more largely planted with a view to profit, but not upon that extensive scale it appears to merit, taking the excellent quality of its timber and the large scantling it attains into account, in both of which respects it is equal, if not superior to the Spruce, or even the Scotch Pine; it has also the advantage of thriving upon soils where the Spruce would never attain a timber-like size.

It is indigenous to all the mountainous districts of central Europe, being found in those of France, Spain, Italy, Switzerland, Germany, and Greece, inhabiting a zone immediately below that of the *Pinus sylvestris*. In these its native habitats it frequently attains enormous dimensions, trees of from sixteen to twenty feet in circumference at five or six feet from the ground, and from one hundred to one hundred and sixty feet high, being by no means uncommon. It is also a native of the west and north of Asia, but in Siberia and the Caucasus seems to be represented by the *Picea pichta*, which by many is not considered a distinct species, but only a variety of *Picea pectinata*.

The timber of the Silver Fir in this country, at least such as has been allowed to attain age or maturity, is found to be of excellent quality, and adapted for almost all purposes to which the wood of the Pine is applicable; it possesses both elasticity and strength; its grain being straight and even, it is not subject to warp or twist, even when sawn out of the green or new-cut log. Upon the continent, the forests of the Silver Fir, besides affording a large supply of naval timber for masts, yards, &c., produce much of the wood used in building, and in every description of carpentry and joinery; and, as it is found to endure a long time when driven as piles under water, it is extensively used for that purpose in Holland and other places. Other products of considerable value are also obtained from it; among these is the resinous fluid found in the small tumours beneath the outer bark, and known by the name of Strasburgh turpentine, a large quantity being collected from the forest of the Silver Fir near that town, by opening the cysts and securing the included liquid turpentine. The bark is also used in some parts of Switzerland for tanning, and the charcoal it produces, though inferior to that of the beech in evolving heat, is preferred for the forging of iron, as it renders that metal more pliant and more easily worked, in consequence of its producing its heat more slowly.

As an ornamental tree, it has the advantage over the Spruce Fir of growing to a greater size and attaining a more lofty height, and the more important one of growing upon a variety of soils where the other would never reach a timber-like size, or wear a healthy aspect; thus the Silver Fir thrives and advances to large dimensions upon tenacious or stiff clays, as well as upon loams of a richer description. It is, however, in our opinion, inferior to the

Spruce in the general outline of its form, the feathery effect of the waving contour of the branches and spray of that tree being more pleasing to the eye than the stiff and horizontally-disposed branches of the Silver Fir. Gilpin remarks, "the Silver Fir has very little to boast in point of picturesque beauty. It has all the regularity of the Spruce, but without its floating foliage. There is a sort of harsh, stiff, unbending formality in the stem, the branches, and the whole economy of the tree, which makes it disagreeable. We rarely see it, even in its happiest state, assume a picturesque shape." In this opinion Sir T. D. Lauder does not entirely coincide, for in his remarks upon Gilpin's text, he says, "As to the picturesque effect of this tree, we have seen many of them throw out branches from near the very root, that twined and swept away from them in so bold a manner, as to give them, in a very great degree, that character which is most capable of engaging the interest of the artist."

The variety of soils upon which the Silver Fir will thrive, and produce large and profitable timber, the hardiness of its constitution, which is such as to allow of its being planted in any part of England or Scotland, except the highest mountain elevations, (as it naturally grows in a zone next in altitude to that of the *Pinus sylvestris*,) are circumstances strongly in favour of its cultivation with a view to profit upon a more extended scale than it has hitherto received. To this, however, there exists at present one serious objection, which, if not remedied either by natural or artificial means, is likely to deter the planter from appropriating any considerable proportion of woodland to its growth: we allude to the liability of this species to the attack of an insect belonging to the family of the *Coccidæ*, and genus *Eriosoma*, which not only injures the

health of the individual it infests, by disfiguring and destroying the leading shoots, but very frequently causes the actual death of the tree by the absorption of its juices, which constitute the food of these small but destructive beings.

This pest, so fatal to the Silver Fir, appears to have been greatly on the increase, and to have spread widely and generally throughout every district of the kingdom, wherever that tree has been introduced, within the last twenty or thirty years, for we do not find that its ravages had been noticed, or at least that trees of this species had suffered to any injurious extent, previously to this period. This *Eriosoma*, unlike many of the *Aphides* and *Coccidæ* found upon various species of the *Abietinæ*, never attacks the leaves of the tree, but is always confined to the main stem, and the under sides of the branches; upon these parts it appears when first seen, or at least when first distinctly visible to the naked eye, in minute patches of a pure white, which, when closely inspected, are seen externally to be of a flocculent or cottony substance. On removing this covering, which is an exudation from the body of the insect, the creature itself and numerous bunches of eggs become visible, as represented in our magnified figures.

