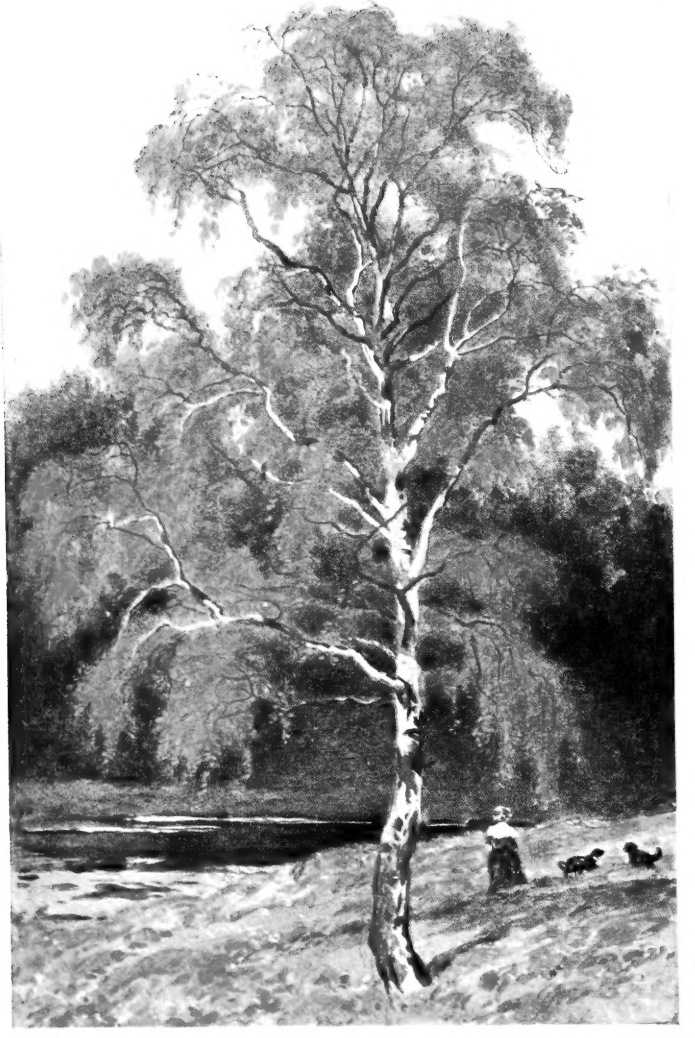
# FAMILIAR TREES



SILVER BIRCH.

# FAMILIAR TREES

BY

G. S. BOULGER, F.L.S., F.G.S., F.R.H.S.

HON. PROFESSOR OF NATURAL HISTORY IN THE ROYAL AGRICULTURAL COLLEGE
VICE-PRESIDENT OF THE SELBORNE SOCIETY, EDITOR OF "NATURE NOTES"
HON. MEMBER OF THE ROYAL ENGLISH ARBORICULTURAL SOCIETY

WITH

COLOURED PLATES BY
W. H. J. BOOT, R.B.A., AND A. FAIRFAX MUCKLEY

AND

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# PREFACE.

"EVERY tree is beautiful, every grove is pleasant and every forest is grand. The planting and care of trees is exhilarating and a pledge of faith in the future; but these æsthetic features, though elevating, are incidental. The people need wood. They have had it in abundance and have been prodigal in its use, as we are too often careless of blessings which seem to have no end. Our history, poetry, and romance are intimately associated with the woods. Our industries have developed more rapidly because we have had plenty of cheap timber. Millions of acres of bare hillsides that produce nothing profitably should be growing trees." These words of an American statesman are true of other lands as well as of the United States; and it is one of the objects of the present work to draw attention to the individual beauty and interest of each familiar species. In doing this the efforts of the author have been most ably reinforced by the work of the colour-artists, Messrs. W. H. J. Boot,

R.B.A., and A. Fairfax Muckley, by the photo-micrographs prepared by Messrs. James A. Weale and F. W. Saxby, and by the photographs of specimen trees taken by the cameras of Messrs. F. Mason Good, H. Irving, and E. J. Wallis.

We should hear as often of the planting of young trees as we do of the felling of old ones. Too frequently, as we gaze upon some fallen monarch of the glen, do we feel constrained to address it apologetically in the words of a little-known poet:—

"Thou canst not censure more than we,
The vandal hand that laid thee low:—
But any fool can fell a tree—
Tho' it takes a God to make one grow!"

G. S. BOULGER.

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# FAMILIAR TREES.

## THE BIRCH.

*Bet'ula al'ba* L.

If the Oak and the Beech contend for the rank of king, there is no doubt as to the right of the Birch, clad as she is in cloth of silver, adorned with emeralds, or with "patines of pure gold," to the title of Lady of the Woods, bestowed on her by Coleridge. Often has this tree roused the enthusiasm of both the artist and the writer; but, useful as it has been in other ages, and as it still is in other lands, it is now mainly for its æsthetic value as part of some of our most beautiful landscapes that we treasure it.

The very name Birch, in its identity with "bark," "barque," or "barge," suggests the time when its silver rind formed the canoes of our early British ancestors, such as have been found buried in the gravels of the banks of the Clyde. This etymology does not seem, however, to have suggested itself to Turner, since in his "Names of Herbes" (1548) he simply says: "Betula—or, as some wryte it, betulla—is called in greeke, Semida; in englishe, a birch tree, or a birke tree; in duche, ein birck baum; in french, bouleau or beula. It groweth in woodes and forestes."

The genus *Betula*, to which the Birch belongs,

includes some five-and-twenty species of shrubs and trees of medium size, confined to the northern hemisphere, and remarkable for their extension into Arctic latitudes. The Canoe or Paper Birch (*B. papyra'cea* Ait.), of North America reaches lat. 70° N., whilst another species (*B. Bhojput'tra* Wall.) grows at an altitude of 9,000 feet in the Himalayas. Our own species, *Betula alba*, ascends to 2,500 feet in the Highlands, and is widely spread over Europe, Asia, and America, extending farther north than any other European tree, but only constituting an essential element of forest scenery as far south as 45°. Together with the Alders, of which there are some fourteen species, the Birches form the Natural Order *Betulaceæ*, catkin-bearing trees with not more than five stamens to each flower, and with neither "perianth" nor "cupule" (like those of Oaks or Hazels) to enclose their small compressed fruits. The Birches differ from the Alders in the scales of the seed-bearing catkin being chaff-like, and falling together with its winged fruits, whilst those of the Alders remain as a woody cone.

The White or Silver Birch is a short-lived tree, as a rule from forty to fifty feet high, though, exceptionally, growing to eighty feet, with a trunk seldom exceeding a foot in diameter, conspicuous from its flaking, silvery-white bark. This flaking is produced by the formation of alternate layers of larger and smaller cells in the "periderm" or outer bark, of which the larger are the more readily ruptured under the influence of variations in the degree of atmospheric moisture. Every careful

observer will have noticed that this polished silver rind is interrupted at frequent intervals by transverse ridges of a darker colour extending partly round the stem. These are the "lenticels," or breathing-pores of the bark, replacing the "stomata" of the young epidermis, and corresponding to the holes filled with powdery dried cells that extend through the cork of the Oak at right angles to its surface. As the stem or branch increases in diameter, these lenticels become stretched from mere spots into long lines.

It is when its slightly crooked stem stands alone on the slope of some river glen, brown with fallen leaves of autumn, and lit up by the varying hue of the dead fronds of bracken, with its round slender branches, of polished purple bronze, weeping in festoons eight or ten feet long, as we see it in MacWhirter's pictures, that the Birch is seen in all its beauty of outline. It is, however, when these bare boughs, or those of the smaller trees that dot the heathery wastes of Epping Forest or Bagshot Heath, begin to clothe themselves in April with their transparent foliage of fluttering brilliant leaflets, that the tree is, perhaps, at its perfection of grace and loveliness. When grouped together in numbers, a grove of young Birches in winter presents an almost smoke-like hazy effect of copper boughs and purple twigs springing round the slender silver stems; but in spring they lose all signs of sombre melancholy, and seem to laugh as their leaves dance in the sunbeams which fall between them on to the Dog-violets that strew the woodside.

Linnæus's species, *Betula alba*, includes several fairly distinct forms. Of these, *B. verruco'sa* Ehrh. is distinguished by its longer pendulous branches having white resinous tubercles on their bark, as also occasionally on the leaves, by its conical buds, by the reflexed sickle-shaped side lobes of the scales of the fruiting catkins, and by the leaf. This is rhomboidally triangular, its long stalk passing abruptly into the blade, its veins projecting from the upper surface of the blade, and its point abruptly "acuminate," or tapering. *B. glutino'sa* Fries, on the other hand, is often a mere shrub; its buds are egg-shaped, the side lobes of the scales of its fruiting catkins are erect; and its leaf is rounded, or even heart-shaped, at the base, and has its veins projecting from the under surface, and its point acute, but not drawn out. The northern form of this last, known as *B. pubes'cens* Ehrh., differs mainly in the absence of tubercles and in the downiness of the leaves, peduncles, and twigs. In all the forms the branches succeed one another in what is termed a "cymose" manner, each axis being comparatively short; and the somewhat thick leaves on slender stalks, with broad "stipules" at the base and doubly toothed margins, appear before the maturity of the catkins. This takes place in April and May, but even in February the pollen-bearing catkins may be seen forming on the twigs.

These "male" catkins are borne at the ends of the shoots of the previous year, and are not protected by any winter bud-scales, whilst the "female" or fruiting catkins terminate lateral dwarf

LEAVES AND MALE AND FEMALE CATKINS OF SILVER BIRCH.

shoots, which bear a few leaves, and are enclosed by bud-scales. The pollen-bearing catkins are often nearly two inches long, each of their scales, or "bracts," having two lateral appendages, or "bracteoles," which protect three flowers, each with two forked stamens. The female catkins are shorter, and are at first erect. In them the two bracteoles cohere with the bract to form a three-lobed scale, which, as we have seen, falls off with the three fruits that are produced from its base, and the form of the side lobes of which distinguishes the sub-species. The little fruits are furnished with a broad membranous wing, which, together with their flattened form, aids in their dispersal by the wind. Their general outline is thus nearly circular, surmounted by two small styles, an indication of the original two chambers of the ovary, each with its one pendulous ovule, reduced in the fruit stage, by an abortion frequent among trees, to one chamber and one seed.

The wood of the Birch is diffuse-porous, with minute vessels in groups of as many as eight, with pith-rays so fine as to be indistinguishable by the naked eye, and with pith-flecks towards the centre of the stem. Whilst the sapwood is a light yellowish-brown, the heart is slightly tinged with red. Though moderately hard, it is exceptionally porous, and of so even a grain as to be readily turned.

In early times not only did the Birch provide primitive man with his canoe, but it probably roofed his rude shanty, and furnished fibre for his cable, fishing-lines, or other cordage, in districts beyond the northern limit of the Linden. Probably, too, it

was at no late period in the history of civilisation that man took to tapping the white trunks in the spring for the sake of the copious flow of sugary sap, and to fermenting this sap into a wine or spirit, as is still done both in Sweden and in Leicestershire. Besides a beer, prepared formerly from its young shoots, and the wine just mentioned, the Birch yields a tea prepared from the leaves, chiefly by the Finlanders. The bark, moreover, contains enough starch to furnish, when bruised, a bread-stuff to the Samoiedes and Kamtschadales. It is also still used in the north for roofing, being very durable and impermeable, and in Russia for the manufacture of jars, boxes, and shoes, and for tanning. On distillation, it yields a fragrant oil, which gives its pleasant odour to Russian leather. The wood, though not durable, is valued in Russia, where the Birch forms the chief tree in vast forest areas, not only as firewood and as a source of charcoal, but also, on account of its toughness and tenacity, for carriage-building, furniture, and turnery. A very extensive domestic industry in that country is the manufacture of wooden spoons, thirty millions, mostly of Birch-wood, being made annually. The flexible branches are largely utilised in the making of brooms, and it is stated that the *fasces* carried by the *lictors* before the magistrates of ancient Rome were made up of Birch-rods.

We may doubt the exact truth of the statement made by M. Alphonse Karr, in his charming "Tour autour de mon Jardin," that "in London they make champagne" from the Birch; but no

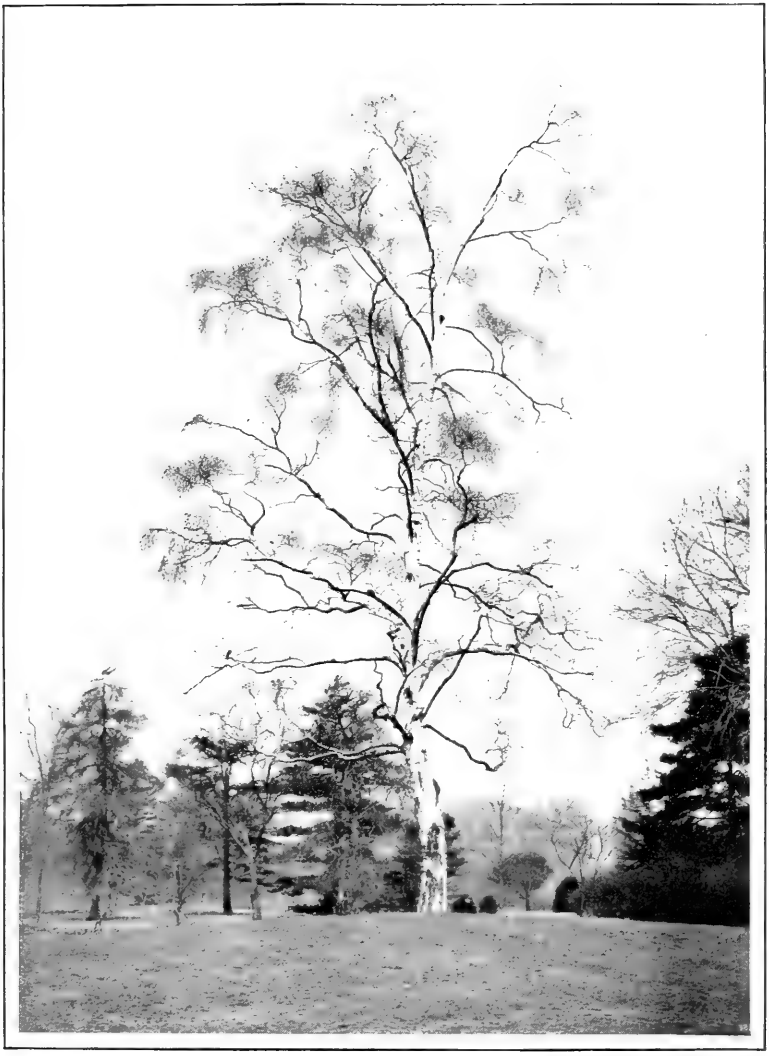


*Photo : E. J. Wallis, Kew.*

SILVER BIRCH.

TRANSVERSE SECTION OF WOOD OF SILVER BIRCH (X 10 DIAMETERS).

schoolboy will probably dispute the truth of his further statement, that "the most virtuous uses to which it is applied are brooms and wooden shoes." Nevertheless, Dr. Turner, the pugnacious Dean of Wells, is of a different opinion; for in his "Herball" (1568) he writes of it: "I have not red of any vertue it hath in physick; howbeit, it serveth for many good uses, and for none better than for betynge of stubborn boys, that either lye or will not learn." This, too, is the only connection in which Shakespeare refers to this beautiful tree. In *Measure for Measure*, he tells how fond fathers,

> "Having bound up the threatening twigs of Birch,
> Only to stick it in their children's sight
> For terror, not to use, in time the rod
> Becomes more mocked than feared."

Owing to the beautiful arrangement of the cells in the outer bark, to which reference has already been made, the Birch is constantly shedding its rind in strips that go right round the stems, and is thus, together with the similarly constituted Plane, one of the species best fitted to withstand the smoke of London.

This tree is, however, peculiarly liable to the disease known as "Witch Knots" or "Witches' Brooms," a confused mass of short twigs, like an old rook's nest, produced by a fungus known as *Exoas'cus tur'gidus* Sadeb., or by a very minute gall-mite, *Phytop'tus rudis*, which attack the young buds. It is desirable to burn all parts so affected, as the mites will otherwise be carried from tree to tree by wind or birds.

The Birch is remarkable for its power of holding its own, and spreading, amongst Heather, where other species are commonly stifled unless protected. Thus, formerly it was not a common tree in Epping Forest, but, from this power and its enormous production of seeds, which are scattered far and wide by the wind, owing to the little wing attached to each, it is now spreading rapidly, springing up spontaneously wherever the soil is dry, if a clearing has been made by fire or felling.

The Birch is a tree that frequently keeps its greenness rather late into the autumn, not changing colour until that after-glow that so often follows the ravages of the early October gales. Then perchance against a background of dark Scots Pines, or the rich browns of the fading Oak or Beech, the little leaflets of the Birch stand out in a relief of pale straw or of pure gold, rendering still more marked the contrast of the white trunks that in an autumn twilight have a most ghostly appearance.

The Birch will grow in moist situations, but requires good drainage, and so seems to flourish best on light soils. In planting it, probably it will be best in any case to secure some dark evergreen background or contrast, effective both in spring and autumn, such as Scots Firs.

SPINDLE-TREE.

# THE SPINDLE-TREE.

*Euon'ymus europæ'us* L.

It is probably only owing to its comparative rarity that the Spindle-tree (*Euonymus europæus* L.) is not more appreciated for its beauties than it is. It is generally but little more than a shrub, seldom exceeding ten or twelve feet in height when in a wild state; though in Forfarshire, and under cultivation elsewhere, it reaches thirty or five-and-thirty feet, with a trunk from a foot to eighteen inches in diameter. The gay colouring of its autumn fruit, however, draws attention to it even where it is only represented by a few small bushes.

Our species is one of about forty belonging to the genus *Euonymus*, which with thirty-nine other small genera constitute the Order *Celastri'neæ*. This Order of woody plants with simple leaves and small flowers, the sepals and petals of which are four or five in number and are arranged in an "imbricate" manner, is further characterised by having a fleshy and often coloured outgrowth from the coat of the seed, known as an "aril." The affinities of the Order seem to be most close to that of the Vines and Virginian Creepers (*Ampeli'deæ*) on the one hand, and to that of the Maples, Sycamores, Horse-chestnuts, and Soap-berries (*Sapinda'ceæ*) on the other.

The genus *Euonymus* derives its flattering name,

which dates from the time of Theophrastus, and signifies "well-named," from its bad rather than its good qualities. As the Irish peasant to-day euphemistically speaks of the fairies as "the good people" because he is afraid of them, so the ancient Greeks called their avenging deities, or Furies, the Eumenides, or "kind folk," and their mother Euonyme, "her whose name is good." From the fetid smell emitted by the whole plant when bruised, and from its poisonous though lovely fruits, the Spindle-tree has apparently been given the name of this once dreaded being. The chief distinctive structural characters are the leaves in opposite pairs and evergreen, or nearly so, though the stipules fall off early; the relatively large fleshy disc within the calyx in which petals, stamens, and ovary are alike inserted; and the angular or winged capsule, which, though dehiscent, is somewhat fleshy in texture.

Our one British species (*E. europæus* L.) is also a native of Western Siberia, North Africa, and the whole of Europe from Sweden and Scotland to the Caucasus. Its popular names in English, French, and German, "Spindle-tree," "Fusain," and "Spindelbaum," all alike refer to the use of its wood for spindles, which still prevails where hand-spinning survives as an industry. The Old English names "Prick-wood" or "Prick-timber," which latter is used by Gerard, and the French "Bois-à-lardoire," allude to its employment for skewers or larding-pins, formerly called "pricks," whilst another French name, "Bonnet de Prêtre," alludes to the resemblance of its four-plaited capsule to a priest's biretta; and the Flemish

"Kardinaalsmuts," referring to the colour also, is even more appropriate.

A good deal of confusion seems to have arisen in popular parlance between this species and the Cornel (*Cornus sanguinea*), both trees being of about the same size, having opposite leaves, hard, tough wood furnishing good charcoal and easily bored longitudinally, and acridly astringent properties in the leaves and bark. Both trees are consequently known as Prick-wood, as Gatteridge, Gaten, or Gaitre-tree, and as Dogwood. The word "gatr," our modern "gaiter," means apparently a cover, and has been supposed to refer to the capsule hanging when burst like a cover over the seed. In this case the name must belong to *Euonymus*, and has only been extended to *Cornus* by mistake. It may, however, signify a pipe, and allude to the use of shoots of either tree, three or four feet long, as stems for earthenware pipes, for which purpose they are readily bored, and are employed in both Russia and Germany. The name Dogwood has been derived from the use of the leaves, either dried and powdered or in a decoction, in the treatment of mange or to expel vermin; but is almost certainly only a corruption of Dagwood.

Though formerly attaining its largest dimensions, as already stated, in Forfarshire, where the large trees were in considerable demand for turnery and cooperage, the Spindle-tree is, on the whole, of but rare occurrence in Scotland, and local in Ireland. In England, however, its smooth bright green shoots and leaves in summer, and its rose-red capsules in

autumn, are not uncommon objects in hedgerows or copses. The whole plant is remarkable for its smoothness, for even when the young green wood becomes grey from the development of cork beneath the epidermis, the bark retains an even surface. A point of some physiological interest occurs in connection with this formation of cork. A few woody plants, such as Mistletoe and the Pennsylvanian Maple (*Acer Pennsylva'nicum* L.), never form any cork at all, but retain their epidermis and their green colour. Others, such as the Willows and the *Poma'ceæ* (*i.e.* Apples, Pears, etc.), form cork from the epidermis itself, and, like most trees, do so towards the end of the first summer in the life of the shoot. The majority of trees form their cork a little below the epidermis, so as to bury the green layers of the bark beneath its opaque tissues, whilst both epidermis and cork are subsequently split into longitudinal cracks, which may widen into the deep furrows so familiar in the bark on the trunks of Oaks, Elms, or Poplars. Anyone cutting a switch of Hazel, Holly, Privet, or, in fact, almost any wood, may notice the bright green layer beneath the dull-coloured external cork. In some few plants, such as the Clematis, the Vine, and the Honeysuckle, cork originates yet deeper, viz. in the "bast," or inner layer of the bark, which, as a consequence, comes away in long strips; but in *Euonymus*, whilst it arises, as in the majority of trees, just below the epidermis, its formation takes place not on yearling shoots, but on those several years old: and until it is formed the branch remains green externally.

FLOWERS, FRUIT, AND LEAVES OF SPINDLE-TREE.

The shoots are matt-green, give off a fetid odour when bruised, and are bitter to the taste. They contain an irritant poison known as *euonymin*. Four distinct wings give the twigs a four-sided character, and their sub-opposite, short, egg-shaped, pointed green buds, which are pressed against the branch, are also slightly four-angled. In April they put forth their pairs of delicately glossy, oblong-lanceolate leaves, of a rather deep shade of green, each leaf being shortly stalked, two or three inches long, with a finely toothed margin and a tapering point. The midribs give off about eight pairs of pinnately arranged secondary veins which curve forward and loop on to one another, the network of finer veins not being conspicuous.

About a month later, in the axils of these leaves appear the bifurcating few-flowered clusters of inconspicuous blossoms. These are not individually half an inch across, and are of a pale green colour; but they are noticeable from the regularly "tetramerous," or fourfold, arrangement of their parts—four sepals, their margins overlapping, or "imbricate," four petals alternating with them, each of an oblong-acute outline, four stamens, and an ovary made up of four carpels.

It is not, however, till the year begins to wane that the Spindle-tree displays its real charm. The leaves often turn crimson in autumn; but the fleshy four-lobed fruit is the most distinctive beauty of the tree. Of a rosy red, or more rarely creamy white, it resembles a cross of coral or ivory; and, on bursting, discloses one of the most beautiful or most daring of Nature's colour contrasts. This is produced by the

"aril," or fleshy covering to each of the seeds, which, alike in the red-fruited and the white varieties, is of a brilliant deep orange. This outgrowth from the "testa" or integument of the seed resembles in structure, colour, and function the more partial and divided covering to the seed of the Nutmeg, which is known as mace; but in the case of the Spindle-tree the development of this outgrowth after the fertilisation of the seed begins, not at the structural base of the seed, its "funicle" or stalk, but at the other end, at the "micropyle," or orifice at which the pollen-tube enters and the primary root leaves the seed; and therefore it is known technically as an "arillode," whilst the mace is an "arillus." The function of either structure is apparently to render the seeds more attractive to birds, and thus to ensure their dissemination. Sir Joseph Hooker alludes to this in the case of the Nutmegs and pigeons of the Molucca islands. Much interest attaches to the obscure question as to the identity or similarity of the æsthetic perceptions, taste, colour, smell, or hearing, in the lower animals, such as the insects that seek honey in the flowers of our gardens, or the birds that eat the gaily coloured fruits of our orchards, with those of man. In this case, however, undoubtedly, as in the parallel instance of the pale blue blossoms of Love-in-a-mist (*Nigel'la sati'va* L.) amid its vivid green foliage, the deft brush of the Master-Artist has secured by a bold contrast an effect most pleasing to the human eye.