These creatures, by the extraordinary mode of propagation common to the members of the family to which they belong, increase with a rapidity it is scarcely possible to imagine: and in a very short time, where at first a few scattered individuals only were to be seen, the entire surface of the bole



of the tree, from the root to the summit, becomes as it were encased by a mass of living matter, each individual of the countless multitude being engaged in extracting the circulating fluids of the tree by means of a sharp hair-like proboscis which penetrates the exterior bark. In this state the tree appears as if covered or dusted entirely over with a white mealy substance, which, as already observed, exudes from the skin of the insect, and probably answers as a defence against rain and cold, or a protection against its enemies. After an attack such as we have described, and which generally lasts for two or three years, the tree is either left in a dying state, or with a considerable portion of the top destroyed, an unhealthy-looking yellow foliage, and a thickened diseased bark, and these effects, we may observe, are not confined to plants of a small size or tender age, but are equally severe upon full-grown trees of stately dimensions.

Hitherto no effectual remedy has been discovered, either to prevent the attack or put a stop to the increase and destructive effects of this pernicious insect; for although there are certain liquids, such as lime-water, infusion of tobacco, &c., which prove fatal when they reach the naked body of the *Eriosoma*, their application is rendered comparatively unavailing by the nature of the cottony substance that envelopes them, which effectually repels the admission of the liquid to the skin of the insect; the cost and labour of such applications upon an extensive scale where numbers of trees are affected, as well as the impossibility of reaching every part of an infected tree, also render such remedies almost nugatory, or necessarily confined to a very few cases.

At Twizell, where the Silver Fir has been liberally introduced, a few trees, which, from their situation it was

desirable should be preserved at any cost, have been saved whenever attacked, by the same process as that resorted to by Sir T. D. Lauder, viz., scrubbing the boles and branches of the trees with a brush, or what is as effectual, with wisps of coarse grass or hay; the labour and expense attending such a remedy it is evident must necessarily restrict its application to very narrow limits, and could scarcely be resorted to where the tree is planted in mass or with a view to profit. Trees in the highest health and growing luxuriantly, seem to be attacked as freely, or perhaps even more so, than those advancing at a slower rate, and we are inclined to think that those growing in a rich soil are sooner infected, and to a greater extent, than such as are planted upon one of inferior quality. In the immediate vicinity of the house at Twizell, where the ground is good, the insect has proved very destructive, and few trees have escaped an attack; but in some outer plantations, where the soil is inferior, having the surface mould of a blackish moory quality, with a clayey substratum, the Silver Firs, though strong, vigorous, and in good health, and now twenty feet high, have hitherto remained untouched. In many parts of Scotland some of the finest specimens have been killed by it. Sir T. D. Lauder remarks that this has been the case with most of the trees at Relugas and Ballindallock, in Morayshire, and also at Cullenhouse, Banffshire. In Dumfriesshire we have seen the sad havoc it has committed, and in many parts of the north of England it is proving equally fatal to the species. This insect seems limited to the Silver Fir, as we have not recognized it upon any other of the *Abietinæ*. The young shoots of the Silver Fir are also frequently infested with an aphid, but its attacks seldom do any serious injury to the tree.

In England, the Silver Fir, under advantageous circumstances, attains a magnificent size, many trees, already recorded by Loudon and others, having reached a height of from one hundred to one hundred and thirty feet, with trunks of a diameter varying from three to upwards of six feet, and containing from two to upwards of three hundred feet of solid timber. In Scotland, also, it has reached dimensions equally great. At Roseneath Castle, Argyleshire, there are several magnificent Silver Firs. Among them one upwards of one hundred and twenty-five feet high, with a trunk whose diameter, at six feet from the ground, is nearly seven feet; another upwards of one hundred and twenty feet high, and a third remarkable for its form as well as size, a figure of which was published by Mr. Strutt. There are also many trees in other parts of Scotland of nearly equal dimensions, and among those not already recorded, we may mention fifteen trees growing on two sides of a small triangle at the Heuk Dumfriesshire, and planted between seventy and eighty years, two of which measure upwards of nine feet in girth, and the remainder from six to seven and a half feet; another fine specimen in the same county, at Rammerscales, which measures thirteen feet one inch at fifteen inches from the ground; and at Arbigland are trees of upwards of thirteen feet in girth, besides the stocks of two which were blown down in the hurricane of January 1838, one of which shows a circumference of fourteen feet nine inches, exclusive of the bark, and the other of thirteen feet six inches. In Northumberland, at Hartburn, there are two noble Firs of this species, planted about eighty-seven years ago; one of these is nearly one hundred and forty feet high, the diameter of the trunk upwards of four feet; the other is about one hundred feet high. At

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