A variety with broader and more glossy leaves and larger fruit, sometimes ranked as a distinct species under the name of *E. latifo'lius* Scop., is well worthy

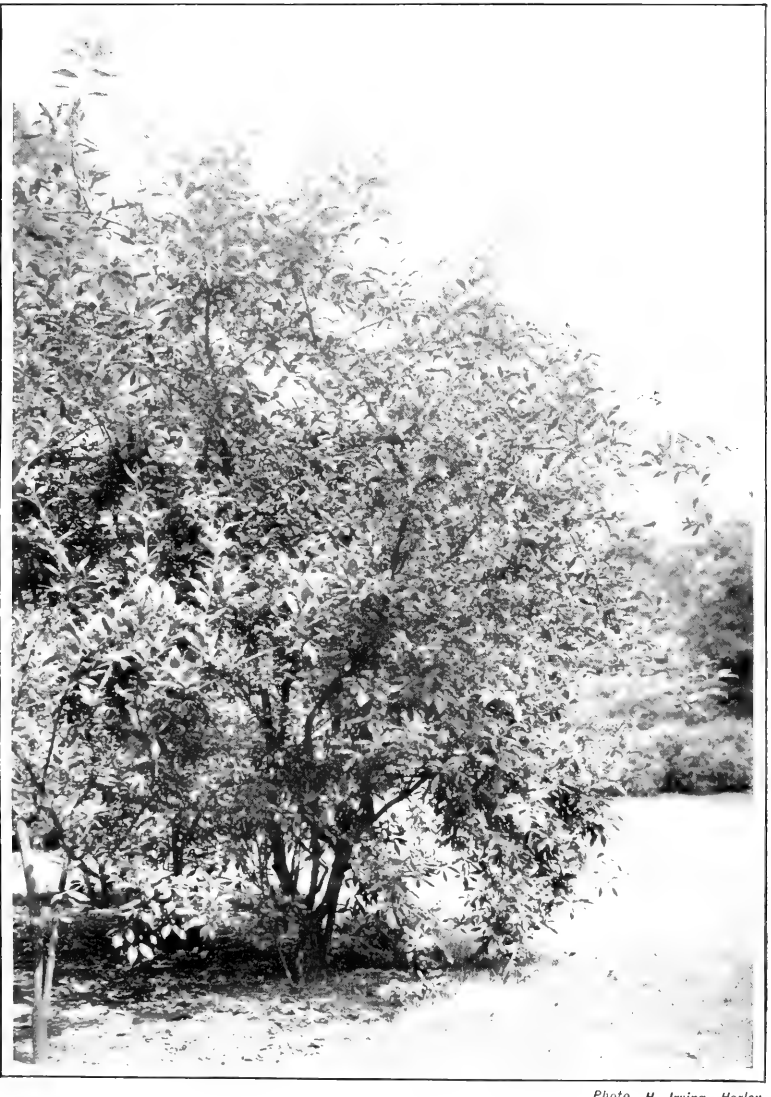
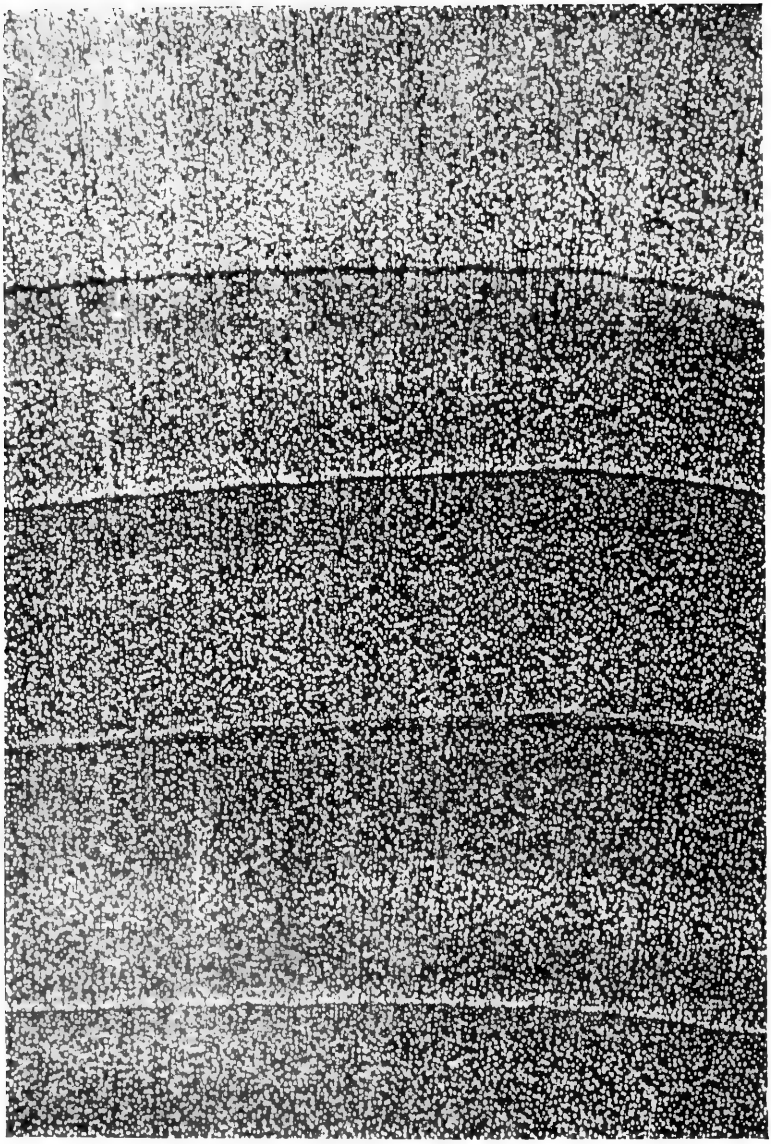


Photo. H. Irving, Horley.

SPINDLE-TREE.



TRANSVERSE SECTION OF WOOD OF SPINDLE-TREE (X 10 DIAMETERS).

of cultivation, not only in shrubberies, where it may be well associated with the white-fruited kind for autumn effects, but also as a standard on lawns; but unquestionably the most generally known species at the present day is the evergreen Japanese Spindle-tree (*E. japon'icus*), introduced in 1804, which, with its more decidedly egg-shaped leaves with scalloped margins, luxuriates in the sea-breezes of our southern watering-places; and, with foliage often ornamentally variegated with white or yellow, sustains but little damage even in severe winters, and ably withstands the fatal smoke of London. On the south coast we have sometimes seen the inconspicuous blossoms of this shrub crowded with Red Admiral butterflies and other species of the beautiful genus *Vanes'sa*.

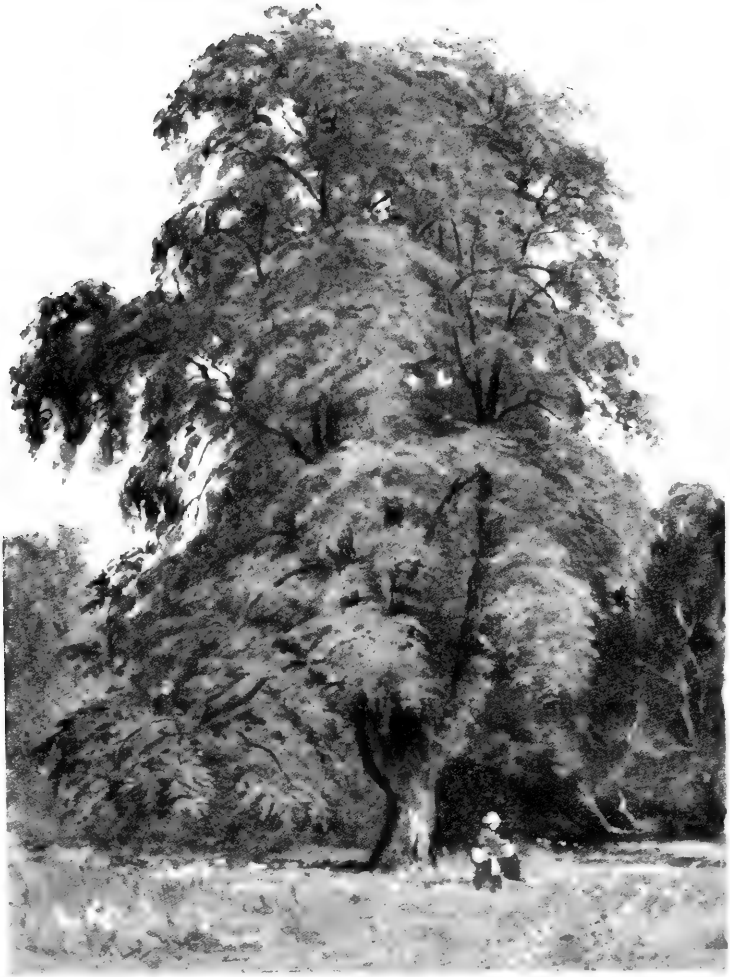
The wood of the Spindle-tree seems to have been employed for knitting-needles and spindles by the ancients; and in England was once used for musical instruments. In Scotland, before the large trees of Forfarshire were used up, their wood, with that of the Alpine Laburnum (*Cy'tisus alpi'nus* Mill.), was used for the staves, alternately white and yellowish and dark brown or black, in the little pails or noggins known as "bickers" or "luggies," used for porridge or as drinking-vessels. Now, however, Holly-wood is generally substituted for that of the Spindle-tree. Butchers' skewers have long ceased to be made of this wood, or indeed of any particular species, deal and other woods by no means free from the tendency to splinter being commonly employed; but owing to its toughness, which permits of its being pared down to the fineness of a needle, it is still somewhat

in request among watchmakers for pegs used in their work.

Its charcoal is used for the finer kinds of gunpowder, and in France, where this and many other small woods are put to a great variety of uses unknown in this country, it is esteemed for artists' crayons.

In spite of its comparative rarity, it is singular that the beautifully modelled and coloured fruits of this tree should not have attracted more attention from our poets; but showing brightly, as they do, late into the year, they suggested to Tennyson the serene wisdom and experience of age. In a short poem called "A Dedication," he expressly refers to the fruit of the Spindle-tree in the following lines:—

> "Take this, and pray that he
> Who wrote it, honouring your sweet faith in him,
> May trust himself; and, spite of praise and scorn,
> As one who feels the immeasurable world,
> Attain the wise indifference of the wise;
> And after Autumn past—if left to pass
> His Autumn into seeming-leafless days—
> Draw towards the long frost and longest night,
> Wearing his wisdom lightly, like the fruit
> Which in our winter woodland looks a flower."



HORNBEAM.

## THE HORNBEAM.

*Carpi'nus Bet'ulus* L.

FEW of our common native trees are so little known to the general public as the Hornbeam (*Carpinus Betulus* L.). It is, however, not only common, but has also many features of beauty and interest.

Its general distribution is not wide, being confined to the temperate parts of Western Asia and of Europe, its northern limit being stated at 55° or 56°, though it occurs somewhat north of this in the island of Gothland. It is almost certain that this tree is not truly native in Scotland, even if so in Yorkshire; but in Lancashire, Cheshire, Wales, Norfolk, and the south-eastern counties it is more particularly abundant, and it probably formed a considerable portion of the underwood of the great primeval forests of these areas. Rejoicing, as it does, in a stiff, moist clay, but not refusing to grow on gravel, or even on limestone, it may well once have been far more abundant than it is now, ranging from Wychwood, Shotover, and the New Forest to Anderidaesweald, the great wood of Sussex, Surrey, and Kent, and to Enfield Chase and the Essex forest, of which the existing remnant, now named from the town of Epping, in its northern purlieus, still contains many ancient examples of this species.

These veterans, however, have a delusive air of hoar antiquity from their gnarled and knotted appearance, the result, for the most part, not of age, but of the cruel toppings and loppings to which they have been subject in the past. Like those other thoroughly indigenous British trees, the Holly and the Yew, the Hornbeam can be traced over the whole area where it once abounded, though represented now by isolated trees or small woods, in Kent, Surrey, and Sussex; but the remnants of Enfield Chase, near Ware, and of Epping and Theydon Garnon Forests, in Essex, tell us, in their dense undergrowth of Holly and Hornbeam, much of the nature of our British woodlands when there were no plantations of Larch or—at least in southern England—of Pine, and when perhaps the Oak held sway undisputed even by the Beech.

The Hornbeam, according to Sir J. E. Smith, is generally "a rigid tree, of humble growth, but when standing by itself, allowed to take its natural form, will make a much handsomer tree than most people are aware of." It does not often exceed forty or fifty feet in height, or from three to four feet in the girth of the trunk. A carefully grown seedling, however, which has never been lopped, may grow into a fine, straight-stemmed, round-headed tree, seventy feet in height and nine feet in circumference, resembling a Beech, but having its more slender boughs compacted into a closer outline.

As, however, the Hornbeam is peculiarly tolerant of the pruning knife, and its branches yield

excellent firewood, it is seldom allowed to become a timber tree, and almost all the old trees of the species in this country are pollards. In these the trunk is generally flattened and twisted, as though composed of several stems grown together, or "fasciated." This, in fact, does occur, as also does "inosculation," or the union above of branches which are separate below, a mode of growth more characteristic, however, of the Beech, a tree which the Hornbeam resembles in not a few particulars.

But the flattened or irregular outline of the stem is due, in part at least, to an irregularity in its internal structure, the medullary rays being exceptionally large and wide apart, so as to break up the annual rings of wood, and these rings themselves have generally a very wavy and irregular form.

Specimens of Hornbeam were recorded by Loudon, in 1838, at Melbury Park, Dorsetshire, and Finborough Hall, Suffolk, which, sixty years of age, were seventy-two feet and eighty feet respectively in height, with a girth of over seven feet; whilst a tree near Nantes, about a hundred years old, was ninety feet high and eight feet round. It is, however, never a very fast-growing tree, lengthening from twelve to eighteen inches per annum for the first ten years of its life, but increasing far more slowly as it gets old, and not being apparently very long-lived.

The bark, which has tonic properties, is smooth, and of a silvery light grey colour, much resem-

bling that of the Beech, and affording a pleasing contrast to the green or russet of the leaves in summer or autumn. These last are of a hazel-green colour, oval—or, more precisely, "elliptic-ovate"—in outline, from one inch to two inches long, with a margin notched with serrated teeth, a distinct and permanent point, and numerous parallel transverse hairy ribs projecting on their under-surfaces. They thus somewhat resemble those of the Elm, as was pointed out by Gerard, for which reason the Hornbeam is also known as "Yoke Elm." They are, however, smoother, and of a lighter and more olive green, and, being folded in the bud into numerous charming plaits along their lateral veins, still further excuse the common mistake of the tyro, or casual observer, who generally confuses the white stems of the Hornbeam with those of the Beech.

From Beech leaves, however, those of the Hornbeam are distinguishable by lighter and browner colour, by want of gloss, by the greater prominence of the veins on their lower surface, by the permanence of the pointed and toothed outline, which is lost in the older leaves of the Beech, and, as a rule, by remaining longer on the tree. The buds of the Hornbeam, moreover, are shorter than those of the Beech, and rest against the twig, instead of diverging from it at an angle of 60° or 70°. The leaves unfold generally in April, furnished with large, deciduous stipules, of a lighter colour and unplaited surface, and in autumn they wither to a warm copper brown, remaining on the

FLOWERS AND LEAVES OF HORNBEAM.

tree, especially if pollarded, until the following spring.

About a month after the unfolding of the leaf-buds the catkins make their appearance. The staminate or male catkins are produced in the axils of the leaves of the previous year—*i.e.* in the angles between these leaves and the stem—the female or fruit-bearing ones terminating the young shoot. Both kinds of catkin are pendulous, and vary in length from one inch to two inches each; but after fertilisation the fruit-bearing axes elongate considerably.

The Hornbeam agrees with the Hazel in having no perianth round its male flowers, this being one of the characters by which they are separated, under the name *Coryla'ceæ*, from the Oaks, Beeches, and Chestnuts, or *Querci'neæ*. The male catkin consists of numerous overlapping, pale-coloured scales, or bracts, beneath each of which the minute observer will find a group of twelve or more stamens, each of them forked, and bearing two anthers ending in a tuft of hair. These male spikelets, as is usually the case with similar organs, fall off entire as soon as they have discharged their function—*i.e.* as soon as they have liberated the pollen.

The female catkin well illustrates the structure, at once simple and elaborate, of the flower-buds of most of our trees. In the axil of each bract of some trees there is one central flower, on either side of which are two smaller bracts, or "bracteoles," and in the axils of each of these there is

a lateral flower, which also is flanked by two secondary bracteoles. In the Hornbeam the female catkin bears a number of bracts, narrower and more pointed than those of the male flowers, and in the axils of each of them are the two lateral florets of the typical catkin above described, with the two bracteoles, and four secondary bracteoles, but no central floret. It is these bracteoles which form the conspicuous three-lobed "cupules" when the fruit is ripe.

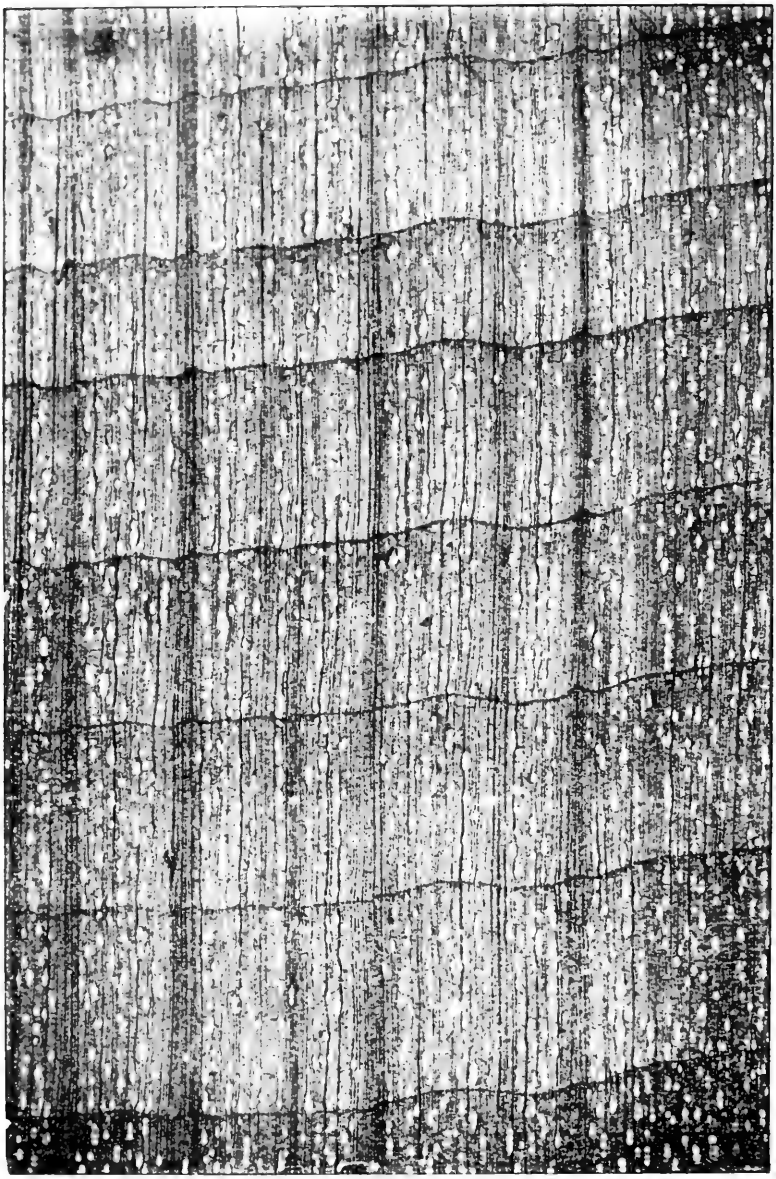
The catkins naturally remain on the tree until the fruit is ripe—that is, until October. They are then sometimes as much as four inches in length, the pale, buff-green, three-lobed, leaf-like cupules being each an inch or more in length from its point to its base. The fruits occur in pairs at the base of these scales, and are small, olive-green, roughly three-sided nuts, resembling small Spanish chestnuts, or Beech-masts, about a quarter of an inch long, crowned by the remains of the perianth, and each containing a single seed. The effect of the pale green fruit-clusters among the somewhat sombre foliage that in summer hides much of the silvery bark, is distinctly pleasing.

Gerard, in 1597, gives, in his "Herball," a very accurate figure of the Hornbeam in fruit, and a description of the tree and its name, at once so correct and so characteristic that it may well be quoted at some length:—

"*Betulus*, or the Hornebeam tree, grows great, and very like vnto the Elme, or Wich Hasel tree, hauing a great body, the wood or timber whereof is better for arrowes and shaftes,

*Photo: H. Irving, Horley.*

HORNBEAM.



TRANSVERSE SECTION OF HORNBEAM WOOD (X 10 DIAMETERS).

pulleies for mills, and such like deuises, than Elme or Wich Hazell; for in time it waxeth so hard, that the toughnesse and hardnesse of it may be rather compared vnto horn than vnto wood, and therefore it was called Hornebeame, or Hardbeame; the leaues hereof are like the Elme, sauing that they be tenderer; among those hang certain triangled things, vpon which be found knaps, or little heads of the bignesse of Ciches, in which is contained the fruit or seed; the root is strong and thicke. . . . The Hornebeam tree is called in Greek ζυγία, which is as if you should say *Coniualis*, or belonging to the yoke, because it serueth well to make ζυγία of, in Latine, *Juga*, yokes wherewith oxen are yoked together, which are also euen at this time made thereof . . . and therefore it may be Englished Yoke Elme." . . .

From this passage, Yoke-elm would seem to be one of Gerard's many coinages; but the scientific name *Carpinus* has also been derived from the Celtic "car," wood, and "pen" or "pin," a head, though another suggestion is the Latin "carpentum," a chariot, the Swedish "karm," which closely approaches "charme," the French name for the tree. The wood, which is normally white, hard, tough, rather cross-grained, strong, light, and flexible, is also used for other agricultural implements, for the screws of presses, cog-wheels, and tool-handles, and furnishes an excellent gunpowder charcoal. The modern German name for the tree, "Hainbuche," refers to another use to which Hornbeam has long been put. As it will stand a great amount of pruning, so long as this is not done in spring, when the tree is likely to suffer from the bleeding that results from the rising sap, it is a favourite tree for hedgerows, known in French as "charmilles"; and since the dead leaves remain late on the branches, rustling crisply in the autumn gales, but resisting all the

buffetings of the wind, it is largely used for this purpose in nurseries of seedling forest trees, and elsewhere where shelter is required, and was formerly employed in mazes and other geometrical devices. Evelyn ranks it foremost among deciduous trees for this purpose, reserving the claims of his favourite evergreen, the Holly. Flourishing, too, on soil too stiff for many kinds of trees, the Hornbeam is useful as a nurse to other species, and as cover for game. Deer will not touch it, but hares, rabbits, and especially field-mice, are very fond of its young leaf-shoots and foliage.

The decrepit specimens in Epping Forest, that have been ruthlessly and repeatedly polled, are merely grotesque, for such masses of disease cannot justly be regarded as beautiful. When felled, their wood is stained of a black colour, and is of inferior quality; and when, as during the last few years, no longer lopped, they send up long ungainly branches, which, from the crowding, take a vertical direction, bearing only a few leaves at the top. When, on the other hand, they have been judiciously thinned, their boughs sweep down gracefully to the ground, well covered with leaves, with nearly as much beauty as those of Lime or Beech. Such trees, once pollarded, can never entirely regain the charm of the naturally round, compact head; but their feathery sprays, reaching to the very turf, form a decidedly desirable feature in the woodland glade or wild shrubbery. A row of fine trees of this species may be seen in Richmond Park between Pembroke Lodge and Ham Cross.

POLLARD WHITE WILLOW.

# THE WILLOWS.

*Sal'ix al'ba, etc.*

THE Druids are stated to have burnt their human sacrifices in wicker cages; and, though we cannot with equal confidence vouch for the antiquity of that other more harmless use of the Willow, the making of bats to be wielded at Lord's, or on any other English greensward, even if we forget altogether its many uses in manufactures, we can find many points of interest in the Willow group. It may as well, however, be mentioned here that the wood, especially that of the White Willow (*Salix alba* L.), is made into paper pulp, besides affording the best charcoal for artists' crayons; whilst, not to mention the undoubted value of the bark for tanning purposes, it is now well known in the medical world as the source of salicine.

The Willows differ essentially from the Poplars in having their catkin-scales unnotched, though hairy, and in the absence of the rudimentary perianth which characterises the latter group. They have generally also narrower leaves, more erect catkins, and fewer stamens in each male flower. Though their flowers generally appear before the leaves, so that the abundant pollen may without obstruction be carried by wind, they also secrete honey and are much frequented by bees. The male and female trees are often somewhat dissimilar, and hybrids (*i.e.* seedlings produced

by the fertilisation of the stigma of one species by the pollen of another) occur frequently, not only in withy-eyots, but also in a truly wild state. This and some other variation has caused some seventeen well-marked British species to give rise to nearly a hundred puzzling forms.

It will be remembered that Willows are "diœcious"; and this is the explanation of the children's distinction between "golden palms" and "silver pussy palms"—the former, though bearing at first a tuft of silvery down within the brown bud-scales, soon becoming studded with the yellow anthers, while the latter bear only the down-clad ovaries, which resemble the grey fur of a cat.

Though belonging mainly to the Arctic and North Temperate zones, there are a few Willows in temperate South America and South Africa; and the species are very diverse in the situations, or "habitats," which they frequent. Thus, while Osiers are almost confined to spots where their roots are liable to be soaked with flood-waters, and many other species are fond of moisture, the Sallows, such as *S. Cap'rea*, flourish in dry woods and hedgerows, and several species inhabit the barren tops of Alpine mountains, or the equally barren plains of Arctic latitudes. So, too, do they vary in size, from the White Willow (*S. alba* L.), a tree sometimes eighty feet in height, the Crack Willow (*S. fra'gilis* L.), which attains an equal, if not greater, height, with a girth of as much as twenty feet, down to the prostrate *S. reticula'ta* L., under two feet in height, and the still smaller *S. herba'cea* L., the most diminutive of British shrubs.

The most convenient arrangement of the ninety or more forms of Willow which occur in our islands seems to be that of Du Mortier, as modified in Professor Babington's "Manual of British Botany." According to this system the genus is divided into three sections, *Vitisa'lix*, *Caprisa'lix*, and *Chame'lyx*, which, with their sub-sections, series, and sub-series, run as follow, a few synonyms having been added for the use of students accustomed to other books :—

SECTION I.—VITISALIX.

Sub-section i. — Ly'cus (= Pentan'dræ). (Bay-leaved Willows.)

Sub-section ii.—Ameri'na.

Series i.—Dian'dræ.

Sub-series *—Fra'giles. (Crack Willows.)

Sub-series * *—Albæ. (White Willows.)

Series ii.—Trian'dræ. (Almond-leaved Willows.)

SECTION II.—CAPRISALIX.

Sub-section i.—Heli'ce (= Purpu'reæ, or Synan'dræ).

Sub-section ii.—Vi'men.

Sub-section iii.—Ve'trix.

Series i.—Ca'preæ (= Cine'ræ). (Sallows.)

Series ii.—Phylicifo'liæ. (Tea-leaved Willows.)

Series iii.—Incuba'ceæ (= Fus'cæ).

Series iv.—Daphnoi'deæ (= Arbus'culæ).

Series v.—Chrysan'thæ.

SECTION III.—CHAMELYX.

Series i.—Myrsini'tes.

Series ii.—Reticula'tæ.

Series iii.—Herba'ceæ.

Among the more obvious distinctions of the three main sections are the following: The species belonging to *Vitisalix*, which include the large trees of the group, produce their leaves and flowers simultaneously, the flower-stalks bearing fully developed leaves, and the catkin-scales being of a uniform, generally pale colour. The filaments of the stamens are perfectly free from one another, and are hairy on the lower part, while the capsules are free from hairs; and the leaves are "convolute"—*i.e.* rolled together in the bud, like a scroll of paper, with one free edge. Those belonging to *Caprisalix*—shrubs and small trees, among which are most kinds of Osier—have no stalk to the catkin in the flowering stage, and have only small leaf-like bracts, or none at all, at the base of the catkin. The catkin-scales are generally discoloured at their tips, and the male flowers have but two stamens each. In the fruiting stage the catkin sometimes becomes stalked, the stalk falling off with the catkin, as is also generally the case in the previous section. It is, perhaps, necessary to caution the tyro against confusing the catkin, which is made up of many flowers, with a single flower. Finally, the diminutive species belonging to the *Chamelyx*—the "Ground" Willows, as the name signifies—also have only two stamens; but their catkins are on long, leafy, terminal or sub-terminal shoots, which do not fall with the catkins.

The first sub-section of *Vitisalix*—viz. *Lycus*—having from four to twelve, but generally five, stamens, includes the Bay-leaved Willow (*S. pentandra* L.) and the possible hybrid, the Shrewsbury *S. cuspida'ta*

FLOWERS AND LEAVES OF WHITE WILLOW.

Schultz. The Bay-leaved Willow is a beautiful many-stemmed shrub, six or eight feet high, or a tree of twenty feet. The young bark is brown, harmonising with the broad, polished leaves, whose fragrance gives the plant its name; and the species is noticeable on the banks of our northern rivers as the latest of the Willows in flowering.

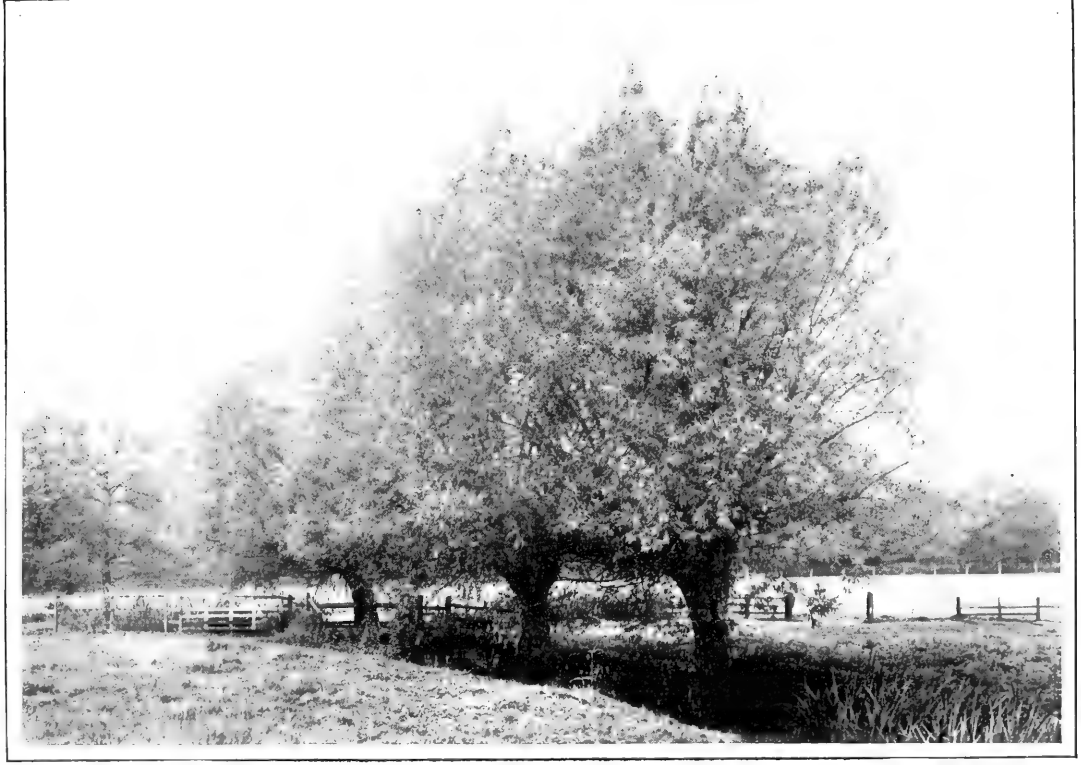
Of the *Diandræ*, the sub-series *Fragiles* and *Albæ* correspond to Linnæus's species *S. fragilis*, the Crack Willow, and *S. alba*, the White Willow. The first of these two groups has "semi-cordate" stipules, stalked capsules, and forked stigmas, and includes *S. fragilis* and its possible hybrids, *S. decip'iens* Sm. and *S. Russellia'na* Sm., which differ mainly in the character of the young bark and of the leaves. *S. fragilis* L. has very smooth, yellow-brown twigs, that are brittle in spring, and "elliptic-lanceolate" leaves, sometimes six inches long. *S. decipiens* seems only a slight variation which has smooth orange or crimson twigs, turning to a reddish brown, and leaves sometimes not over three inches in length.

These two forms, though they are commonly pollarded as Osiers, will grow into trees as large as the beautiful Bedford Willow (*S. Russelliana*), which has smooth, green, flexible twigs and long tapering leaves, very glaucous on their lower surfaces, and is always associated with Dr. Johnson, since his favourite tree, near Lichfield, finally blown down in 1829, was a magnificent specimen of this variety, twenty-one feet in girth. Specialists are, however, in doubt as to its identity, considering it either identical with *S. fragilis* or—and this is the more general view

—a hybrid between that species and *S. alba*. This Willow yields a light but firm timber, remarkably uninflammable, suited both for joists and for flooring, and grows with great rapidity, reaching fifty feet or more in ten years.

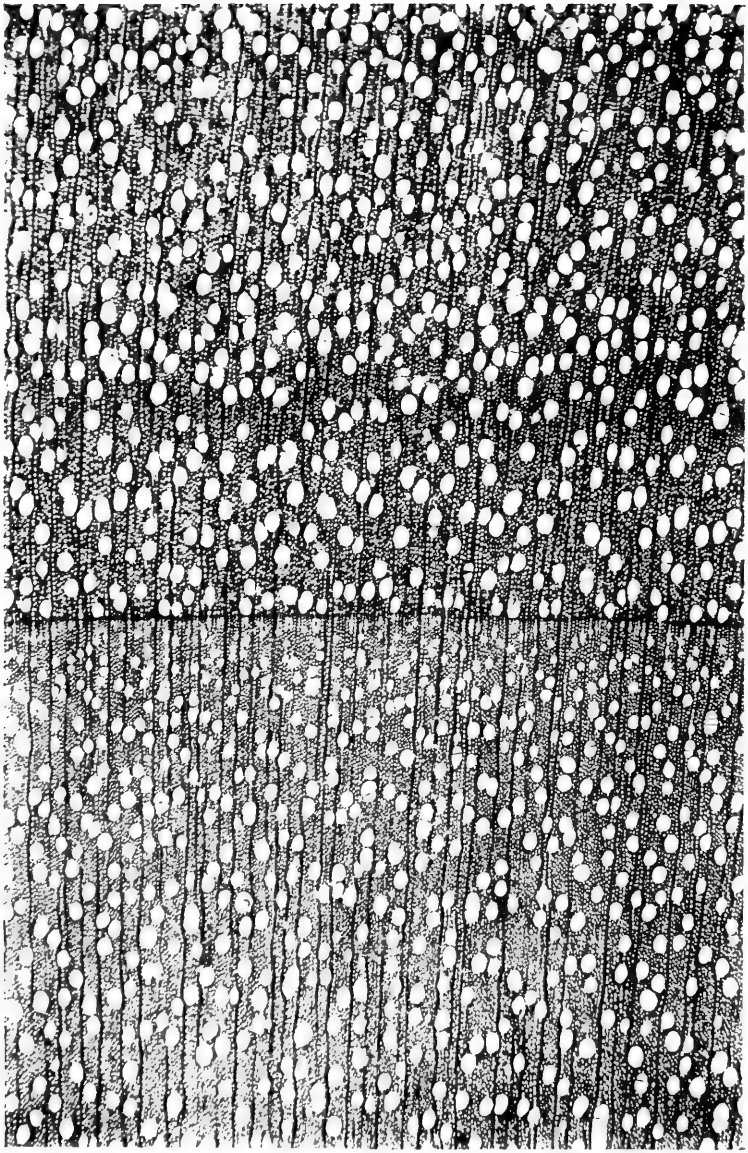
The sub-series *Albæ*, characterised by its minute, ovate-lanceolate stipules, its nearly sessile capsules, and its recurved stigmas, includes the White, or Huntingdon, Willow (*S. alba* L.), the Blue Willow (*S. cæru'lea* Sm.), and the Golden Willow (*S. vitelli'na* L.). These grow into large and useful timber trees, distinguished from the last-mentioned group by having their branches not smooth, but silky, and without the tendency to break off at the base which gives their name to the Crack Willows. The silky hairs on the olive-green twigs of the Huntingdon Willow, with the leaves silky also on both surfaces, give the tree a weird appearance, which has earned it the name of the "White tree." It is often pollarded, but will grow into a fine tree if allowed, reaching a height of fifty feet, with a girth of six, in eighteen years. The Blue Willow has the leaves smooth on the upper surface when old, and glaucous, but not very silky, beneath; and the Golden Willow has bright yellow or reddish twigs, but slightly silky, and leaves which also become smooth, and are often not more than two inches long.

The *Triandræ*, having three stamens, include the French Willow (*S. triandra* L.) and its related forms, the Almond-leaved Willow (*S. amygdali'na* L.), *S. Hoffmania'na*, Sm., and *S. undula'ta* Ehrh., all of which are used as Osiers, though they will grow to



POLLARD WILLOWS.

*Photo : H. Irving, Horley.*



TRANSVERSE SECTION OF WILLOW WOOD (X 30 DIAMETERS).

twenty feet or more. The latter is probably a hybrid.

The sub-section *Helice* is distinguished by "equitant" folding of the leaves—each leaf being doubled longitudinally over the next, as if astride it —by purple anthers, which become black, and by united stamens, to which it owes the name Synandræ. It includes the Purple Osier (*S. purpu'rea* L.) the Red Osier (*S. ru'bra* Huds.), and the Rose Willow (*S. He'lix* L.). The dark-coloured bark of the tough, but slender and drooping boughs of the first of these is well known; whilst the last-named has long been recognised by botanists from its crowded tufts of leaves, like green roses, caused by the punctures of a gall-fly.

The sub-section *Vi'men*, with two distinct filaments, yellow anthers, a longish style, and a silky under-surface to the leaves, includes the Common Osier (*S. vimina'lis* L.) and other closely related forms. The leaves on the long, slender, wand-like branches of the Osier are sometimes as much as ten inches long, and have their margins rolled back and slightly wavy. The catkins, appearing long before the foliage, generally in April, form much of the golden "palm"-boughs of Easter.

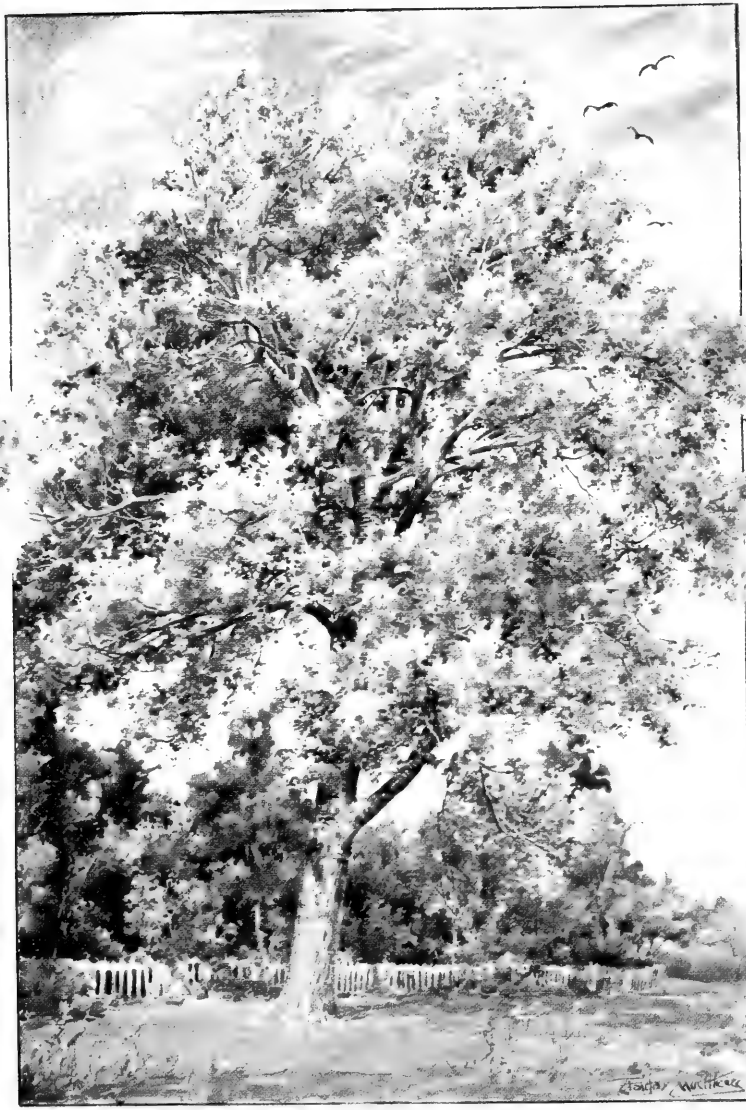
The only remaining forms of any considerable size or importance, however, are the Sallow (*S. cinerea* L.) and the Goat Willow (*S. Caprea* L.), belonging to the series *Capreæ*. These agree in having elliptical, wrinkled, dark green leaves, more or less covered with short, curling hairs, and having two kidney-shaped stipules, whilst the style is very short or absent, and

the capsule has a slender stalk. The Sallow is a large shrub or a small tree, fifteen to thirty feet high, frequenting damp situations, the first to flower of our British Willows, and, therefore, contributing the "palm" for a March Easter. It is typically distinguished from the Goat Willow, into which some of its varieties graduate, by its downy buds and twigs and glaucous "obovate-lanceolate" leaves, with reddish brown hairs on their under-surfaces, and with large stipules. The Goat Willow, frequenting drier situations, is a small tree, with smooth buds, and large broad, "ovate" leaves, having wavy margins with rounded serrations.

The detail necessary for their discrimination proves the ornamental value of many of the forms of Willow to be almost equal. The Almond-leaved, the Bay-leaved, and the Crack Willows, producing their bright golden flowers and graceful foliage simultaneously, are well worth planting by the water-side, as is also the Common Osier, on account of the elegant outline of its long leaves. In the bare-boughed, moist month of February, the glossy, brightly coloured young twigs of many kinds have a peculiar charm; but we have too often to be content to see the larger sorts in the grotesquely maltreated form of pollards :—

"The shock-head Willows, two and two."

It is, however, when growing to its full natural stature, and reflected in the clear water of a river, by whose margin the Meadowsweet foams in creamy luxuriance, that the White or Bedford Willows are seen to the best advantage.



ABELE.

# THE ABELE.

*Po'pulus al'ba* L.

THE two genera *Populus*, the Poplars, and *Sal'ix*, the Willows, constitute the Natural Order *Salic'aceæ*, a group of catkin-bearing trees and shrubs not very obviously allied to any others. Though varying greatly in dimensions, all of them are perennial woody plants, generally of rapid growth, and producing a soft white wood. Their leaves are deciduous and undivided, spring singly from the nodes, and are furnished with stipules; and their flowers are in conspicuous catkins, the two sexes being on different plants ("dicœcious"). This introduces a double difficulty into the study of the group, for not only do the staminate and carpellate trees of one species sometimes differ to some extent from one another, but hybrids or cross-bred trees frequently occur in a natural state, and still more frequently where, as in withy-eyots, several kinds are cultivated side by side.

The flowers are of a very much simplified type, the "perianth"—the calyx and corolla, that is, of an ordinary flower—being replaced by simple minute scales. These scales being single—*i.e.* there being but one to each flower in the catkin—they are probably really rather of the nature of bracts; whilst the perianth may be looked upon as altogether absent in Willows, though perhaps represented by a little one-sided, cup-shaped body, called a "disk," in the

Poplars. This little cup occurs in both staminate and carpellate flowers, springing from the axil of the bract or scale and surrounding either the stamens or the ovary, as the case may be. In both genera the female flower consists of a one-chambered ovary surmounted by a more or less two-lobed stigma, and forming a small capsular fruit, which splits open by the rolling backward and downward from its apex of two valves. This suggests that there are actually two united carpels.

The fruit contains a number of minute seeds, each enclosed in a tuft of long white hairs springing from its base, from which characteristic these trees have acquired their American name of Cottonwoods.

The Poplars form, as a rule, larger trees than the Willows, with broad leaves; their catkins droop, whilst those of Willows are more or less erect; and their catkin-scales are slashed into several lobes, whilst those of the other genus, though hairy, are not notched. Another and more physiologically interesting difference between the two genera is that, whilst the Willows have two, three, four, five, or even twelve stamens to each flower, and produce honey, so that their flowers are visited by insects, the Poplar blossoms have no honey, depending entirely upon the wind for the dispersal of their pollen, and being obliged to have, in consequence, more stamens, generally from six to twelve, or even thirty, to a flower.

The name *Populus* has been supposed to be connected with the Greek *palpalus*, from *pallo*, to quiver, but there is no evidence of any Greek name resembling *Populus* Possibly the mere difference in

quantity of the first syllables of the two Latin words, *pŏpulus*, the people, and *pōpulus*, a Poplar tree, may hide a real identity of etymology. Whatever the origin of the name, this group of trees gained by it what, in spite of the pun, we must term popularity, at the time of the French Revolution.

The genus is almost confined to the north temperate zone, a few species extending a little farther north, whilst within their area of distribution they occur very generally, especially in moist ground and along the banks of rivers.

Opinions differ as to the limits of the species in this genus; but, besides various American forms now common in cultivation, we have in England, and in fact, throughout Europe, five readily distinguishable types — viz. the Abele or White Poplar, the Grey Poplar, the Aspen, the Black Poplar, and the Lombardy Poplar. Of these, the two first should, perhaps, be classed as sub-species of one species, and the two last-named, neither of which is truly indigenous, should almost certainly be so treated. Perhaps the best point of difference is the stigma; but the lover of trees, who may be but a tyro in botany, will be glad of other means of recognising the objects of his attention. The three first forms agree in having downy shoots, dense female catkins, bracteal scales fringed with hairs, and stamens varying in number from four to twelve in each male floret. They have, therefore, been grouped together in a section known by the name of *Leu'ce*, the Greek appellation of the White Poplar. The two last, on the other hand, have their young shoots smooth,

their female catkins lax, their scales almost smooth, and their stamens more than twelve in number; and they have been accordingly united in the section named *Aigeï'ros*—a name formerly applied to the Black Poplar. It will, perhaps, be clearer to give their characters in succinct form.

Populus.—Section I.: Leuce.—Shoots downy; female catkins dense; scales ciliate; stamens four—twelve.

1. *P. alba* L., White Poplar, or Abele: Leaves on the suckers lobed, those on the branches roundly heart-shaped, slightly lobed; white and cottony on the under surface; stigmas two, bifid, linear, cross-like, yellow.

2. *P. canes'cens* Sm., Grey Poplar: Leaves on the suckers angled and toothed, those on the branches roundly heart-shaped, hoary or smooth on the under surface; stigmas two-, three-, or four-lobed, wedge-shaped, purple; buds downy.

3. *P. trem'ula* L., Aspen: Leaves on very long stalks, those on the suckers heart-shaped, pointed, not toothed, those on the branches rounded, with incurved teeth, silky or smooth on the under surface; stigmas two, bifid, erect; buds slightly viscid.

Section II: Aigeiros.—Shoots smooth; female catkins lax; scales nearly smooth; stamens twelve—twenty.

4. *P. nig'ra* L., Black Poplar: Leaves on long stalks, when young rhombic in form, silky on the under surface, and ciliate; when old more rounded finely toothed, smooth; stigmas two, roundish, two-lobed; buds viscid; no suckers.

FLOWERS, LEAVES, AND FRUIT OF ABELE.

5. *P. pyramida'lis* Roz, Lombardy Poplar: Differs from the last mainly in its erect, or "fastigiate," mode of branching, and in having suckers.

The Poplars form one of the exceptions to the rule that roots do not produce leaves or leafy shoots. This characteristic is most obvious when one of these trees has been felled, for then a small forest of suckers springs up, often at a distance of many yards from the parent tree. These are true root-suckers, and not merely ascending subterranean branches, like those of the Rose; and, as has been seen in the list just given, the leaves on these suckers are often different in form from those on the branches of the tree.

The rapidity of their growth renders Poplars very useful for forming screens; and, though all the species like a moist soil, or the neighbourhood of running water, they will thrive under the very different conditions of a crowded city. The wood of all species is soft and light and white, or pale yellow with broad annual rings, but with neither the pith-rays nor the vessels at all conspicuous. Poplar wood is not splintery, and ignites with difficulty; for which reasons, and for the readiness with which it can be scoured white, it has been used, like Willow, for flooring. It is employed to a considerable extent on the Continent and in the United States for packing-cases, blindwood and small turnery, such as the heels of ladies' shoes, ribbon reels, pack-saddles, sabots, clogs, milk-pails, herring-casks, and butchers' trays. The polishing-wheels used by glass-grinders are made of horizontal sections cut across an entire tree of the

commonly cultivated American species, *P. monilif'era*, wrongly known as the Black Italian Poplar. This, and to a considerable extent the other species also, are now largely used for paper-pulp. From its rapid growth and softness, Poplar wood has come to be thought perishable; but this is said to be only true when it is alternately wet and dry, according to the old saying —

> "Though heart of Oak be e'er so stout,
> Keep me dry, and I'll see him out."

When impregnated with a saccharine solution by the new method known as Powellising, Poplar becomes darker and harder and takes a good polish, so that it might be employed as a cabinet wood.

The long, slender leaf-stalks, which are laterally compressed, causing the leaf-blades to hang obliquely downwards and thus to quiver in the slightest breeze, are characteristic of the whole group. Occurring thus in a group of trees remarkable for rapid growth, the power of draining marshy ground by a wide-spreading system of roots, a spongy stem and copious transpiration, it is not unnatural that Herbert Spencer should have suggested a connection between this constant leaf-movement and transpiration. To draw the watery sap up into the leaf, transpiration is constantly going on from its surface, and Spencer's suggestion was that the swaying of bough and leaf in the wind gives an upward thrust to the circulating liquids. That evaporation may be unimpeded, the leaves are spread out to the air on separate stalks, and in diverging directions. It has, however, been suggested that this quivering serves only to shed water from the

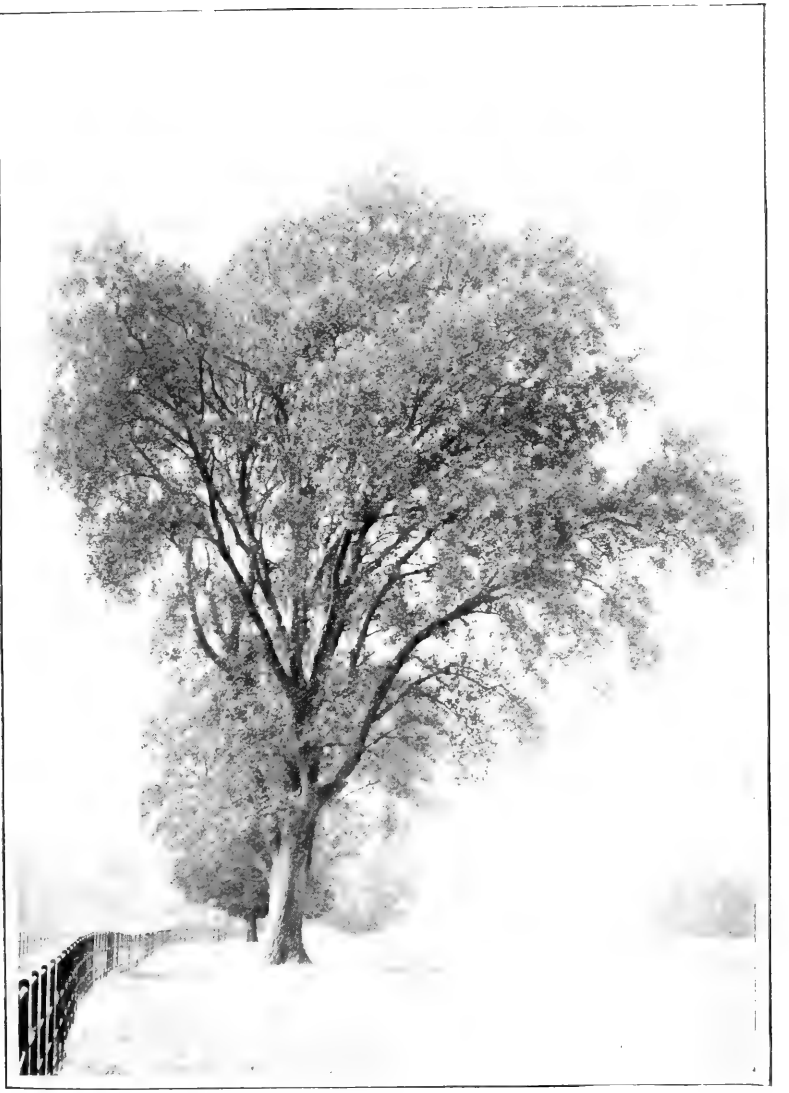
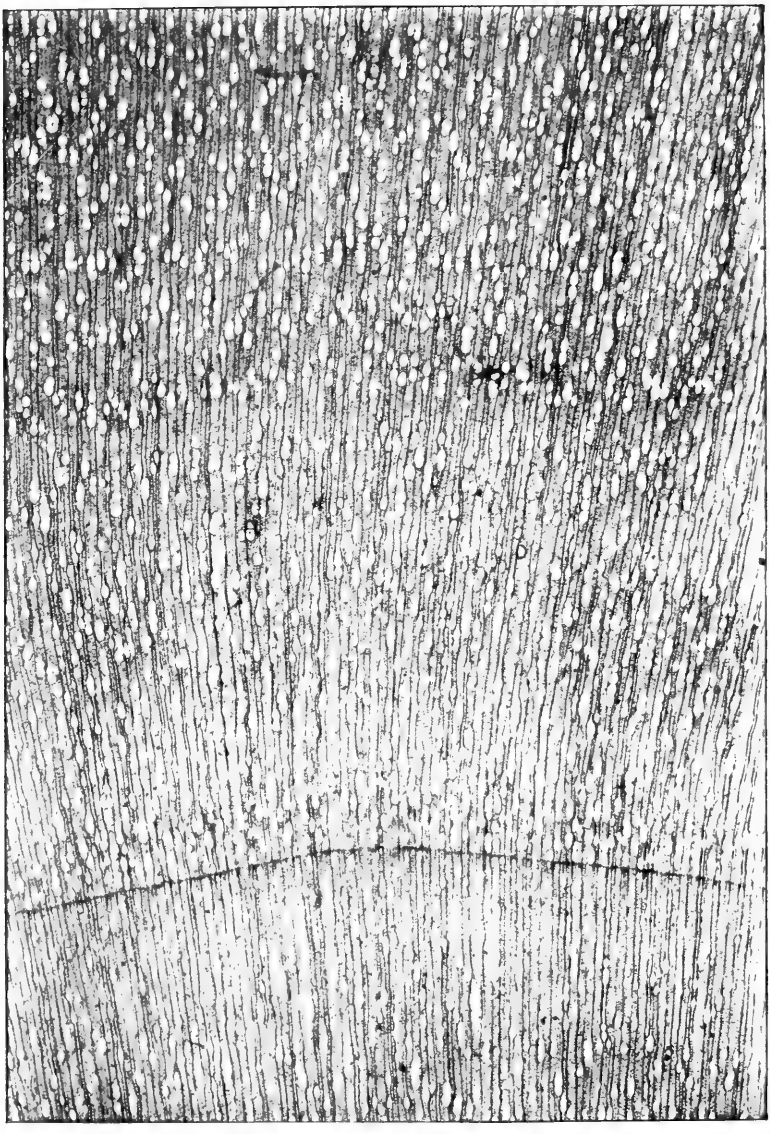


*Photo : H. Irving, Horley.*

ABELE.



TRANSVERSE SECTION OF ABELE WOOD (X 10 DIAMETERS).

surface of the leaves; whilst Professor Marshall Ward seems to favour the view that it enables "otherwise partially shaded leaves to swing often into the light, and to catch the breezes."

The Abele or White Poplar (*Populus alba* L.) grows rapidly to a height of fifty or even 100 feet, and reaches four feet in diameter. It has a smooth grey bark interrupted at many points by the enlarged lenticels, but neither so lustrous nor so split up as that of the Birch. The branches spread horizontally, and the young twigs are covered with a white cottony down which rubs off readily. The buds are similarly covered, but have none of the viscid resinous secretion which occurs in some other Poplars. The foliage is very variable. The leaves at the bases of shoots, on weak shoots or on old trees, may be ovate, or have bluntly angular lobes, an inch to an inch and a half long, but generally broader, covered with a dense white down beneath, and, when young, also pubescent on their upper surfaces. Those on the numerous suckers, and at the ends of the strong shoots, are larger, reaching even six inches in length and nearly as much in width, and having from three to five palmately arranged triangular lobes. Appearing first in March, they become thicker as they get older and lose the down on their upper surfaces, which become a deep green.

The name Abele and its variants are of Dutch origin, and the tree itself may have been introduced from Flanders; but we may well hesitate to accept the suggestion that this name has anything to do with the city of Arbela in the plains of Nineveh. It may

be, however, that the French word *Obel* gave his family name to that eminent botanist Matthias de l'Obel, who was born at Lille and died in 1616 at Highgate, and who is now commemorated by the Lobelia. On one of his title pages he uses this tree as a device with the motto "Candore et spe," referring to the white under surfaces of its leaves, symbolical of candour, and the green of the upper, typifying hope.

In March and April while some trees bear drooping catkins, often four inches long, made up of lobed and fringed scales with clusters of vinous-purple anthers, others have shorter and more erect assemblages of the less conspicuous female flowers; and after the pollen is discharged the ground is strewn with the now effete male catkins, whilst the fruiting capsules remain to burst and discharge their woolly seeds in autumn.

The white leaves of this tree as it grows in some marshy wood, when turned upwards by rain-foreboding gusts against a dull sky, give it a cold and melancholy appearance; but when they glance in the sunshine the airy lightness of its mode of growth gives the tree a most cheering character. Though its suckers render the Abele undesirable in too close proximity to a lawn, it may well find a place in some moist spot, by the water's edge, or at the margin of a park.

SCOTS FIR

# THE SCOTS FIR.

*Pi'nus sylves'tris* L.

Few contrasts in the plant-world are more striking than that between the ever-changing charms of our southern woodlands—the winter tracery of bare branches, the verdure of spring, and the golden glories of autumn—on the one hand, and the sombre and monotonous grandeur of the dark bluish foliage and tawny stems of the Pines of the north.

We need not hesitate to say that it is only in Scotland we now have the Pine in a wild state; and we accordingly speak of it as the Scots Pine or Fir. Some writers attempt to restrict the name Fir to the Spruces and Silver Firs, and to translate the name *Pinus* only by the word Pine; but popular usage clings to the name of English origin for our only truly indigenous member of the group. This noble tree, known to botanists as *P. sylvestris* L., occurs in the mountains of southern Europe, reaching the altitude of 7,000 feet on Mount Etna, and in the lower ground of higher latitudes, being found in the Scottish Highlands at an altitude of 2,200 feet above the sea. It also forms a vast belt of forest land from Kamschatka across Siberia and Russia into Prussia, Sweden, and Norway; whilst in former ages it spread equally over the lowlands of Denmark, England, and Ireland, as is proved by its occurrence beneath the peat-bogs and in the submerged forests of these countries.

The Scots Fir is much planted on sandy soil in hilly situations throughout England, since it will flourish in many instances where the more rapid-growing Larch will not. This is the case, for example, with the Bagshot Sand area of North and West Surrey, and with the Lower Greensand wastes of the middle of that county, and of Bedfordshire. An anecdote of the seventeenth century may possibly point to the indigenous character of this species as far south as Staffordshire. At Warton, in that county, there were then thirty-six very large Firs, several reaching 120 feet in height, and one even exceeding 140 feet, and having a girth of nearly 15 feet. The tenants who for many generations held the farm on which these trees stood, bore the name of Firchild, an ancestor having been found under one of the trees.

Accustomed as we are to the short, much branched stems of our deciduous or hardwood trees, the Pine is to us the very type of lofty uprightness. Its straight stem, seldom exceeding twelve feet in girth, attains a height of from fifty to 100 feet, and is of such a bulk as to render its branches comparatively insignificant; but most of us who remember such from our earliest years will echo Hood's reminiscence of their impressive grandeur:

"I remember, I remember
The Fir-trees dark and high;
I used to think their slender tops
Were close against the sky.
It was a childish ignorance;
But now 'tis little joy
To know I'm further off from heaven
Than when I was a boy."

One of the great beauties of the tree is its rough reddish bark, made up of flaky scales, and deeply ridged down the stem, giving it a curiously mottled effect. The branches are given off numerously in whorls, so that, when the trees are grown close together, the lower boughs die off, and, as Shakespeare says—

> "Knots, by the conflux of meeting sap,
> Infect the sound Pine, and divert his grain,
> Tortive and errant, from his course of growth."

The needles of the Scots Fir do not exceed two or three inches in length, they are grooved along their upper surface, curved and often twisted, and finely toothed throughout their length; and they remain on the tree for two or three years. As in other species of Pine, their "stomata" or transpiration-pores are considerably sunk below the general surface of the leaf, a markedly "xerophytic," or drought, adaptation. It is the remarkable dark indigo-tinted colour of the needles that lends to the tree the air of gloom with which it is generally associated, an effect which is heightened by the brown needle-carpeted ground beneath, silent and bare, since, owing to the absence of light, scarcely anything will grow. At a slight distance the young leaves produce quite the impression of a bluish haze, which no doubt led Tennyson to associate the "thick mysterious boughs" of the Pine with "many a cloudy hollow."

The tree generally flowers in May, both male, or pollen-bearing flowers, and female, or seed-bearing ones, being borne on the same tree. The former are small yellow spikes of scales, each scale bearing a

single two-chambered anther; and when the pollen is discharged the whole catkin falls. The female cones on the other hand remain, of course, until the seeds they contain have been ripened and discharged. They occur generally in twos or threes, each, when young, of a purplish colour and an ovoid outline, tapering conically to a point and at first erect and stalkless, but after fertilisation hanging by short stalks in a drooping position. The scales that make up the cone are not many in number: their points wither, and they become woody so as to present at the surface of the cone a series of hard rhombic or roughly-hexagonal plates, known as "apophyses," each rising in a re-curved central point, forming collectively well-defined spirals closely packed together. It is not, as a rule, until the second or third year that the seeds ripen: in fact, the pollen, when it has fallen upon the ovule, or immature seed, sends out a tube which takes more than a year in penetrating to the embryo-sac. The scales of the cone then bend outwards, so as to let the winged seeds escape from between them. Thus it is that the close packing of the scales serves, until the seeds are ripe, every purpose of the closed ovary which distinguishes Angiosperms from "gymnospermous" plants.

The seeds, which in some allied species are large enough to be of not a little value as human food, occur in pairs at the base of each scale, and are furnished with a brown membranous wing three times their length. This closely resembles, and performs the same purpose as, the "samaras," or winged fruits, of Elms and other trees, the disposal of the

CONES AND LEAVES OF SCOTS FIR.

seed away from the parent tree by the agency of the wind being the object in either case. The nutty flavour of these seeds, their slowness in ripening, and the difficulty of extracting them, did not escape the notice of the emblem-writers of the sixteenth and seventeenth centuries. With them the seed was a type of the results of persevering labour. Camerarius, for instance, gives a plate of a man holding a Pine-cone, or "Fir-apple," with a motto to the effect that "thus it is not possible to arrive at virtue, worth, or praiseworthy deeds, save through many toils and difficulties, but the after-fruits thereof are most sweet." The internal structure of the ripe seed and its germination are of interest, as the "cotyledons," or first leaves, develop their green colouring-matter while still within the seed and thus excluded from light; and they are so deeply divided as to appear like a whorl of many leaves rather than a single pair, from which fact the name "Polycotyledons" was formerly applied to the group.

Few plants yield a greater variety of useful substances than the Scots Fir. Tar, pitch, turpentine, resin, and deal are the chief, its timber being imported under various names, such as Dantzic and Riga Pine, according to the port of shipment. Though the timber varies considerably, that of the best varieties is of a deep brownish red colour. The quality varies considerably according to the situation, that grown on well-drained slopes being better than that produced in wet land, where in fact the tree never flourishes.

Pines are commonly raised from seed in nurseries,

but in suitable situations the species multiplies freely by self-sown seeds. Darwin, in the "Origin of Species," gives a striking case of this, illustrating the struggle for existence. Near Farnham, in Surrey, "there are extensive heaths, with a few clumps of old Scotch Firs on the distant hill-tops; within the last ten years large spaces have been enclosed and self-sown Firs are now springing up in multitudes, so close together that all cannot live. On looking closely between the stems of the heath, I found a multitude of seedlings and little trees which had been perpetually browsed down by the cattle. In one square yard I counted thirty-two little trees; and one of them, with twenty-six rings of growth, had during many years tried to raise its head above the stems of the heath, and had failed."

At first conical in general outline, its branches rising slightly from the trunk, the Scots Fir with us reaches full maturity in from seventy to a hundred years, and is generally felled at a less age; but in Norway it is stated to grow much more slowly, and to have reached an age of 400 years. When old, the tree assumes a spreading flat-topped Cedar- or mushroom-shaped outline; and its boughs are often twisted into gnarled forms. Though the tree is generally associated in the minds of poets and painters with mountain scenery, the finest Pines are probably grown in more sheltered, lowland, but not damp situations.

Few probably realise how recent in date are the extensive Pine plantations of our southern counties; while the taste for the regular but graceful outlines of the Conifers as ornamental trees only

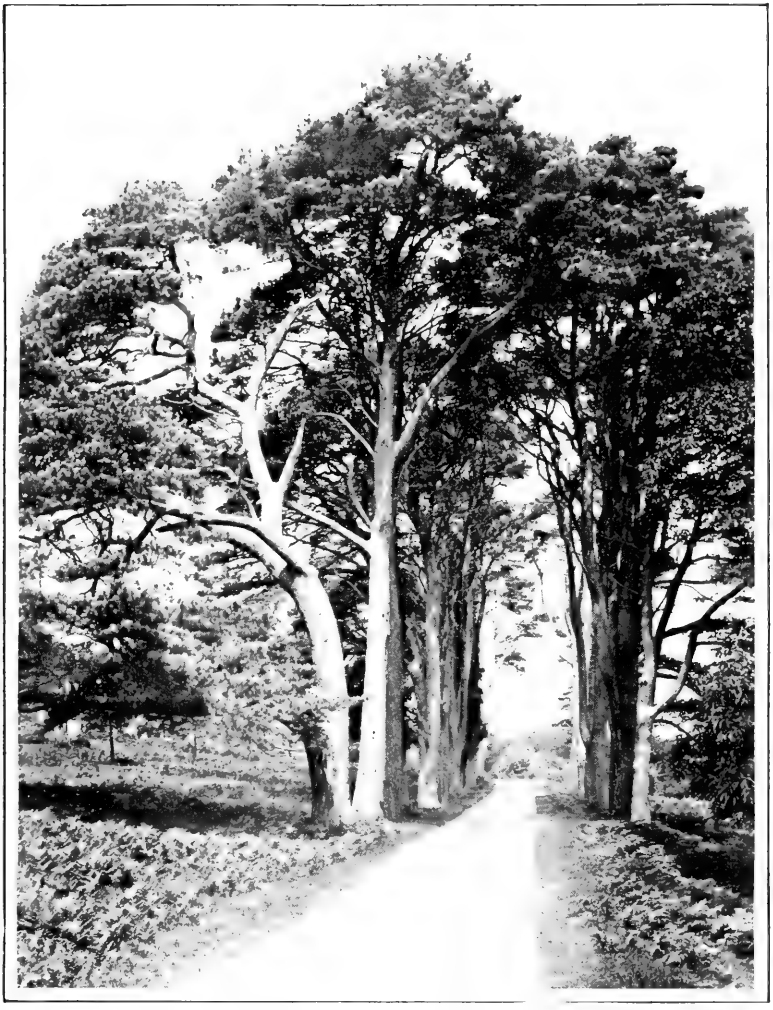
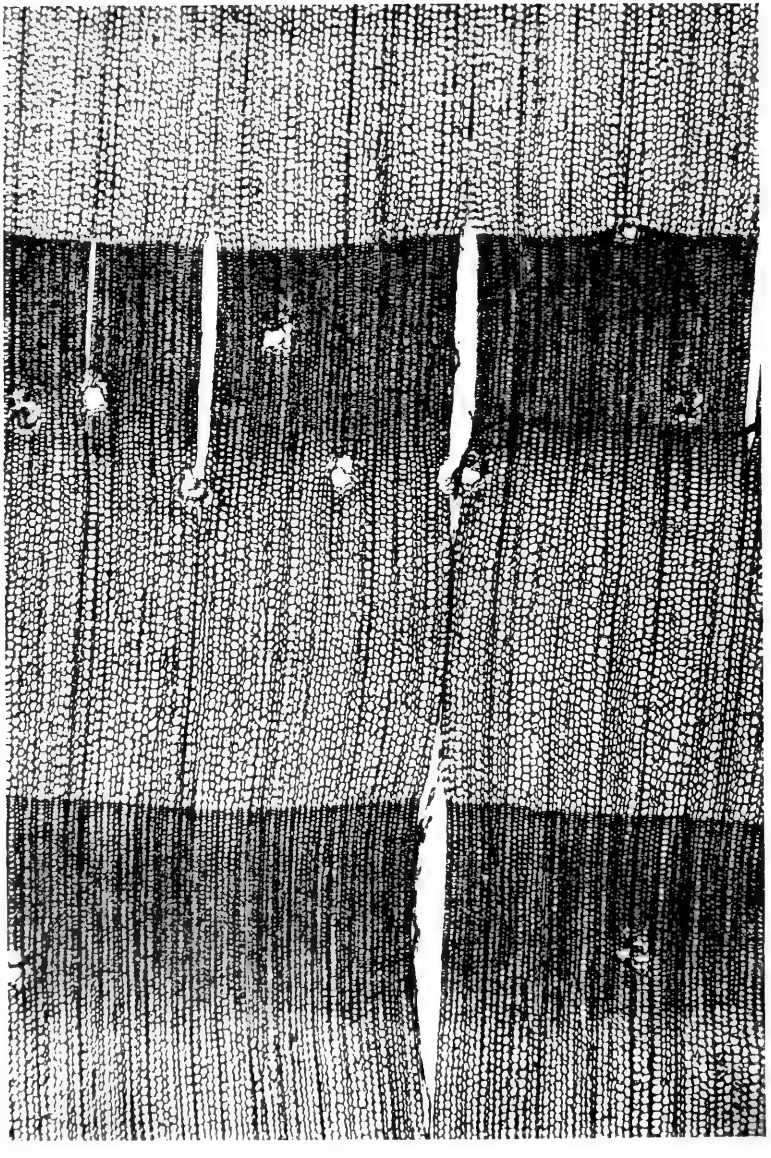


*Photo : F. Mason Good, Winchfield.*

SCOTS FIR



TRANSVERSE SECTION OF SCOTS FIR WOOD, OR "PINE"
(X 30 DIAMETERS).

became general after the establishment of the beautiful Pinetum at Dropmore, at the beginning of the last century.

Though not so remunerative a crop as the Larch, it will grow where that tree will not; and, though the primary use of the tree, from which, in fact, the name of "Fir," *i.e.* fire-tree, is derived, viz. the making of torches from its resinous wood, is with us a thing of the past, the valuable shelter it affords from the wind sweeping from the sea or over wide stretches of heath; its utility as a "nurse" to draw up young Oak trees; its timber; and its health-giving fragrance (to which the town of Bournemouth owes its popularity as a sanatorium), not to mention its beauty, are sufficient reasons for the more extensive planting of the Pine. It is liable to the attacks of various insects, of which the chief are perhaps the Pinechafer (*Hylur'gus piniper'da*), the Fir-weevil (*Hylo'bius abie'tis*), the Pine-sawfly (*Lo'phyrus pi'ni*), and the *Si'rex*.

Whilst, in his sonorous verse, Milton brings before us

> "the tallest Pine
> Hewn on Norwegian hills to be the mast
> Of some great ammiral";

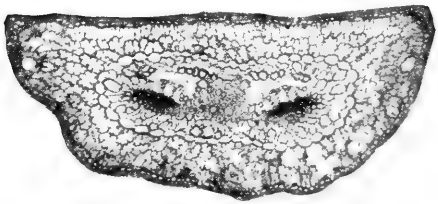
Mr. Ruskin, in his graphic prose, has described one of the most wonderful effects of Pines in a landscape, though, as he points out, it has only been noticed by two of our poets. "When," says he, "the sun rises behind a ridge of Pines, and those Pines are seen from a distance of a mile or two against his light, the whole form of the tree, trunk, branches and all, becomes one

frost-work of intensely brilliant silver, which is relieved against the clear sky like a burning fringe, for some distance on either side of the sun." This phenomenon it is to which Shakespeare alludes when he makes the heroic but ill-fated Richard II. speak of the sun:

> "When from under this terrestrial ball
> He fires the proud top of the eastern Pines;"

and this, too, Wordsworth refers to more precisely in his "Stanzas composed in the Simplon Pass":

> "My thoughts become bright like yon edging of Pines
> On the steep's lofty verge: how it blacken'd the air!
> But, touched from behind by the sun, it now shines,
> With threads that seem part of his own silver hair."



TRANSVERSE SECTION OF NEEDLE LEAF OF SCOTS FIR.

HAWTHORN.

# THE HAWTHORN.

*Crataegus Oxyacantha* L.

ABOVE a fifth of our forest trees belong to the Rose tribe; and nearly half of them have white flowers. Among these, none, perhaps, exceeds in beauty that characteristically English tree, the Hawthorn, *Crataegus Oxyacantha* L. True, its geographical range includes all Europe, the North of Africa, and the West and North of Asia, whilst it has been introduced into North America; but in England, from the earliest days of private property in land, it has been our chief hedge-forming bush, and perhaps many of the large, many-boled trees on our bare hillsides or commons date from even an earlier period.

"Haw" is the same as "hedge"; and in the North the fruits of the Thorn are still termed "haigs," so that it is somewhat doubtful whether the word "hedge" is derived from the name of the tree that bears the "haws," or whether, as is more probable, the fruit took its name from being borne on a hedgerow tree.

This fruit resembles a miniature rosy-cheeked apple. Though it may consist of but one "carpel," while in the allied genus *Pyrus* there are never less than two, it often has, as we shall see, five of these divisions. In either case the round or oval fruit is surmounted, as in the apple, by the withered remains of the calyx. The mealy flesh of the fruit,

which is perfectly wholesome—though so tasteless as generally to be left, even by the omnivorous schoolboy, to the birds—conceals the upper end of the bony core. This boniness of the core is one of the leading distinctions of the genus *Crataegus*.

There are some fifty species of Hawthorn, all confined to the North Temperate zone; but our English forms yield to none in their varied beauty and interest. They are seldom more than twenty feet in height; but aged specimens sometimes have boles two or three feet in diameter, or still more frequently divide into several stout ascending limbs, while the multitudinous boughs and twigs spread outwards, forming a close, round-headed bush, the favourite nesting resort of many of our feathered friends.

The bark is of a dull grey, and the boughs are usually beset with thorns. The leaves are small, and have a short but distinct stalk, whilst their outline is extremely variable; and the snowy flowers are grouped in flat clusters, each containing many blossoms, in the centre of each of which is the bunch of stamens, whose delicate pink anthers soon become brown as they burst and discharge their pollen.

There are several wild varieties of the Hawthorn, besides the many cultivated sorts in our gardens and shrubberies. One, known as *Crataegus oxyacanthoïdes* by botanists, has larger flowers and fruits, with a smooth flower-stalk and calyx-tube, and with two or three "carpels," or divisions, to the core; whilst another *C. monógyna*, has deeply cut leaves, downy flower-stalks, and smaller flowers and fruits, the flowers appearing later, usually in June, and the fruit having,

as indicated by the scientific name, only one carpel. The fruits of these two forms can be distinguished at a glance, by having either several styles, or only a single one, projecting, like a little thread, from the opening surrounded by the withered calyx. Occasionally, however, some fruits of one type may be found, on a tree bearing mainly those of the other. Other forms have yellow, black, greenish orange, or dull white fruits, whilst everyone knows the varieties with double pink or scarlet flowers. Most people, too, must have heard of the celebrated Glastonbury Thorn, reputed to have sprung from the staff of St. Joseph of Arimathæa, planted on Wearyall Hill at Glastonbury, which blossoms early in the year, and sometimes as early as Old Christmas Day, January 6th, besides flowering later in the spring. Botanists term this variety *præcox;* and the same occurrence is not unknown in other plants.

The Thorn may be propagated either by seed or by cuttings, from which last-mentioned fact it gets its name of "Quickset."

Under its various names of Albespeine, Whitethorn, Hawthorn, May, and Quickset, this tree must always have been a favourite with all lovers of the country. It was formerly regarded as the emblem of hope, and was carried by the ancient Greeks in their wedding processions, and used to deck the altar of Hymen. Its symbolism has, however, undergone a change, probably owing to the mediæval belief which is so quaintly told by Sir John Maundeville:—

"Then," he writes, "was our Lord yled into a gardyn, and there the Jews scorned hym, and maden hym a crown of the branches of

the Albiespyne, that is Whitethorn, that grew in the same gardyn, and setten yt upon hys heved. And therefore hath the Whitethorn many virtues. For he that beareth a branch on hym thereof, on thundre, ne no maner of tempest, may dere hym, ne in the howse that yt is ynne may non evil ghost enter."

The Hawthorn is still known in Germany as *Christdorn;* and the tradition is current among the French peasantry that it utters groans and cries on Good Friday; whilst in England, an old superstition that it is unlucky to uproot a Thorn tree still lingers, often in a belief that it is ill-omened to bring boughs of it into the house.

The quiet pastoral charm of this tree has endeared it to poets, who have sung its praises in conjunction with those of almost every season of the year. In winter, when

> "Through the sharp Hawthorn blows the cold wind,"

its boughs can hardly be said to present a cheerful aspect. They appear dull grey, or, at a little distance, almost as a black blot upon the landscape, save when the mildness of the season may have allowed the fastidious birds to leave its heavy crop of crimson fruit, preferring daintier fare.

Even then, when, as Sackville says—

> "Hawthorne has lost his motley lyverye,
> The naked twigges are shivering all for colde,
> And dropping-down the teares abundantly,"

the sunbeams, glistening on dew or hoar-frost or the delicate threads of the gossamer, lend it a borrowed grace.

FLOWERS, FRUIT, AND LEAVES OF HAWTHORN.

It is in April, however, "when Hawthorn buds appear" as the first tufted harbingers of summer, throwing off their russet scales, and unfolding in the most perfect purity of green, that the tree exhibits its real charm. Before the change of style its flowers may generally have been gathered on May-day in most parts of England, and have decorated many a maypole; but now this seldom happens except in Cornwall and Devon, it not being generally out until at least the middle of the month, while in Scotland it may be a month later. In Brande's "Popular Antiquities" we are told that "it was an old custom in Suffolk, in most of the farmhouses, that any servant who could bring in a branch of Hawthorn in full blossom on the first of May was entitled to a dish of cream for breakfast. This custom is now disused, not so much from the reluctance of the masters to give the reward, as from the inability of the servants to find the Whitethorn in flower."

Again, in a manuscript account of "The State of Eton School, A.D. 1560," in the British Museum, it is stated that, on the day of St. Philip and St. James—*i.e.* the first of May—"if it be fair weather, and the master grants leave, those boys who choose it may rise at four o'clock, to gather May branches, if they can do it without wetting their feet; and that on that day they adorn the windows of the bed-chamber with green leaves, and the houses are perfumed with fragrant herbs."

The long leafy sprays, whose foliage is, however, almost hidden by the lavish masses of blossom that have earned for the plant the name of Whitethorn, as

opposed to the black, leafless boughs visible between the snowy flowers of the Blackthorn, seem to have attracted most of those who write its praises, its fragrance being a great additional source of pleasure. Thus, in the "Forest Minstrel," William Howitt sings of

> "The beautiful Hawthorn, that has now put on
> Its summer luxury of snowy wreaths,
> Bending its branches in exuberant bloom,
> While to the light enamour'd gale it breathes,
> Rife as its loveliness, its rare perfume.
> Glory of England's landscape! Favourite tree
> Of bard or lover! It flings far and free
> Its grateful incense."

That is, indeed, a joyous season of the year, when the air is fresh with the breath of flowers, and free from the dust of later summer; when the meadows are gay with Cowslips, Buttercups, or Ladies' Smocks, and the woods still rejoice in Primrose, Orchis, Hyacinth, and Anemone; when the trees have not lost the first freshness of their greenery, and the hedgerows on the distant hill-side look like billowy snowdrifts unmelted by the summer sun. As Spenser says—

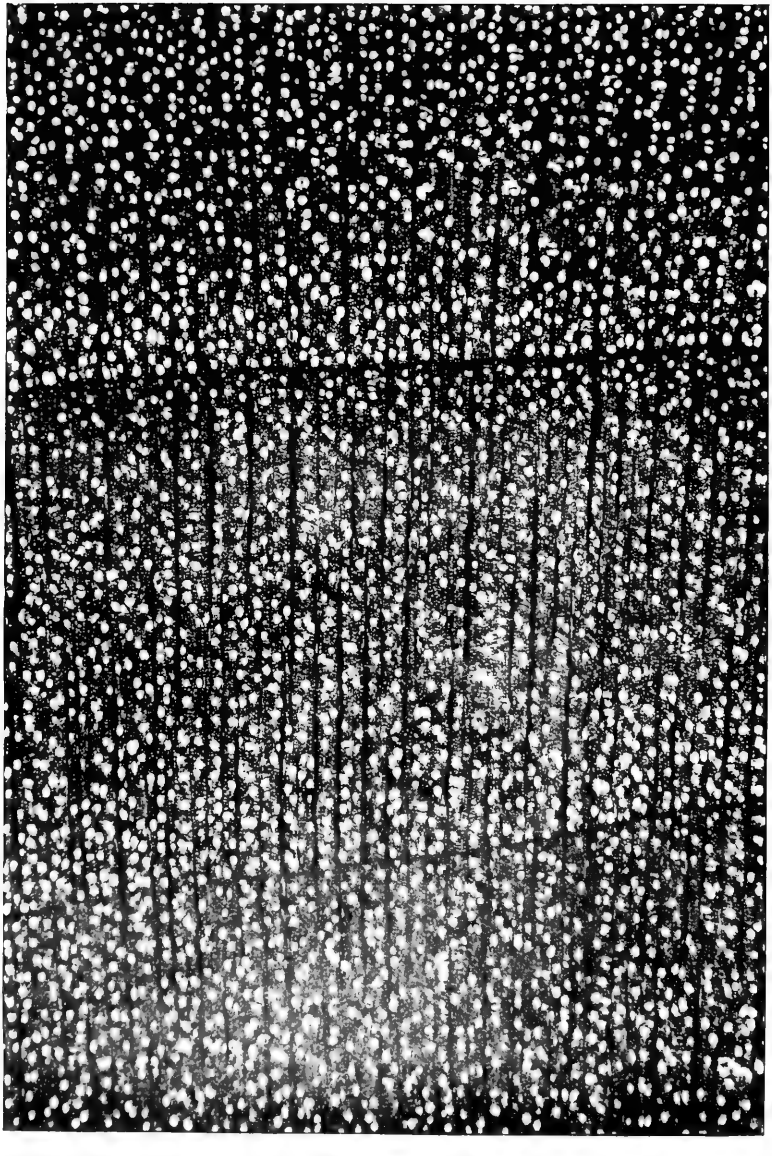
> "Youngthes folke now flocke in everywhere
> To gather May buskets and smelling Brere;
> And home they hasten the postes to dight,
> And all the kirk pillours eare day-light,
> With Hawthorne buds and sweet Eglantine."

The thickly set boughs, whether in flower or in leaf, make the Thorn afford a pleasant shade on the open down or by the village green. There, at noontide—

> "Every shepherd tells his tale
> Under the Hawthorn in the dale";

*Photo : E. J. Wallis, Kew.*

HAWTHORN.



TRANSVERSE SECTION OF HAWTHORN WOOD X 30 DIAMETERS).

and, later in the day, young lovers

> "In other's arms breathe out the tender tale,
> Beneath the milk-white Thorn that scents the evening gale";

whilst Goldsmith tells us that the shade may be pleasing to others besides Milton's shepherds and Burns's lovers:—

> "The Hawthorn bush, with seats beneath the shade,
> For talking age or whispering lovers made."

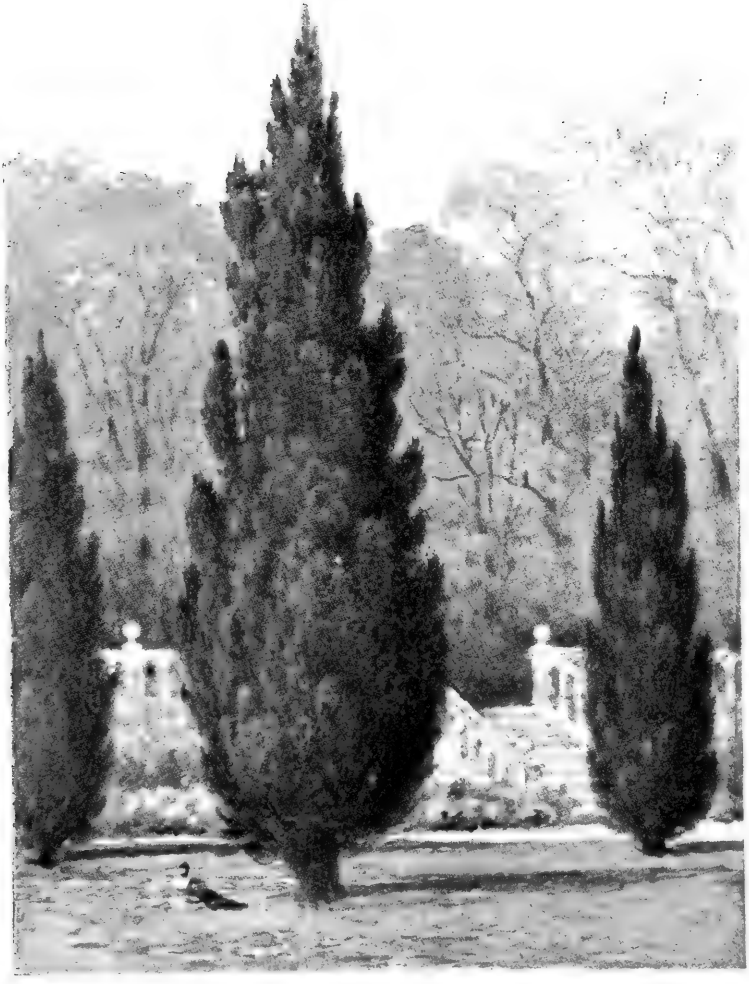
The scarlet variety of the May, when in flower, has, by itself, perhaps too glaring an effect, making one feel oppressed with heat through the eyes, as, by its powerful perfume, through the nostrils; but it is admirable when in a clump with several of the white-blossomed forms, especially if in a shrubbery with a neighbouring Laburnum. Thorns are pleasing when thus placed on the edge of the lawn or park, on the outside of the belt of trees, or in their most frequent situation, the hedgerow. Undoubtedly, however, the most effective use of Thorns is, either singly or in clumps, in the park, for they are rather too untidy for the lawn, or in the wild garden, especially on any elevated knoll. The landscape-gardener of the future will think himself fortunate if he find one or two venerable Thorns, with much divided boles, and with blossom-laden boughs yearly sweeping to the ground, ready to his hand in such situations.

The gay colours of decay, the sign of autumn's reign and of winter's approach, the tattered ensigns of beauty waved aloft in forlorn hope of the fight against the blackness of winter, the end of which is foredoomed, have formed the theme of the poet less

often than the joyous glories of spring and summer; but when the summer beauty of the Thorn, "with its locks o' siller grey," has given place to the green fruit ripening to a pure, though opaque, crimson, the leaves put on what is, indeed, as Sackville described it, a "motley lyverye." Some become a clearer green, losing the yellow and brown shades that have dulled in July their April verdancy; others blush pink on one half of the leaf, or at their edges, whilst others outvie the crimson of the fruit or the reddish purple of a rain-stained hunting coat. Some become yellow as the Maple, others orange or russet, until the later mists of autumn reduce all this varied splendour to the uniform dull brown of decay, which on the ground soon becomes a mere black leaf-mould—

> "And so, from hour to hour, we ripe and ripe,
> And then, from hour to hour, we rot and rot."

The wood of the Hawthorn, to the density of which it owes the name *Crataegus* (from the Greek *kratos*, strength), can seldom be obtained of a large enough size for much practical use, and is liable to warp; but its toughness recommends its use for walking-sticks, for the cogs of wooden mill-wheels, and as a substitute for boxwood in engraving. The bark has been used in tanning, and the leaves as a substitute for tea; but, except as making a dense, quick-growing, and ornamental hedge, the Hawthorn is certainly rather beautiful than merely useful.



CYPRESS.

# THE CYPRESS.

*Cupres'sus sempervi'rens* L.

THE associations of some trees are ineffaceable. Though in neither form nor colour has the Cypress any suggestion of grief or gloom to the dweller in Northern Europe who may be ignorant of its name and history, the customs and language of ages have, in its own Southern climes, indelibly impressed upon it the symbolism of bodily death and spiritual immortality.

The Cypress (*Cupressus sempervirens* L.) is generally a flame-shaped, tapering, cone-like tree, with but a short stem below its branches, which rise erectly and close to the trunk, much as in the Lombardy Poplar. Even in its native country it seldom exceeds fifty or sixty feet in height; and in our climate its average rate of growth is from a foot to eighteen inches per annum for the first eight or ten years, and after that it lengthens more slowly, so that trees forty years of age are seldom as many feet in height. After reaching a height of between thirty and forty feet its growth is often almost imperceptible. Nevertheless, the largest specimens in England have reached considerably larger dimensions. In the climate of Devonshire, which is peculiarly favourable to this class of tree, a specimen is recorded by Loudon, at Kenton, which had reached a diameter of two feet and a height of sixty feet in thirty-eight years. Probably

the oldest Cypresses in England are those at Syon House, Isleworth, believed to have been planted by Turner before 1548. One of these is over fifty-two feet high, and one foot three inches in the diameter of its trunk and eight feet in that of its head. Turner dates the dedication to Somerset of his "Names of Herbes" "From your graces house at Syon, Anno Dom. MCCCCCxlviij, Martii xv," and in that work he writes: "Cupressus is named in greeke Cyparissos, in englishe a cypresse tree. Cypresses growe in great plentie in my Lordes graces gardine at Syon."

About fifty years later Gerard speaks of the Cypress as well known to most people, but specifies Syon, Greenwich, and Hampstead as places where it then grew; so that this is not inconsistent with its having been brought from Italy by Turner.

The dimensions of the species in Southern Europe vastly surpass our largest examples. Thus one at Monza, in Italy, known to be 150 years old, is recorded as ninety feet high, two and a half feet in diameter of the stem, and twenty feet in that of the tree. Two Cypresses planted by Michael Angelo are still living in the garden of the Chartreuse at Rome. By far the largest and oldest Cypress in Europe, perhaps the oldest living tree of any kind, is the historical and gigantic tree at Soma, in Lombardy. It is popularly supposed to have been planted in the year of the birth of Christ, and is looked upon with great reverence in consequence; but there is said to be documentary evidence that it was a tree more than forty years earlier. It is over 120 feet in height, and its stem is twenty-three feet round. In addition to

the interest arising from this great age and size, the tree has the distinction of having been wounded by Francis I., who is said to have stuck his sword into it in despair after his defeat at Pavia; and of having been so respected by Napoleon that in planning his road over the Simplon he deflected it from the straight line to avoid injuring the tree.

The branches of the Cypress divide repeatedly, and approximately in a single plane, so as to form flat frond-like sprays, the smaller twigs of which are quadrangular in section and are closely covered with small overlapping leaves in four rows. These are of a yellowish shade of green, with a smooth and shining curved surface, and remain on the tree for five or six years, spreading outwards and becoming more sharply pointed as they get older. On the main stem the leaves are longer and needle-like.

As in most members of that main division of the *Coniferæ* that is known as the *Pinaceæ*, the male and female flowers of the Cypress are produced on the same tree. The staminate flowers are very numerous, and are only about a quarter of an inch long. Each of them consists of an elongated cone or axis, bearing the male "sporophylls" or staminate leaves, minute scales of a yellowish colour, each bearing three pollen-sacs. The female flowers are fewer in number, each being a globose, or rather polyhedral, cone made up of about a dozen polygonal scales in decussate pairs, with a conical projection in the centre of each and a number of erect ovules at the base of its inner surface. When mature, this cone or "galbulus" is from an inch to an inch and a half in diameter, and

its scales become corky externally and woody within, and separate to allow the seeds to drop out.

The wood of the Cypress is hard, remarkably fine and close in grain, very durable, of a beautiful reddish brown colour, and resinously fragrant. The evergreen character of the tree, and perhaps its flame-like, monumental outline, the durability of its timber, and its wholesomely balsamic odour, have no doubt jointly contributed to that symbolism which Spenser summed up by speaking of it as "the Cypresse funerall." As Horace says, whatever was thought worthy to be handed down to the most remote posterity was by the ancients enclosed either in Cypress or in Cedar wood. The Gopher wood of which the Ark was constructed is supposed by some to have been Cypress; Herodotus tells us that the Egyptians used Cypress-wood for their mummy-cases; Thucydides mentions that it was specially reserved to contain the ashes of those Greeks who died for their country; and Plato directed that his code of laws should be engraved on Cypress-wood, as being more durable than brass. Theophrastus states that the tree grew wild in the island of Crete, on snow-covered mountains, and in Cyprus; and that it would not grow in too warm a situation. He recommends those who wish to grow it successfully to obtain some of its native soil from Cyprus; and says further that it was dedicated to Pluto because, when cut down, it, like most other Conifers, never throws up suckers. This may perhaps be connected with the custom of burying branches of Cypress with the dead, though more probably this, like the modern practice of the

CONES AND LEAVES OF CYPRESS.

Turks of planting the tree at either end of their graves, arose from the belief that the aroma of its resin would neutralise the effluvia of the cemetery. So wholesome was this aroma considered, that Oriental physicians were in the habit of sending patients with weak lungs to the isle of Crete.

Pliny narrates several remarkable, but yet not incredible, instances of the durability of Cypress wood. He says that there were in his time Cypresses still standing at Rome which were more ancient than the city itself; but that the tree was not a native of Italy, having been originally introduced from Greece to the Greek colony of Tarentum. The doors of the temple of Diana, at Ephesus, were, Pliny relates, of Cypress wood, and appeared quite new when four centuries old; as did also the statue of Jupiter in the Capitol, which was of the same material and half as old again. The tree in his time was employed for rafters, joists, and especially for vine-props, so that a Cypress grove was thought a valuable dowry for a daughter. The Cypress was also one of the trees tortured into various shapes with the shears in that "topiary" work which was as fashionable in the Roman villa of the first century as in the English, French, or Dutch garden of the seventeenth. The wood of the Cypress may have been one of several kinds of timber marked with ornamental knots and wavy figures in the grain which, under the name of Citron wood, were most highly prized by the Romans for the manufacture of tables known as "mensæ tigrinæ et pantherinæ." From mediæval times the coffins of the Popes have been made of Cypress wood,

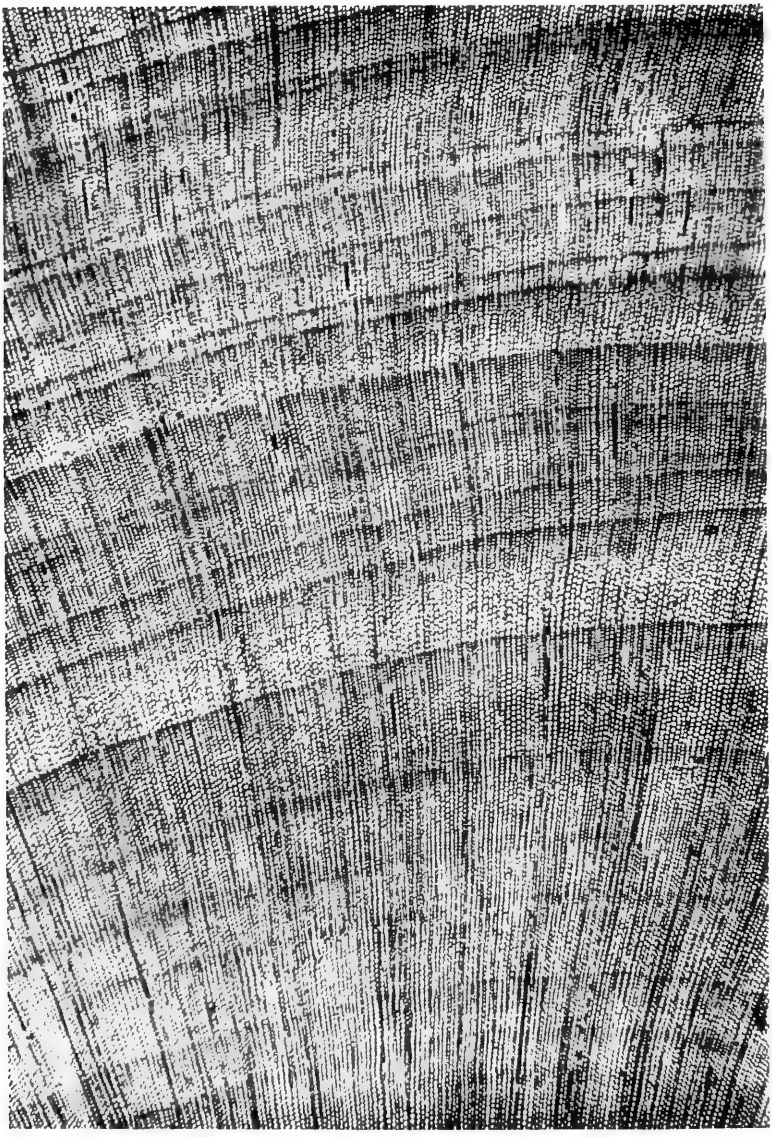
at least in part; and it is related that the doors of St. Peter's, made of this wood, lasted without decay from the time of Constantine to that of Pope Eugenius IV. in the fifteenth century. Evelyn mentions many uses to which the wood was put:—

"What," he says, "the uses of this timber are for chests and other utensils, harps, and divers other musical instruments (it being a sonorous wood, and therefore employed for organ-pipes, as heretofore for supporters of vines, poles, and planks, resisting the worm, moth, and all putrefaction, to eternity), the Venetians sufficiently understood, who did every twentieth year, and oftener (the Romans every thirteenth), make a considerable revenue of it out of Candy. . . . There was in Candy a vast wood of these trees, belonging to the republic, by malice or accident, or, perhaps, by solar heat (as were many woods, seventy-four years after, here in England), set on fire; which, beginning 1400, continued burning seven years before it could be extinguished; being fed by the unctuous nature of the timber, of which there were to be seen at Venice planks above four feet broad."

There can be little doubt that the Cypress was originally a native of Asia Minor, and probably also of the island of Cyprus, from which it almost certainly derives its name. It may perhaps be doubted how far the legends versified by Ovid in his "Metamorphoses" are due to original mythologising by the poet on his own account, and how far they represent popular belief; but the story of the origin of the Cypress, according to Ovid, is somewhat as follows: A beautiful deer, a pet of Apollo's, used to come every day to be fed either by the god or by his faithful attendant, a youth named Cyparissus; but one day, as it came bounding from the forest towards Cyparissus, he, by mischance, killed it with a javelin which he was hurling in sport. So great was the

Photo . H. Irving, Horley.

CYPRESS.



TRANSVERSE SECTION OF CYPRESS WOOD X 30 DIAMETERS

boy's grief at the accident that Apollo could not console him. He flung himself on the ground in despair as the conclusion of the story has been translated,

> "Praying in expiation of his crime
> Thenceforth to mourn to all succeeding time.
> And now, of blood exhausted, he appears
> Drain'd by a torrent of continual tears.
> The fleshy colour in his body fades,
> A greenish tincture all his limbs invades.
> From his fair head, where curling ringlets hung,
> A tapering bush, with spiry branches, sprung,
> Which, stiffening by degrees, its stem extends,
> Till to the starry skies the spire ascends.
> Apollo saw, and sadly sighing, cried,
> 'Be, then, for ever what thy prayer implied:
> Bemoan'd by me, in others grief excite,
> And still preside at every funeral rite.'"

The last line refers to a Cypress-tree being placed at the door of a Roman house where a dead body was lying.

Though every cemetery in the East is thickly planted with Cypresses, the tree is, in fact, a very pleasant and ornamental evergreen, with a somewhat formal but unusual outline that renders it suitable for planting singly or in rows, especially where space is limited. It cannot withstand the severe winters of Northern France or Germany; but with us it ripens its seed freely, and, as has been seen, grows almost as rapidly, if not to so large a size, as in its native land. It cannot, however, endure the smoke of towns so well as the Lombardy Poplar or as the Arbor-Vitæ. It is not particular as to soil, but flourishes best in one which is deep and sandy, and therefore somewhat dry and warm, and in sheltered situations, not, in our

latitudes, very much above sea-level. To see Cypresses flourishing most luxuriantly in England one should visit the sheltered sandy combes facing the sea in South Devon, as at Ivybridge or Salcombe, where they seem as much at home as in Candia itself. Until it reaches a considerable age the Common Cypress is, however, somewhat too stiff in outline for our modern taste in gardening, so that it is now being replaced by the more free-growing species from North America and Asia, especially the now much and deservedly admired *Cupressus Lawsonia'na* Murray.

ELDER.

# THE ELDER.

*Sambu'cus ni'gra* L.

SUGGESTING much traditionary lore and several questions of interest to the philosophical botanist, the Elder (*Sambucus nigra*) and its allies merit attention, even if they cannot lay claim to great beauty.

The Elder itself is a tree of such mingled good and evil report, that its commonness in the neighbourhood of farms and cottages is probably an example of the victory of utilitarianism over superstition. According to mediæval notions, as Shakespeare tells us in *Love's Labour's Lost*, "Judas was hang'd on an Elder." Sir John Maundeville, a traveller but slightly more veracious than Baron Munchausen, was shown at Jerusalem the identical tree, and the repulsive black fungus, the Judas'-ear (*Hirne'ola auric'ula-Ju'dæ*), may still be found growing on the stem of this ill-omened species. True, this fungus also occurs on the Elm, and there is a very different tree known as Judas-tree, from a rival tradition, viz. a blood-red flowered leguminous plant, *Cer'cis Siliquas'trum;* but one legend is as likely to be true as the other, and *Cercis* was not a native of Britain—nor the Elder either, for that matter, of Syria. To confirm its evil reputation, it has been pointed out that the wood of the Elder, though hard, is heartless, that its flowers have that narcotic perfume that is suggestive of death, and that its foliage has so strong, and, to many, so unpleasant an odour, that in

*Cymbeline,* Shakespeare, using it as symbolical of woe, speaks of "the stinking Elder, grief." So, too, Spenser, in the "Shepheard's Calender," speaking "of the death of some mayden of greate bloud":—

> "The water nymphe, that wont with her to sing and daunce,
> And for her girlond Olive braunches beare,
> Nowe balefull boughes of Cypres doen advaunce!
> The Muses, that were wont greene Bayes to weare,
> Now bringen bitter Eldre braunches seare."

On the other hand, the ancients as well as the moderns were alive to many of the merits of the Elder. Its hard wood, so very easily hollowed, adapted it for a variety of musical instruments, one of which, named from it the "sambuca," is supposed to have been the sackbut of the Bible, the ancestral type of the modern trombone; and Professor Henslow used, with characteristic practicality, to illustrate his lectures, when dealing with this tree, by a dissertation on the aërostatic principles of an Elder pop-gun. From this character the tree still bears the names of Bore-tree or Bottery in the North and in Ireland.

Though the German name of the tree, *Holdre,* is said to signify hollow, it is also said to be mythologically connected with Hulda, the goddess of love; and, like love, the Elder drives away evil spirits and defeats the arts of the sorcerer, being an antidote to all his machinations. Good housewives, too, have long prided themselves on their Elderflower water and Elderberry wine; and its wood is useful for skewers and shoe-pegs. From the berries a purgative extract is prepared; and the flowers, besides being used to give a muscat flavour to some wines, are said

to form, when dried, an excellent sudorific antidote to snake-bites. So many, indeed, were its supposed medicinal virtues, that the great Boerhaave is said to have taken off his hat to every Elder-tree he passed. Well may our ancestors, therefore, have planted this tree at their doors, to shield them alike from bodily and from spiritual harm. The late Dr. Prior suggested an etymology for the name Elder itself which may explain some of the veneration with which the tree has undoubtedly been regarded, apart from its many medical applications. He connected the old form "Eller," under which the name of the tree appears in "Piers Plowman," with an early English word signifying "kindler," "a name which," he says, "we may suppose that it acquired from its hollow branches being used, like the Bamboo in the Tropics, to blow up a fire." If this be so, we can believe the Elder to share that primitive sanctity which attaches to everything connected with the production of fire. The ancient Cornish name for the Elder was *scauan*, which occurs in many place-names in Cornwall and in the family names Scawen and Boscawen. The name still survives in Cornwall as skew-tree.

The Elder seldom attains a great height, twenty to thirty feet, which it may reach in as many years, being its limit; but its stems are sometimes nearly two feet in diameter, a size indicating an age of several scores of years. The bark of the old wood is rough and corky, and of a light brownish grey colour; but the young shoots have a very pleasingly bright grass-green surface, on which the darker cork-warts are conspicuous, whilst the young foliage also has a

clearness and cheerfulness of tone that it loses later in the year. The leaves, which are in opposite pairs, consist of two, three, or four pairs of broadly egg-shaped, serrated leaflets, and a terminal one, each of which seldom exceeds three inches in length. The small creamy-white flowers form an erect and singularly flat "cymose" inflorescence, sometimes nearly a foot across, which is especially characterised by having five principal radiating branches.

Even in a wild state this tree exhibits a considerable tendency to vary, a disposition which naturalists have been but too apt to ignore in the subjects of their study. Thus the number of the leaflets is sometimes reduced to three, and they are almost round in outline; at other times their edges are much notched; or, again, they are more or less completely variegated with yellow or white, whilst the usually black fruit is occasionally green or white when ripe. Though, perhaps, an escape from cultivation, as it certainly is generally in this country, we have noticed the cut-leaved variety to be very frequent in the hedgerows of Belgium.

Such plants, with divided leaves, densely clustered small white flowers, and juicy fruitlets, suggest many ideas as to the probable causal or purposive significance of their structure. One sees at once a connection between the arrangement of the branches (two of which spring from the stem in the "axils" of a pair of "opposite" leaves, while the next pair are given off at right angles to them, or "decussately") and that of the paired leaflets in the "pinnate" leaf. The relations between the veins, or rather the skeleton, of

FLOWERS, FRUIT. AND LEAVES OF ELDER.

the leaf and its outline, is equally apparent; and it needs no great acuteness to perceive that it will require less cellular tissue, and, therefore, less food, to cover this skeleton with a segmented covering than to enclose it between the surfaces of one huge undivided leaf. Here, then, we have economy of nutrition, whilst at the same time the arrangement of the leaves secures their free exposure to the necessary light and air, and the greater length of saw-tooth margin secured renders them less inviting to the tender-mouthed cattle. In rendering themselves conspicuous, the small flowers have, by the process of natural selection, shown their practical appreciation of the Belgian motto, "L'union fait la force," and whilst in twilight the eye forms some idea of their success when it notices their spectral distinctness in the hedgerow, in a room our noses tell us that they aim mostly at attracting the insects of the dusk. Nearly all white flowers are more strongly scented in the evening. Colour and perfume here go hand in hand. Perhaps, too, the small size and great number of their fruits may stand in distinct relation to the smallness and number of the fruit-eating birds of those northern temperate latitudes in which flat clusters of white flowers, whether "umbels" or "cymes," are most abundant.

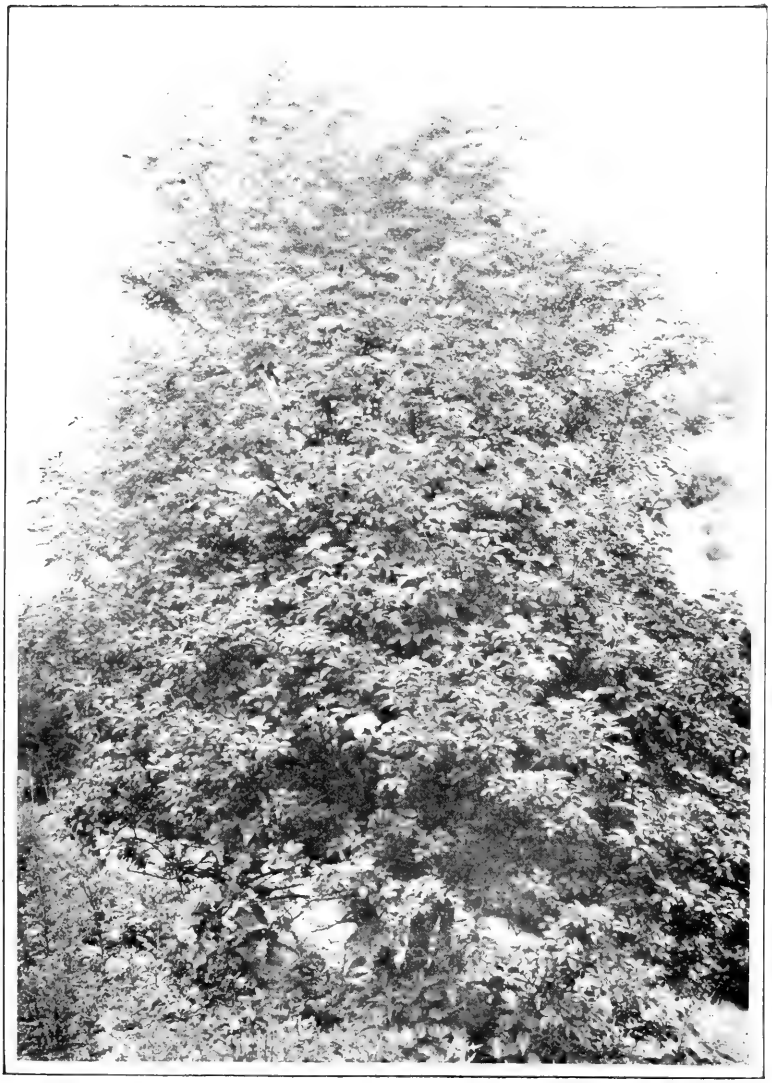
The flowers of the Elder make their appearance at the end of May or the beginning of June, the fifth of the latter month being said to be the average date by which the trees are fully in bloom in the South of England. Its blossoming may thus be said to mark the beginning of summer, and at this season the

Londoner must often notice it brightening the littered back-yards of suburban cottages. It forms, for instance, a characteristic feature about Chiswick and Gunnersbury. Sir J. E. Smith remarks that "our uncertain summer is established by the time the Elder is in full flower, and entirely gone when its berries are ripe." It is, indeed, a peculiarly hardy tree. Careless as to soil, apparently luxuriating in loam, but well at home in gravel, its office seems often to be the over-shadowing of the rubbish-heap of the cottage garden, whilst it absolutely rejoices when the carpenter chooses it as a prop to support his stock of planks. Dyer, the author of "The Fleece," refers to the flowering of the Elder as marking the time for sheep-shearing:—

> "If verdant Elder spreads
> Her silver flowers; if humble Daisies yield
> To yellow Crowfoot and luxurious grass,
> Gay shearing-time approaches."

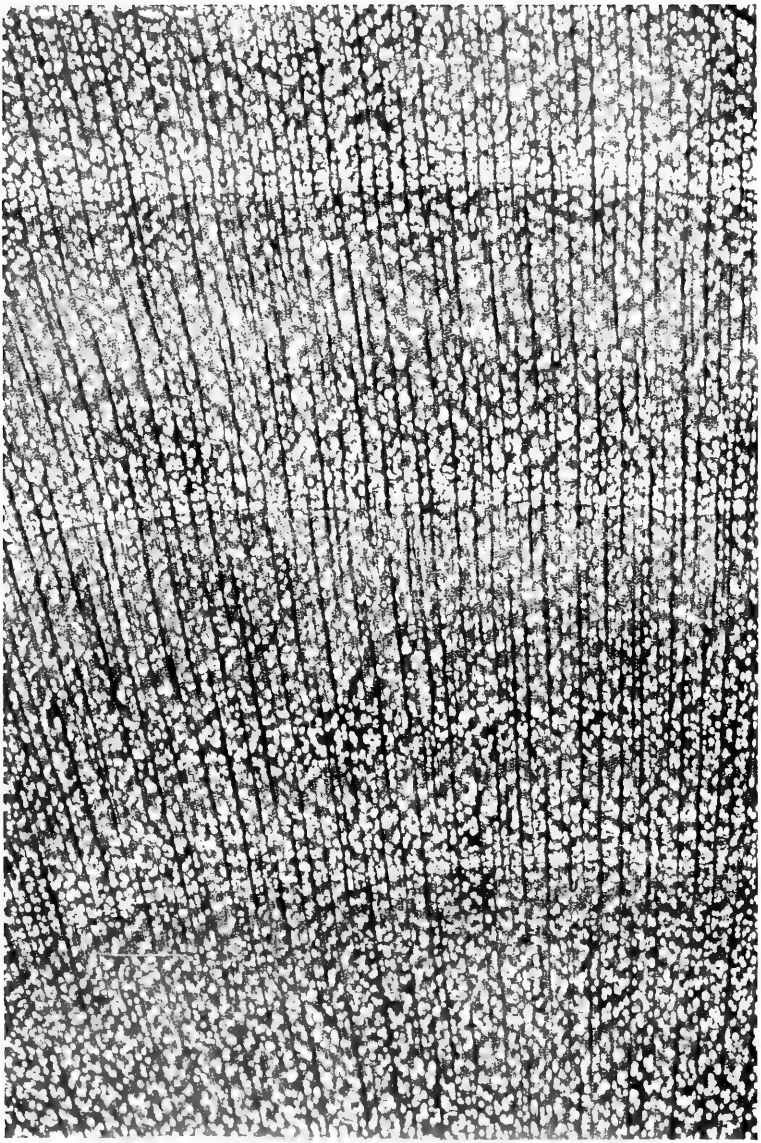
Elderflower water, though useful as an eye-lotion, is not to be despised as a perfume. It is, in fact, with lavender-water, our native representative of the otto and eau-de-Cologne of more favoured climes. At the same time the wine obtained from the bright black berries is not only a richly flavoured British wine, but is said to do duty on occasion for the more highly reputed liquor of Portugal. Certainly Elderberries would furnish as wholesome and palatable a beverage as logwood, with which port wine is said to be frequently adulterated.

These same flowers and fruits, which form some of its chief attractions to the cottager, are the chief drawbacks to the use of the Elder for ornamental



ELDER.

*Photo : H. Irving, Horley.*



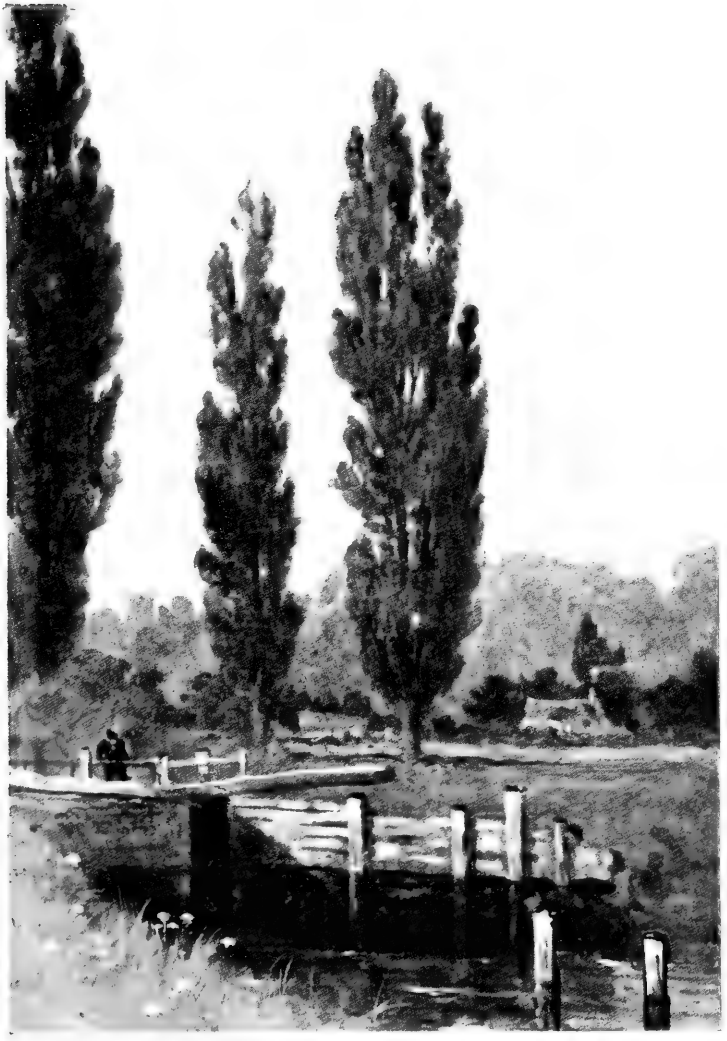
TRANSVERSE SECTION OF ELDER WOOD (X 10 DIAMETERS).

purposes. On a lawn they make an intolerable litter. The irregularity of its growth and the bareness of its stems unfit it for the shady alley or the hedgerow, though in old gardens it is not unfrequently seen in such situations. Its proper uses in ornamental planting, in which it should not be altogether passed over, are to be found in the wild shrubbery, in a clump of shrubs in the park, or the edge of a wood, or in any other situation in which its masses of white blossoms and clusters of black berries can appear in effective contrast to the surrounding leafage. To relieve the undeniable heaviness of its mature foliage, it may be either mixed with, or replaced by, some of the variegated forms that are in cultivation.

An undoubtedly more attractive plant for such purposes is the Dwarf Elder, or Danewort (*Sambucus E'bulus* L.). Though a perennial, its herbaceous stem hardly entitles it even to rank as a shrub; but its noble foliage renders it worthy of more notice at the hands of our landscape gardeners, and though uncommon either in a wild or in a cultivated state, it is too fine a plant to be here passed over unpraised.

It seldom exceeds four feet in the height of its main stem, which terminates in a cluster of flowers; but the leaves are made up of from five to eight pairs of lance-shaped, smooth, but serrated leaflets, each of which is nearly six inches long, so that they measure as a whole some twelve inches in width, and, with the terminal leaflets, nearly eighteen inches in length. These grand leaves are surmounted, in July or August, by a flat cluster of flowers, whose corollas are pink on their under-surfaces. To this cluster

there are three main branches. The five stamens in each little flower have purple anthers and crumpled filaments; and in autumn the clustered blossoms give place to numerous small round berries, ripening from red, through a dark shining purple, to an almost pure though lustrous black, and forming an attractive feast for our feathered friends and for the human eye searching into the beauties of the landscape in the fall of the year. Besides the herbaceous stem, the Danewort is further distinguished from its congener, the Elder, by the possession of distinct ovate, leafy, and saw-edged stipules at the base of its leaves. Though the traditions to which the plant owes its more familiar name allege that this Dwarf Elder grows only in spots once watered by the blood of our ancient invaders, the Danes, it will not, as a matter of fact, be found at all unaccommodating in the question of soil. If they will only "give ample room and verge enough," the happy possessors of a shrubbery cannot do better than find a place in it for the Danewort.



LOMBARDY POPLAR.

# THE LOMBARDY POPLAR.

*Po'pulus pyramida'lis* Roz.

Most of our broad-leaved deciduous trees have rounded contours, whilst some Conifers, at least when young, present a conical, or rather pyramidal, outline. The Lombardy Poplar stands almost alone in the remarkably erect, or "fastigiate," habit of growth of its branches. True, the boughs of the Mount Atlas Cedar have an upward slope, whilst those of the Florence-Court or Irish variety of the Yew have a still fuller right to the description of "fastigiate"; but neither of these needle-leaved trees rises above its fellows in such a narrow, pointed column as does the Lombardy Poplar.

The "tall Poplars," however, alluded to in the lyrics of Horace as the supports round which the vines were twined, were not of the variety now known as the Lombardy Poplar. This last form, which is known in France as "Peuplier d'Italie," though there are several other Italian species, does not seem to have been known in Italy even in the time of Pliny, eighty years after the death of Horace.

As we have before seen, there is but little to distinguish the Lombardy Poplar from the old Black Poplar (*Populus ni'gra* L.) save its general outline and the erect tendency of its branches which produces that outline. Poplars, however, are none of them very long-lived trees; and if a quick-growing American

species attracts attention as suitable for town planting, as more tolerant of the pruning-knife than our native species, or as forming a screen more rapidly, it may in a few years all but replace the less popular indigenous kind. Thus it has come about that, whilst the American *P. monilifera* Ait., miscalled the Black Italian Poplar, can be seen in many a London square, and has been largely planted in some moist situations as material for paper-pulp, it is difficult to come across a genuine wild specimen of the true *P. nigra* L.

The Black Poplar is not indigenous in Ireland or Scotland, and doubtfully so in England or the North of Europe; but its area of distribution extends from Central Europe into Northern Asia. It may grow fifty, or even eighty feet in height, reaching forty feet within ten years, but beginning to decay when sixty or seventy years of age. Its branches spread in an ascending, but not typically fastigiate manner, and it will bear pollarding, or even coppicing, throwing out an abundance of shoots; but, unlike the Lombardy Poplar, it does not produce suckers. The dark ash-grey bark has been supposed to be the origin of the name "Black"; but perhaps this is only used in contradistinction to "White," to signify the absence of the white cottony down from the under surfaces of its leaves. The buds are conical, or slightly angular, and secrete gum, the bud-scales being stipular. The outer pairs are hard and dead, the later pairs having rudimentary leaves between them represented by minute awl-shaped bodies. The terminal buds are considerably larger, and the lateral ones are seated

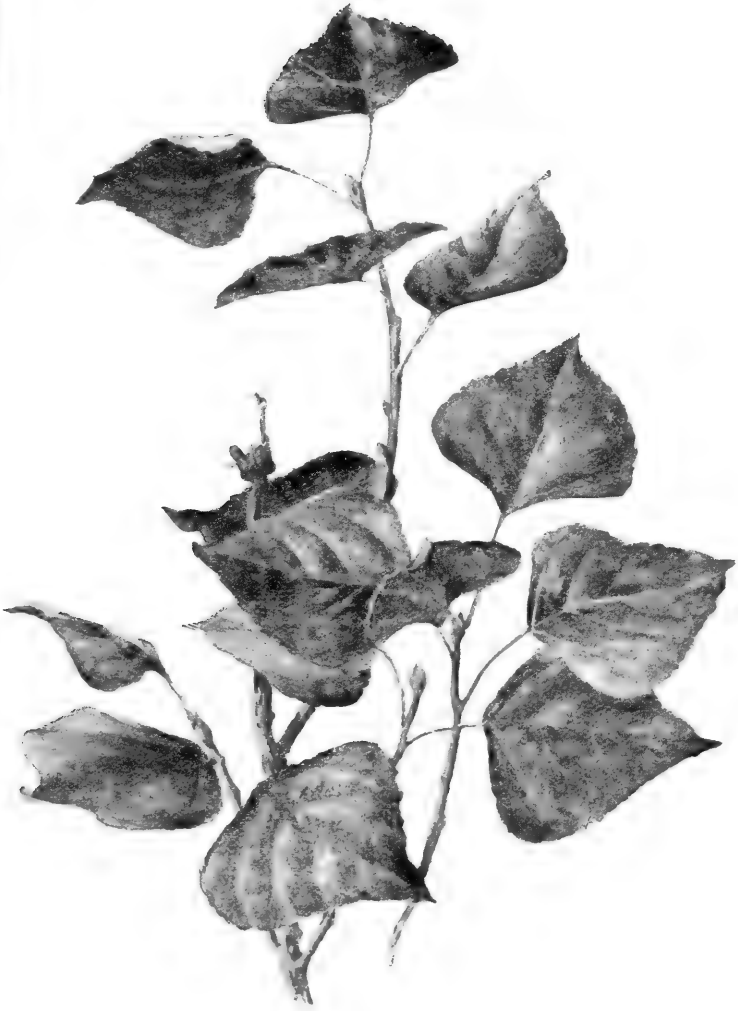
above prominent leaf-bases. The twigs are a shining yellow or light bronze, and smooth, round below but slightly angular above, with scattered cork-warts and five-angled pith. The leaves are involute in the bud, triangular or rhombic in outline, and two to four inches long, in addition to the slender stalk, which itself is about two inches in length. The blade is either straight, slightly cordate, or slightly wedge-shaped at its base, with an acuminate "drip-tip" and regular crenate-serrate margin.

When young the leaves are of a beautiful translucent bronze, fringed with silky hairs, and with similar deciduous hairs on both surfaces; but they become rigid, smooth, and grass-green, only slightly paler beneath. Hanging loosely, as they do, on their slender petioles, their surfaces are perhaps more often in a vertical than in a horizontal plane. The petioles are laterally compressed, as in the other species; and the veins are arranged much as in the Aspen, the midrib being sinuous and prominent, and the secondaries few in number, given off pinnately, and slightly arcuate, looping into an inframarginal series, and connected by a copiously branched meshwork of tertiary veins, but with the basal pair opposite and strong, so as to produce the "pseudo-palmate" appearance. The leaves are developed in May, after the catkins and later than those of the other species or of the Lombardy Poplar. Whilst in spring they have shone and blushed with hues of mingling red and yellow, to which the word "bronze" that we have used does but faint justice, as they seem sometimes to have warm blood coursing in

their veins, in summer their green, if monotonous, is generally cheerful and, even when it becomes duller and more grey, is never heavy, owing to their constant motion; and in autumn, though soon scattered by the winds of the equinox, they present us with new, if brief, glories. Their green becomes clearer and is then invaded by lemon yellow; damp turns this yellow first to gold or orange and then to the umber of decay; and all these tints are frequently to be seen on a single leaf.

The catkins produced in March or April are characteristically loose in the arrangement of the flowers upon them. Those of staminate trees are two to four inches long, cylindrical, pendulous, and dark red from the colour of the anthers, of which there are generally eight in each flower. The fruiting catkins are shorter and take a more upward direction. The stigmas are four-lobed and the capsules are round. They ripen in May, when the cottony seeds are often conspicuous among the young leaves.

Growing by the water-side, or in moist earth, with thick sapwood through which their watery food-supply rises rapidly, the Poplars have at the tips or on the margins of their leaves, at least when they are young, special glandular structures whence water may exude in drops, so that the tree may be said to weep. According to Ovid, when Phaëton borrowed the chariot and horses of his father the Sun and by his furious driving set half the world on fire, Jupiter hurled him from the chariot into the river Po, where he was drowned. His unhappy sisters, the Heliades, lamenting his fate upon the river bank, were changed



LEAVES OF LOMBARDY POPLAR.

into trees, either Poplars or Alders, the poets not being agreed as to the species. In their despair they clasped their hands above their heads until there they became fixed, while their long hair, which hung like a veil around them, changed into leaves from which their tears flowed without ceasing. Black Poplars, at any rate, are plentiful to-day upon the banks of the Po, and their water-pores exude tears as the sun shines upon them with paternal affection. Black Poplars may therefore well have been, as Spenser says,

> "Those trees, in whose transformèd hue
> The Sun's sad daughters wailed the rash decay
> Of Phaëton, whose limbs with lightnings rent,
> They gathering up, with sweet tears did lament."

Though a merely "fastigiate" habit is not generally considered a character of specific importance, the presence of suckers in the Lombardy Poplar is an important distinction between it and the Black Poplar, with which botanists generally unite it. The absence of the grey hairiness common on the leaves of other species, which has earned for its allied form the inappropriate name of "Black," is equally characteristic of the Lombardy Poplar.

This fastigiate variety is probably a native of the mountains of Western or Northern Asia, perhaps of Persia. It has been common in that country, and in Kashmir and the Punjaub, from very early times, and is often planted along the roadsides in those distant lands, as it is in France, its somewhat scanty shade-producing powers being there of more importance than they are with us. Introduced from these countries into Southern Europe, the tree derives its

popular names, both in France and in England, from its abundance along the banks of the Po and the other rivers of Lombardy, where at the present day it grows readily from self-sown seed, which it will not do in England. Considering that it was only introduced into France in 1749, and into England in 1758, it is interesting to note that William Turner, writing 200 years before, in his "Names of Herbes" (1548), says of the genus :—

"Populus is of two kyndes, the fyrste kynde is called in greeke Leuce, in latin Populus alba, in englishe whyte poplar, or whyte Esptree, in duch wisz sarbach. Thys kynde is commune about the bankes of the floude Padus [the Po]. The seconde kynde is called in greeke Argeiros, in englishe alone a popler, or an Asp tree, or a blacke popler."

Not many years before his "Names of Herbes" was published, Turner travelled in Italy, and may then have seen the true Lombardy Poplar; but his account does not show any more discrimination between the species than was suggested to him by the existence of two names in both the Greek and the English languages.

Like many quick-growing, spongy-timbered trees, the Lombardy Poplar seems not to be by any means a long-lived tree; so that, though the artistic value of

"The Poplars in long order due"

may have been instinctively recognised at once, it is very doubtful whether any specimens are still in existence that date from the first few years of the introduction of the species into England. A hundred years, in fact, would seem to be a fair limit to state

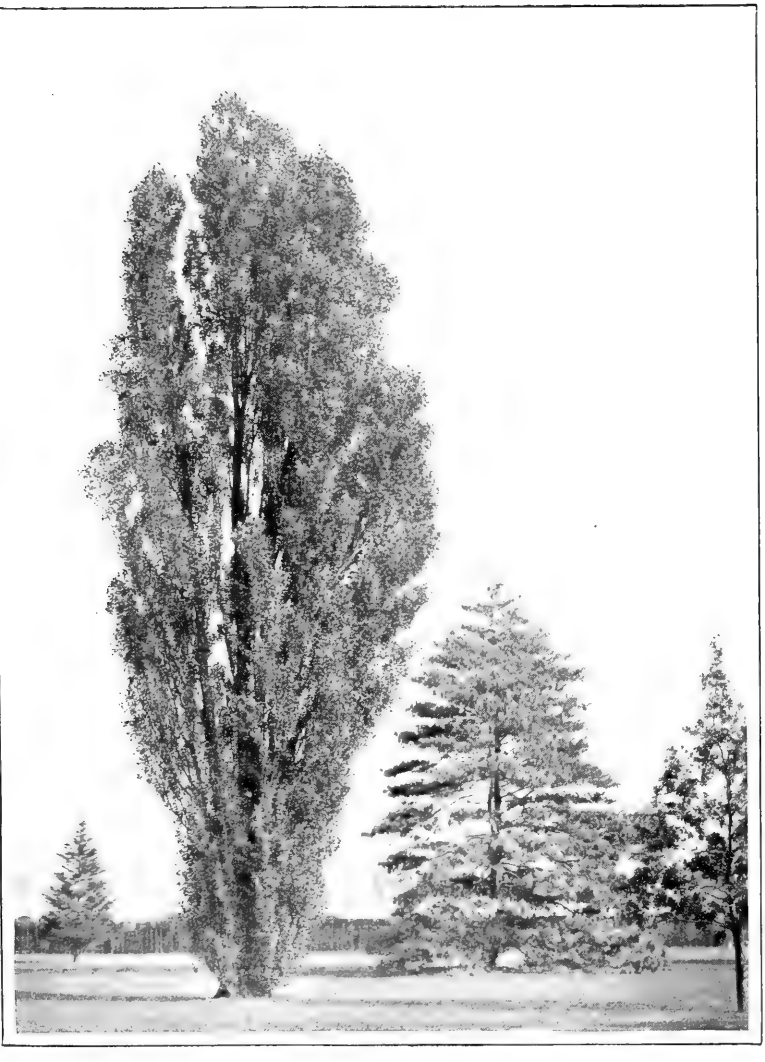
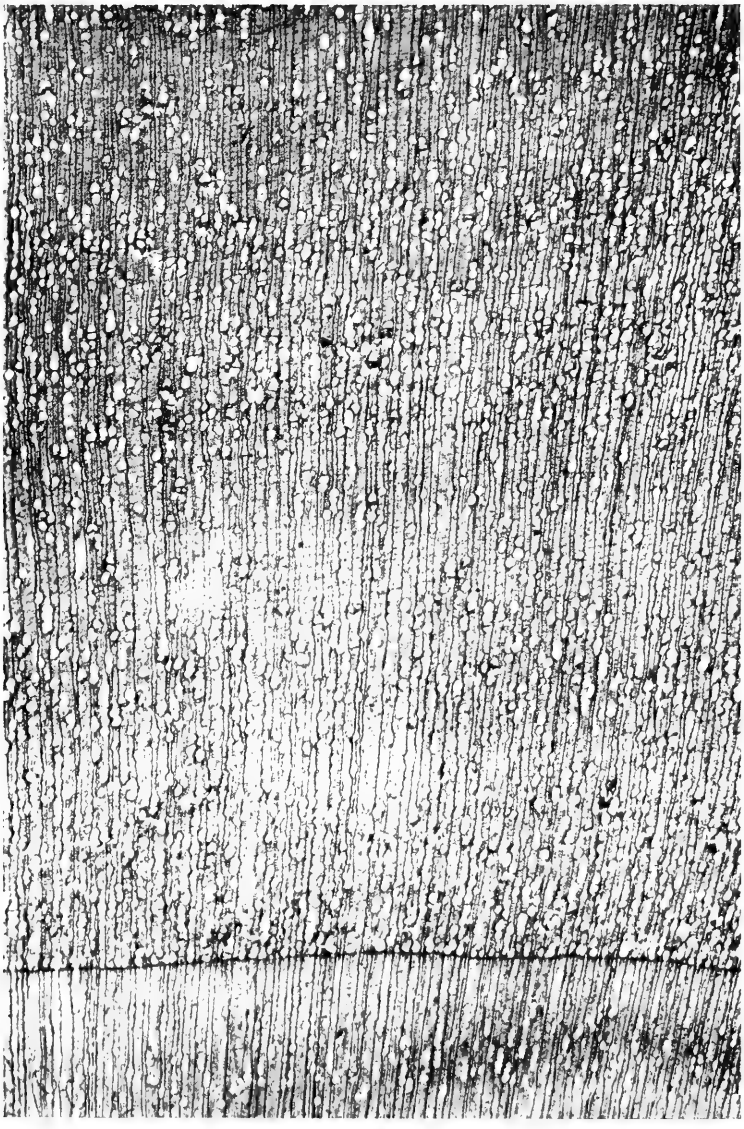


*Photo : E. J. Wallis, Kew.*

LOMBARDY POPLAR.



TRANSVERSE SECTION OF LOMBARDY POPLAR WOOD
(X 10 DIAMETERS).

as that of the duration of life of this species, at least in our climate.

Growing sixty feet or more in twenty years, and ultimately attaining sometimes to the height of 150 feet, the Lombardy Poplar has not the smooth stem common in the other species. Its bark is deeply furrowed, and stands out in buttresses at the base of the trunk, recalling the appearance of some of the giant Figs of the Tropics. Sometimes, too, the stem acquires a twist in its growth, though not with the symmetrical regularity of the Spanish Chestnut.

This form seems to have been introduced into England from Turin, in 1758, by the Earl of Rochford, then our ambassador at the Piedmontese Court, the earliest specimens being planted near the interesting priory of St. Osyth in Essex.

The beauty of the Lombardy Poplar is mainly one of landscape effect, its tall, erect growth acting as a relief or foil to the rounded outlines of other trees, and contrasting admirably with the horizontal lines of the water by the side of which it is so often seen. Whilst in Lombardy and France it is commonly planted as a hedge in lines, which from their length are decidedly monotonous, with us it occurs commonly in shorter lines, acting as a screen, or merely as an ornamental break in the landscape. Properly it should never stand alone, and should always be so placed that the row of vertical green plumes may serve, as has been suggested, to break, or to contrast with, some horizontal line—a river bank, a road, an unsightly railway embankment, or the arches of a viaduct or aqueduct. Their suckers form an objection to their

being planted near the lawn; but purely artistic considerations make it desirable that Poplars should be planted in a row at some distance from the house or other point from which they are to be viewed.

This variety is not, however, deficient in those minuter beauties that repay the student of trees. At the end of April or the beginning of May, when most other trees are in full spring-tide verdure, the little triangular leaflets come forth, on their characteristically long leaf-stalks, in the charming variety of golden tints, now yellow, now brown, now russet-red, glinting cheerfully in the young sunbeams before they decide on being a somewhat dull shade of green, to which we have alluded when writing of the Black Poplar; and again in autumn, after most other trees are bare, these same leaves, which have survived the equinoctial gales of October, are often, in the fitful sunshine of St. Luke's summer, or of that autumnal after-glow that sometimes marks the latter half of the month, seen bright with an almost spotlessly clear lemon-yellow, or variegated perchance with a green clearer than any hue they have hitherto worn.

WYCH ELM

# THE WYCH ELM.

*U'lmus monta'na* Stokes.

WHETHER a particular tree is or is not indigenous is often a difficult question to decide. One of the most difficult cases is that of our Common Elm (*Ulmus surculo'sa*). The Wych Elm, however (*U. montana* Stokes), has far more irrefragable claims to be considered one of our native trees. Though more abundant to the north of the Trent, it is, wherever it occurs, less distinctly a hedgerow tree than its congener, though its name, *montana*, the Mountain Elm, which seems to have been applied to it in very ancient times, is not very appropriate. It produces seed freely even in Scotland, being, in fact, often known as the Scotch Elm ; and, unlike the Common Elm, seldom producing suckers, it depends entirely upon its seed for the perpetuation of the species. Lastly, in addition to the forty places mentioned in "Doomsday" with names derived from that of the Elm, it must be remembered that the Wych Elm was formerly known, even more commonly, as the Wych Hazel, and may accordingly have given rise to some of the names apparently due to the true Hazel.

The name Wych is of uncertain origin. Turner uses it alone. In his "Names of Herbes" (1548) he says :—

"Vlmus is called in greeke Ptelea, in englishe an Elme tree, or a Wich tree, in duch ein Vlme baume, or Ylmen or Rust baume, in frenche Orme."

Dr. Prior was of opinion that "Wych" was the early English "Hwæcce," the French "Huche," a chest, our modern "Hutch," the wood of this tree being used in making such chests.

From the resemblance of the name—which is indeed not infrequently written "Witch"—the tree has been considered a preservative against witchcraft, and in the midland counties a small piece of its wood used accordingly to be let into the churns, under the belief that without it the butter would not come.

The name, like that of the Common Elm, is applied to a number of tolerably distinct forms rather than to a well-marked typical species. These forms all agree in producing no suckers; their branches are usually pendulous; the "samara," or winged seed-vessel, is more or less elliptical, with the seed-cavity below the middle, and the seed is fertile. Though characters like that of the position of the seed-cavity in the fruit appear trivial to the unbotanical, they are often, as in this case, the most readily detected; and when we become familiar with the general appearance of growing plants such distinctions are often borne out by differences which it is more difficult to describe in words. The Wych Elms do not grow to quite so great a height as the Common Elms, though they equal them in girth. In some forms the bark is corky, but not in others; but in all the twigs are usually downy, and the leaves for the most part large, coarsely and irregularly toothed, and unequally or "obliquely" rounded at the base. The leaves thus closely resemble those of the Hazel, from which fact the tree obtained its old name of Wych Hazel.

The typical form of the Wych Elm has a smooth thin bark, and does not throw out heavy horizontal limbs like the Common Elm. It flowers, too, rather earlier than the latter, and its samaras form conspicuous pale green hop-like clusters on the otherwise bare boughs in April, before the appearance of its leaves. The stem is often of no great height, though attaining a large girth; and from the main ascending limbs numerous twiggy branches wave pendulously with a pleasing effect when partly clothed with the unripe fruits or with the young leaf-buds in their tender greenery, whether the tree overhangs some steep-banked lane or stands isolated in a park. Gilpin says of it that it "is, perhaps, generally more picturesque than the common sort, as it hangs more negligently, though, at the same time, with this negligence it loses in a good degree that happy surface for catching masses of light which we admire in the Common Elm. We observe, also, when we see this tree in company with the Common Elm, that its bark is somewhat of a lighter hue."

Commenting on this passage, Sir Thomas Dick Lauder remarks:—

"We are disposed to think that Mr. Gilpin hardly does justice to this Elm. For our parts, we consider the Wych or Scottish Elm as one of the most beautiful trees in our British sylva. The trunk is so bold and picturesque in form, covered, as it frequently is, with huge excrescences; the limbs and branches are so free and graceful in their growth, and the foliage is so rich, without being leafy or clumpy as a whole; and the head is generally so finely massed, and yet so well broken, as to render it one of the noblest of park trees; and when it grows wildly amid the rocky scenery of its native Scotland there is no tree which assumes so great or so pleasing a variety of character."

It must perhaps be admitted that at midsummer all Elms are dull in colour, and not seldom heavy in outline. It is in spring and autumn that they are of most picturesque value in the landscape; and it is important that the beauties presented by them and by other trees at these seasons should be recognised alike by the artist and by the landscape gardener. The tree planter has the immense advantage over the painter that his materials are already blended by Nature; and imagination can suggest few colour effects more harmonious than those she presents in the vinous tufts of staminate flowers on the boughs of the Elm in March, its pale green fruit clusters a little later, or the October change to a clear lemon yellow spreading from bough to bough, each leaf paling to a pellucid grass-green as the autumnal tint encroaches upon its margin.

The Wych Elm grows more rapidly than the Common Elm, and its wood is consequently far inferior in hardness and compactness, besides being more liable to split. Statements to the contrary have arisen from the confusion in Scotland and the North of England of the spongy-timbered Cork Elm (*U. subero'sa* Mœnch) with the true Common Elm (*U. suberosa* Stokes), which occurs but rarely north of the Trent. The wood of the Wych Elm is, however, tough, straight-grained, and, when steamed, flexible, so that it is employed by boat-builders and cartwrights, and in making pumps. As it does not splinter, but becomes smooth from constant wear, it is also sometimes used for rollers, for the handles of spades, etc., and for wheel-barrows;

FRUIT, FLOWERS, AND FOLIAGE OF WYCH ELM.

whilst the excrescences on the stems are valuable for veneering. Gerard tells us that formerly long-bows were made from the wood of this species, and its tough bark was made into ropes.

In appearance the timbers of the two species of Elm are very difficult to distinguish, as may be gathered from our two photomicrographs, although one is taken from a large and the other from a small stem. The latter—the Wych Elm—shows the relatively large polygonal pith, the former best exhibits the rows of large pores forming the broad band of spring wood and the characteristic wavy peripheral lines of numerous small ones crowded together. These and the less prominent pith-rays distinguish Elm wood from Oak, which it resembles in colour. Some of our old English linen-chests are of Elm.

Among the chief varieties belonging to this group of the Elms—most of which are remarkably distinct in appearance—are the Downton, Exeter, Chichester, Canterbury, and Dutch Elms, and a form which may perhaps be fitly known as the Essex Elm.

The Downton Elm (*U. montana pendula*) is the variety commonly grown in our London squares and gardens, grafted on the ordinary Wych Elm. It was raised from seed from a Nottinghamshire tree at Worcester in 1810, and grown at Downton Castle, in Herefordshire, from which it takes its name. Its leaves are dark in colour, large, and somewhat closely set—so that, when large, the tree has sometimes a rather sombre effect; but its drooping boughs form many a pleasant arbour, and a row of specimens of this variety overhanging the River Ouse in the

churchyard of Newport Pagnell, in Buckinghamshire, is exceedingly beautiful.

The Exeter Elm (*U. m. exonien'sis*), occasionally seen in nursery gardens, is simply a "fastigiate" variety, having the leaves set closely round the erect branches. It has all the effect of an abnormal or monstrous form, without any redeeming beauty.

The Chichester Elm (*U. m. vege'ta*), though it may have originated more than once, was raised in 1746 by Wood, a nurseryman at Huntingdon, from seed collected in the neighbourhood. It is variously known as the Huntingdon, Scampston, or unfortunately as the American Elm, though it is, of course, quite distinct from the species (*U. america'na*) with its fruits fringed with hairs, to which that name properly belongs. It is valuable as a timber tree, and is of remarkably rapid growth, often sending up shoots six or ten feet long in a single season, and making a total growth of as much as thirty feet from the graft within ten years. According to Selby, there are many fine old specimens referable to this form in the counties of Huntingdon and Nottingham.

The Canterbury Elm (*U. montana super'ba*) was raised by the late William Masters in his nursery at Canterbury, and distributed under the name of *U. m. ma'jor*—a name likely to lead to confusion with the Dutch Elm, the *U. major* of Sir J. E. Smith. The Canterbury seedling had very large leaves, and was of rapid growth, but of no proved value as a timber tree.

The Dutch Elm (*U. hollan'dica*) has perhaps more claim than any of those just mentioned to rank as a

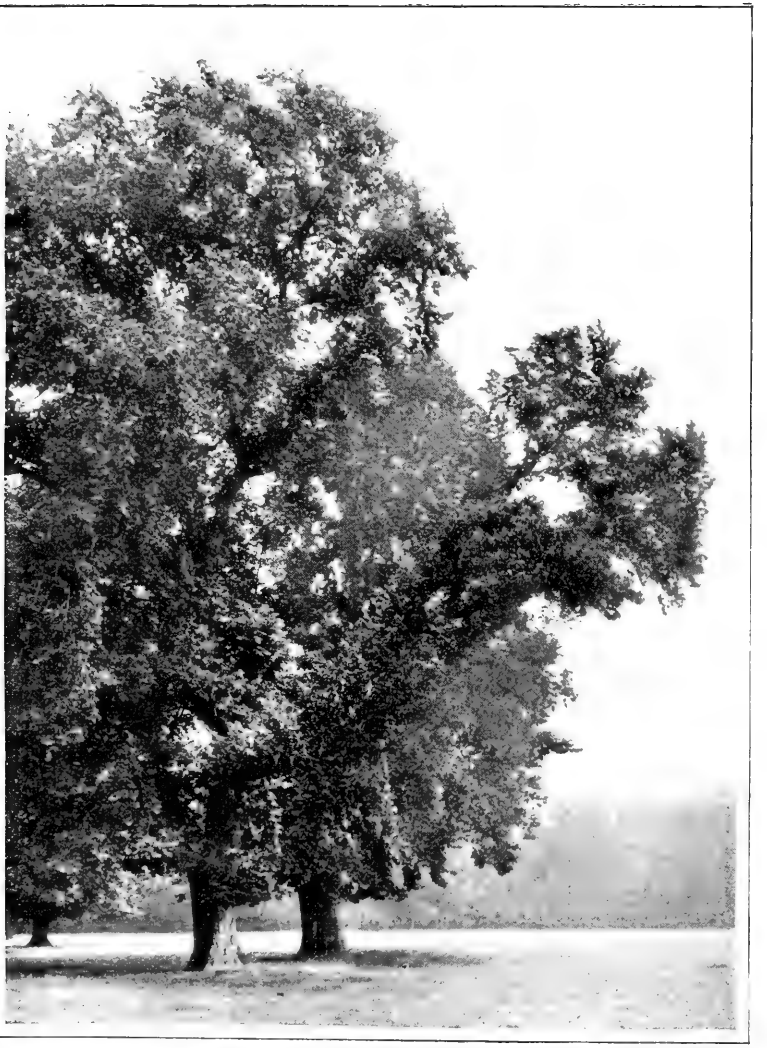
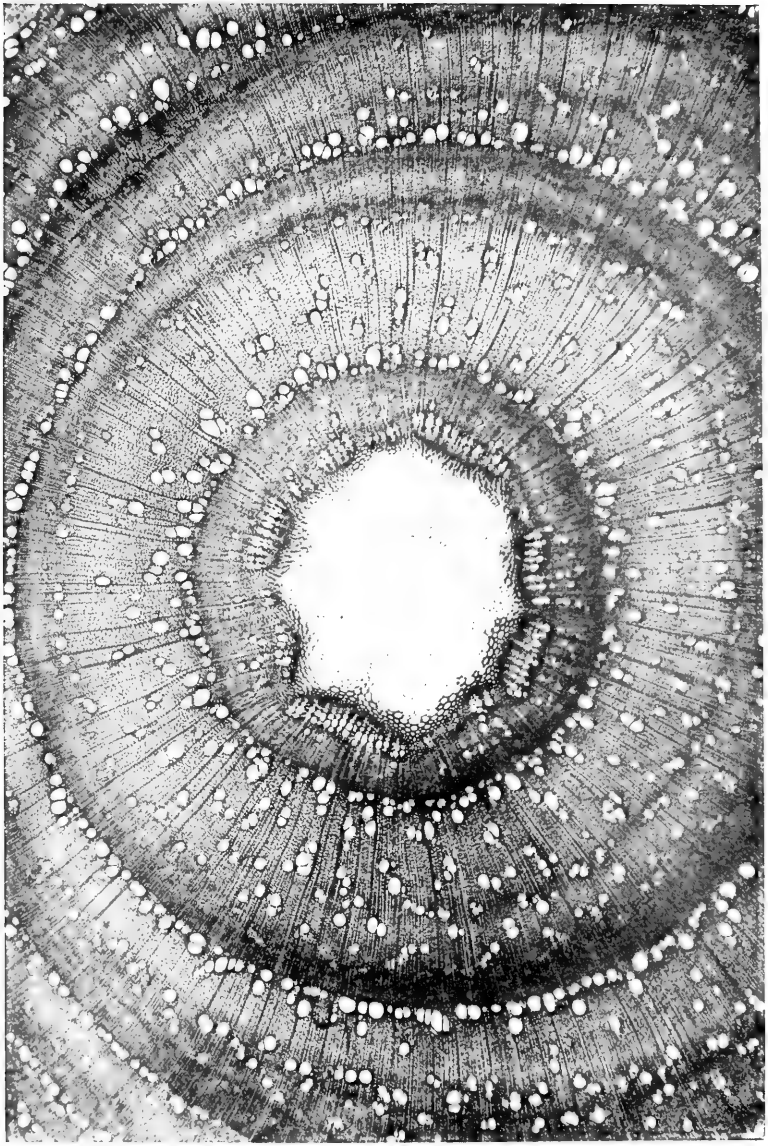


*Photo : H. Irving, Horley.*

WYCH ELMS.



TRANSVERSE SECTION OF WOOD OF WYCH ELM
(X 30 DIAMETERS)

distinct species; but it seldom matures its seed. It was introduced by William III. for clipped hedges, on account of its rapid growth. It has branches which spread almost as widely as those of the Common Elm, and the bark of which, at first smooth, becomes afterwards more corky than that of any other Elm, not excepting the form known as the Cork Elm (*U. suberosa*). The leaves are large and coarse; and the calyx-lobes and stamens each four in number, instead of the more frequent five. Many of the Elms near Kensington Palace belong to this variety; but except for its handsomely furrowed bark and rapid growth, it has not much specially to recommend it, as its rapidity of development renders it liable to the defect known as "star-shake," which makes it less fit for boat-building or other uses.

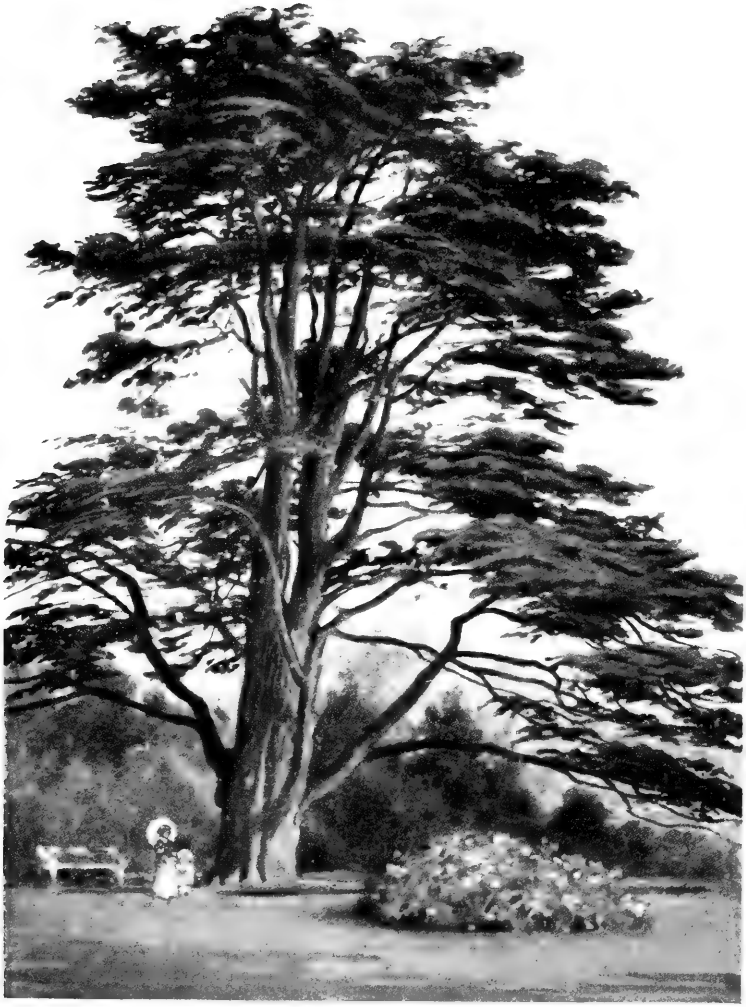
The variety which, it is suggested, from its abundance in that county, may be known as the Essex Elm (*U. nitida* of Syme, or *U. elegans* of Edward Forster's MSS.), forms fine straight-stemmed trees with gracefully curving but only slightly pendulous boughs, and with leaves which are not very large, but smooth and shining, of a dark shade of green, and with a tapering point and regularly serrate margin somewhat resembling in their delicate outline the foliage of the Hornbeam.

All these forms are classed as Wych Elms, from the seed-cavity in their samaras being below the centre, and several of them are worth consideration by the tree planter. Like various foreign species, they are commonly grafted upon the hardy typical Scotch Elm, which is itself mainly reproduced from

seed. As a park tree, no variety excels this typical form, which is seen to the greatest advantage when standing alone, as the drooping boughs are then able to display all their natural grace of curvature.

There are many fine specimens of this tree in the Lowlands of Scotland, and in various parts of England; but, from confusion of nomenclature, the Wych Elm is hardly distinguished from the Common Elm by the majority of Continental observers. At Ashtead Park, Surrey, there is a magnificent tree, said to date from the time of William Rufus. Its massive, though much decayed trunk and lofty wide-spreading limbs produce in the mind of the lover of trees an echo of the apostrophe of Allan Quatermain, who says :—

"I do love a good tree. There it stands so strong and sturdy, and yet so beautiful—a very type of the best sort of man. How proudly it lifts its bare head to the winter storms, and with what a full heart it rejoices when the spring has come again! How grand its voice is, too, when it talks with the wind: a thousand Æolian harps cannot equal the beauty of the sighing of a great tree in leaf. All day it points to the sunshine and all night to the stars, and thus passionless, and yet full of life, it endures through the centuries—come storm, come shine—drawing its sustenance from the cool bosom of its mother earth, and, as the slow years roll by, learning the great mysteries of growth and of decay. And so on and on through generations, outliving individuals, customs, dynasties—all save the landscape it adorns and human nature—till the appointed day when the wind wins the long battle and rejoices over a reclaimed space, or decay puts the last stroke to his fungus-fingered work. Ah! one should always think twice before one cuts down a tree!"



CEDAR OF LEBANON

# THE CEDAR OF LEBANON.

*Ce'drus Li'bani* Barrel.

THE origin of the name Cedar is somewhat doubtful; but it is probably a Semitic word allied to the Arabic "kedre," meaning "power." But, though so frequently mentioned in the Bible, in classical writers, and by early travellers, the tree itself was certainly not brought to England before the latter part of the seventeenth century.

The genus *Ce'drus* is mainly distinguished from the closely allied genus *La'rix*, the Larches, by its leaves being evergreen, they being, as in that genus, grouped in tufts, or "fascicled." The other leading characteristics of the genus are the erect position of its cones and the deciduous character of their scales.

The Cedars are a very small group, only three species being recognised, and these entirely confined to the Old World; but many other trees with somewhat similar wood are popularly known as Cedars in many quarters of the globe. The three true Cedars —the Deodar (*C. Deoda'ra* Loudon) of the Himalayas and Hindoo Koosh, the Lebanon Cedar (*C. Libani* Loudon), with its small-leaved variety in Cyprus, and the Mount Atlas Cedar (*C. atlan'tica* Manetti) —are so closely allied as to be by some regarded as merely geographical races of one species. As all three are now common in cultivation it will readily be noticed that at different ages each kind nearly

resembles the others; and when grown from seed the Lebanon Cedar varies considerably, its branches either drooping or rising in a fastigiate manner. The main distinctions between the three are, however, that the Deodar has drooping branches and silvery foliage, the Lebanon Cedar has its branches horizontal and its mature foliage of a dark and somewhat bluish green, whilst the Mount Atlas Cedar has ascending branches and needles of a yellower shade of green.

The most striking characters of the Lebanon Cedar are the numerous large and wide-spreading horizontal branches and the broad and flattened summit of the full-grown tree. When young, one or two leading branches rise above the rest; but the mature form is known to nurserymen as "clump-headed." These points, together with the fact that the Cedar grows best in a deep soil, where its roots have access to water, are most graphically presented to us in the grand passage in the Book of Ezekiel, the most striking of the many Biblical allusions to this tree:—

"Behold the Assyrian was a cedar in Lebanon with fair branches, and with a shadowing shroud, and of an high stature; and his top was among the thick boughs. The waters made him great, the deep set him up on high with her rivers running round about his plants, and sent out her little rivers unto all the trees of the field. Therefore his height was exalted above all the trees of the field, and his boughs were multiplied, and his branches became long because of the multitude of waters, . . . Thus was he fair in his greatness, in the length of his branches; for his root was by great waters . . . nor any tree in the garden of God was like unto him in his beauty."

The rich brown bark of the gradually tapering stem becomes deeply scored with age, and contrasts well with the level layers of dark foliage. Though

the tree seldom exceeds eighty feet in height, its massive branches often spread from thirty to fifty feet on all sides, the lower ones resting upon the ground, though not rooting in it, thus forming a broad-based pyramid densely clothed with leaves. The horizontal lines of its upper boughs give it, in common with the Stone Pine, an architectural character harmonising with the columns and straight copings of classical buildings. This was noticed by Martin, who is fond of introducing the Cedar into his pictures, particularly into those of the terrace gardens of Babylon and Nineveh.

Its stately outline and somewhat sombre hue equally entitle the Cedar, alone perhaps among our larger trees, to a position on the trim lawn, or near the balustraded terrace of a mansion in the style of the eighteenth century.

The dwarf shoots that bear the tufted leaves continue to do so each spring for several years with hardly any lengthening, and ultimately terminate in either a pollen-bearing catkin or a cone. The leaves are straight, nearly cylindrical, but tapering towards their points, and about an inch long, and they remain two years on the tree. On falling, they do not decay for several years, so that a layer of leaf-mould has been observed half an inch in depth under a plantation fifteen years old, whilst that under the Cedars on Mount Lebanon is a foot thick.

The Cedar in England grows rapidly, making annual rings from an eighth to half an inch across; but its wood is spongy, very apt to shrink and warp, and by no means durable. It is of a reddish colour and less resinous than that of the Larch. In its

mountain home, however, the Cedar grows more slowly and forms a better wood, so that there seems no sufficient reason for doubting that the wood used for Solomon's Temple and palace was that of this tree. It is more doubtful, however, whether Virgil and other classical writers are alluding to the wood of what we now call the Cedar when they speak of it as being incorruptible and therefore used for statues of the gods. The Romans certainly believed in the preservative character of the resin which exudes from wounds in the Cedar, and which they called "Cedria." This was used to protect papyri from the attacks of worms, and is stated to have preserved the books of Numa uninjured in his tomb for five centuries after his death.

The tree seldom flowers until it is five-and-twenty or thirty years old; and it is characteristic that both inflorescences turn upwards. The reddish catkins are about two inches long, but the cones, after fertilisation, become four or five inches in length. When young and green these latter have a pinkish or plum-coloured bloom, which, however, they soon lose, becoming a rich brown. The scales of the cone are very broad and tough, though thin, and each of them bears two broadly-winged seeds. Resin exudes from the cones, and after some years the scales fall away from the axis. Squirrels are fond of the seeds, but the Cedar is singularly free from the attacks either of insects or of fungal diseases.

The Cedars on Mount Lebanon have been frequently visited by travellers since the middle of the sixteenth century. Lamartine writes of them:—

CONES AND NEEDLES OF CEDAR OF LEBANON.

"These trees are the most renowned natural monuments in the world: religion, poetry, and history have all equally celebrated them. The Arabs of all sects entertain a traditional veneration for them. They attribute to them not only a vegetative power which enables them to live eternally, but also an intelligence which causes them to manifest signs of wisdom and foresight similar to those of instinct and reason in man. They are said to understand the changes of the seasons; they stir their vast branches as if they were limbs; they spread out or contract their boughs, inclining them towards heaven or towards earth, according as the snow prepares to fall or to melt."

The mountain is covered with snow during a great part of the year; but on August 5th, the eve of the Feast of the Transfiguration, the Maronites from the surrounding villages have long been in the habit of visiting the mountain, and there celebrating the "Feast of Cedars" with singing and dancing, mass being celebrated on the following day at one of the stone altars which stand beneath several of the larger trees. Most of the Cedars show signs of having been frequently struck by lightning.

There are naturally many legends connected with so interesting a tree. One of the most remarkable relates that Seth, sent by Adam to Paradise for the oil of mercy, saw, from the gate of the garden which he was not permitted to enter, a leafless Cedar with branches borne high towards heaven, on which was seated a child in glittering raiment. The angel-guardian of the garden gave him three seeds from the tree, which, on his return, he placed in the mouth of his parent, who was then dead. From these seeds there sprang, on the grave of Adam in Hebron, a Cedar, a Pine, and a Cypress, which united into one gigantic tree. After being carefully protected by

Abraham, Moses, and David, this tree was felled by Solomon to form a beam in the temple; but his carpenters, finding it impossible to shape it as they wished, laid it aside, and, after forming a bridge over the brook Kedron, and being thrown into the Pool of Bethesda, to which it imparted its healing virtues, it ultimately furnished the wood of the Cross.

The actual date of the first introduction of the Cedar into England is uncertain. A most improbable tradition assigns the planting of the celebrated trees at Enfield and Hendon to Queen Elizabeth, and the tree at Oatlands Park, Weybridge, is said to have been planted by Prince Henry about 1640, but Evelyn in his "Sylva" (1664) speaks of the tree as not grown in England, though he had received cones and seeds of it from Lebanon, so that it is most likely that men so interested in trees as were he and Henry Compton, the Bishop of London, would soon have grown it from seed. The Cedar on the rectory lawn at Childrey in Berkshire is said to have been grown by Dr. Pocock, the first Laudian Professor of Arabic, from a cone brought by him from Lebanon in 1646; and another of the oldest existing Cedars in England is the Enfield tree, planted by Dr. Uvedale, head master of the Grammar School, apparently between 1665 and 1670, from seed said to have been brought to him from Lebanon by a pupil, but possibly given him by Evelyn. The Cedar at Bretby Park, Derbyshire, is said to be proved by the gardener's accounts to have been planted in 1676. Its girth is now nearly sixteen feet, and its branches, though many have been lost, still spread about 100 feet. William Ashby, a Turkey

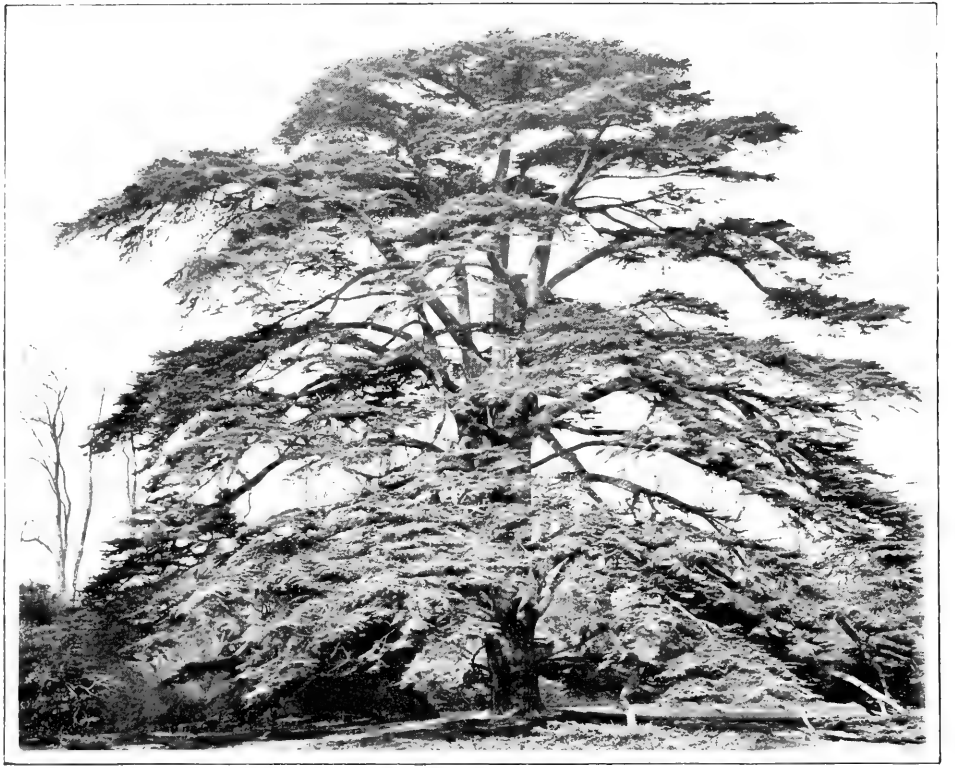
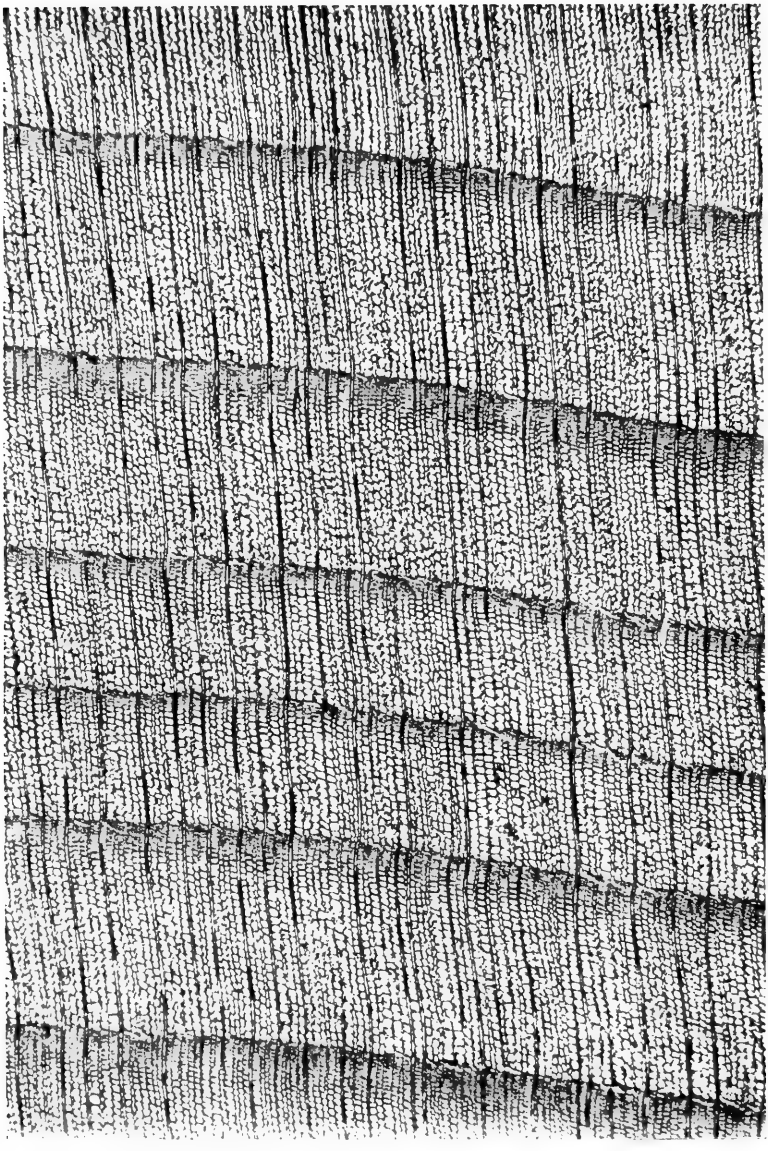


Photo: *E. J. Wallis, Kew.*

CEDAR OF LEBANON AT SYON HOUSE, ISLEWORTH.



TRANSVERSE SECTION OF CEDAR OF LEBANON WOOD
(X 30 DIAMETERS)

merchant, is stated to have brought seed from the Levant, between 1680 and 1690, from which sprang the Cedar at Quenby Hall, Leicestershire; but the trees standing till recently close to the river, in the garden of the Apothecaries' Company at Chelsea, were certainly planted before 1685, under the direction of Sir Hans Sloane, and perhaps of Evelyn.

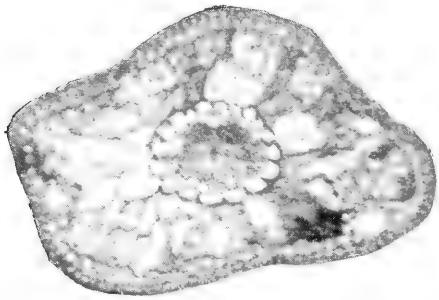
Sir Stephen Fox, the ancestor of Lord Holland, is also stated to have imported the Cedar from the Levant to Farley, near Salisbury, and to Chiswick; and another of the earliest specimens in the country must have been that planted by Samuel Reynardson at the Cedar House, Hillingdon, Middlesex, cut down in 1789, which was over fifty feet high and spread nearly 100 feet in 1779. It is also worthy of note that the finest Cedar in Essex, known locally, like so many others, as the oldest in England, is that at Faulkbourn Hall, which from 1677 to 1679 was the residence of John Ray. This tree is eighty feet high, over twenty feet in girth, and 100 in the spread of its branches.

From the early part of the eighteenth century the planting of the Cedar as an ornamental tree has been general. The magnificent grove at Whitton Park, Twickenham, was raised from seed in 1722 by Archibald Duke of Argyll, who introduced the species into Scotland in 1740. In 1734 Bernard de Jussieu took two plants from England to France in his hat, and in 1761 we find the Duke of Richmond buying a thousand plants of the Cedar for Goodwood Park, for seventy-nine pounds, from John Clarke, a butcher at Barnes, who was very successful in raising seed

from the great tree at Hendon, which was blown down in 1779.

Of existing specimens, that at Strathfieldsaye, 108 feet high, is the loftiest; but unquestionably the largest and handsomest is that at Syon House, Isleworth, seventy-two feet high, over twenty-five feet in girth, and sweeping the ground with its branches, which spread nearly 120 feet.

The Cedar is not difficult to raise from seed, nor is it at all exacting in the matter of soil; but unfortunately it suffers great damage from the accumulation of snow on the fan-like expansions of its evergreen branches.



TRANSVERSE SECTION OF NEEDLE LEAF OF CEDAR OF LEBANON

ALDER.

# THE ALDER.

*Al'nus glutino'sa* Medic.

THE small Order of catkin-bearing trees, the *Betula'ceæ*, includes only the two genera *Bet'ula*, the Birches, and *Alnus*, the Alders. These are, as we have seen, mainly distinguished by the character that, whilst in the Birch the scales constituting the fruit-bearing catkins are thin, and fall off simultaneously with the fruit itself, in the Alders these scales become thick and woody, and remain on the tree as a minute cone after the fruits have been discharged.

The few species constituting the genus *Alnus* are shrubs or trees, seldom reaching a large size, and range from Japan through Asia to the north of the Himalayas, throughout Europe, North Africa and North America, and along the Andes into Chili; but our one British representative of the group is confined to the Old World. Its distinctive feature is its leaves, which are roundish, with a wedge-shaped base, a wavy and slightly toothed margin, and a short stalk, whilst they are hairy and glutinous when young—whence the specific name, *A. glutinosa*—and glossily dark olive-green on both surfaces later on.

Though it may grow to a tree of considerable size, even reaching a height of seventy feet, and more than nine feet in girth, it does not usually exceed thirty or forty feet in height, or six feet in circumference, and is so commonly treated as coppice that it is most

familiar to us in rounded clumps of a bushy habit, with several stems, none of which exceeds half that size. Then it is that what beauty it possesses is revealed, as it grows, either with Willows or isolated, on the banks of streams in our midland or northerly counties. Gilpin indeed speaks of it as growing in perfection on the banks of the Mole; but there are far finer specimens by many more northern streams. "He who would see the Alder in perfection," he writes, "must follow the banks of the Mole in Surrey, through the sweet vales of Dorking and Mickleham, into the groves of Esher. The Mole, indeed, is far from being a beautiful river: it is a quiet and sluggish stream; but what beauty it has it owes greatly to the Alder, which everywhere fringes its meadows, and in many places forms very pleasing scenes, especially in the vale between Box Hill and the high grounds of Norbury Park."

In such situations our attention has often been claimed by the beauty of its rich masses of foliage as they overhang the golden beds of Marsh-marigolds, or, later in the year, the foamy banks of Meadow-sweet and the gorgeous magenta spikes of the Loose-strife. Like all water-side plants, it retains its leaves longer than the deciduous trees of dry situations, keeping them sometimes until January; and, as they do not change colour in autumn, its verdure is pleasing, even though the rigidity of its branches detracts from its gracefulness. Sir Thomas Dick Lauder justly supplements Gilpin's remarks with the observation that the Alder is as often associated with the more rugged scenery of the glens and ravines

of Scotland, where it grows at an altitude of 1,600 feet, as with that of the tranquil alluvial vales of England. Some of the most striking individual trees, indeed, known to the present writer are a few gnarled, crooked, and round-headed standard specimens, of no very exceptional size, in a mountain glen among the ancient Scots Firs of the forest of Ballochbuie, near Balmoral.

Though it certainly flourishes best where its main roots are some little height above the water, the Alder is more tolerant of stagnant water around it than any other European tree ; and from the dense mass of rootlets which it puts out in such situations, no tree is so well adapted for holding together the banks of rivers.

The bark of the larger stems is nearly black, and is full of clefts, as was noticed by Virgil in the passage which Dryden renders—

> " As Alders in the spring the boles extend,
> And heave so fiercely that their bark they rend."

Nor is there anything noticeable in the appearance of the ascending branches, so that, when leafless, the tree is not attractive. When, however, we see how our exotic evergreens suffer from the cold, and how the Yew-trees on the North Downs are bent towards the east by the westerly gales of autumn and winter, we can appreciate the provision of Nature by which the trees of the colder temperature regions are, as a rule, deciduous.

The buds are stalked, bluntly oval, and brown with a violet tinge; and the leaves broadly and bluntly obovate, and pinnately veined, with from

five to seven pairs of secondary veins. Their margin is toothed, and they have conspicuous stipules; but it is, perhaps, their dark glossy green which is their most immediately distinctive character.

When in autumn the Alder-swamps are strewn with the newly felled stems it will be seen that the live wood of the tree is white, but that it becomes red, as if with blood, where it is cut, and afterwards fades to a permanent pale pink. It is soft, with short fibres, giving it a homogeneous texture, and of moderate density, and is of exceptional durability if kept either perfectly dry or under water. It was used by the ancients for boats, possibly "dug-out" canoes; and Virgil stating that this tree formed the first material so employed, Professor Martyn suggests that a hollow Alder, falling into the stream on the banks of which it grew, may have given to man the first idea of a boat. Both Pliny and Vitruvius mention its employment for piles, the former also stating that it was used for water-pipes and for protecting river-banks, and the latter that the city of Ravenna was founded upon piles of its wood. According to Evelyn the celebrated bridge of the Rialto at Venice was similarly founded; and even down to the present day Alder-wood is used for piles in Holland.

The Alder loses about a third of its weight and a twelfth of its bulk in drying, but does not warp, so that it is suitable for turnery, carving, cabinet-making, clogs, sabots, and wooden platters. "Alder for shoes do wise men choose," writes Mr. Kipling. It has also been largely used for the staves of herring-barrels and from its softness, which prevents it from splitting,

FOLIAGE AND MALE AND FEMALE CATKINS OF ALDER.

it is recommended for wheelbarrows and stone-carts. Old trees with wood full of knots, when cut into planks, have all the beauty of the curled Maple, with the colour, though not the grain, density, nor lustre, of Mahogany. The wood is, however, liable to the attacks of the larva of a small beetle, for which reason sabots made of this wood in France are hardened by smoking. It is also recommended to immerse Alder logs for some months in peat to which lime has been added, and to varnish any furniture made from them. Being rich in tannin, the wood, if left long in peat, becomes as black as ebony, and when newly felled it takes a stain readily, so as sometimes to be used as a substitute for that wood; but it is far too soft to admit of the lustrous polish of so exceptionally dense a timber.

As fuel the Alder is far inferior in heating power to the Beech, but for this reason is useful for purposes where a slow heat is wanted. By far the chief use of the tree at the present day is for gunpowder-charcoal, for which purpose it is grown to a considerable extent, being only inferior to the Alder Buckthorn—the so-called "Dogwood"—(*Rham'nus Fran'gula*) and to the White Willow (*Sal'ix al'ba*). It is treated as coppice, and cut down every five or six years. The branches, which should be about four inches in diameter, are, like the buds, somewhat triangular in section, which gives a characteristic form to their small pith. The charcoal of the Alder is used for powder for heavy ordnance, or for the commoner commercial kinds.

The Alder is one of the woods which have of late

been to some extent employed for paper-making. A ton of green wood yields three hundredweight of fibre, which bleaches fairly well, so as to be suitable for paper of various qualities.

From the time of Theophrastus the bark of the young shoots has been used for dyeing and tanning leather. When these shoots are less than a third of an inch in diameter, their bark yields no less than sixteen per cent. of tannin. They produce red, brown, or yellow dyes if used alone, and black on the addition of copperas. The natives of Lapland are stated to use the Alder as a dye for their leathern garments, chewing its bark, and then employing their saliva, which becomes red in the process.

As final recommendations of the planting of this somewhat neglected tree in our swampy meadows, it may be mentioned that its boughs, from their durability in water, are especially suitable for filling in drains in wet land, and that it is exceptional in not in any degree injuring the grass that grows beneath it, either by its shade or by its fallen leaves. This last characteristic is alluded to by Browne in "Britannia's Pastorals," where he writes—

> "The Alder, whose fat shadow nourisheth;
> Each plant set neere to him long flourisheth."

As in the allied Birch, the male and female catkins are in the Alder on the same tree. They appear before the leaves, the male ones being visible in autumn and the female ones being often conspicuous among the dark branches in March, whilst

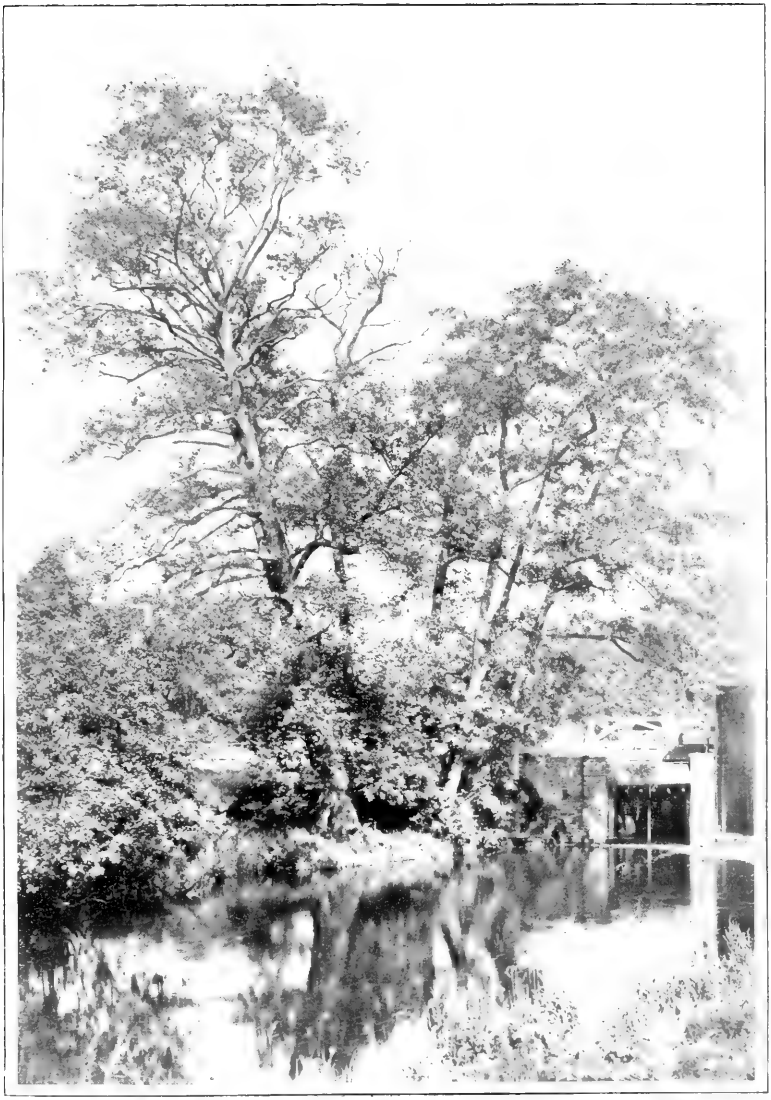
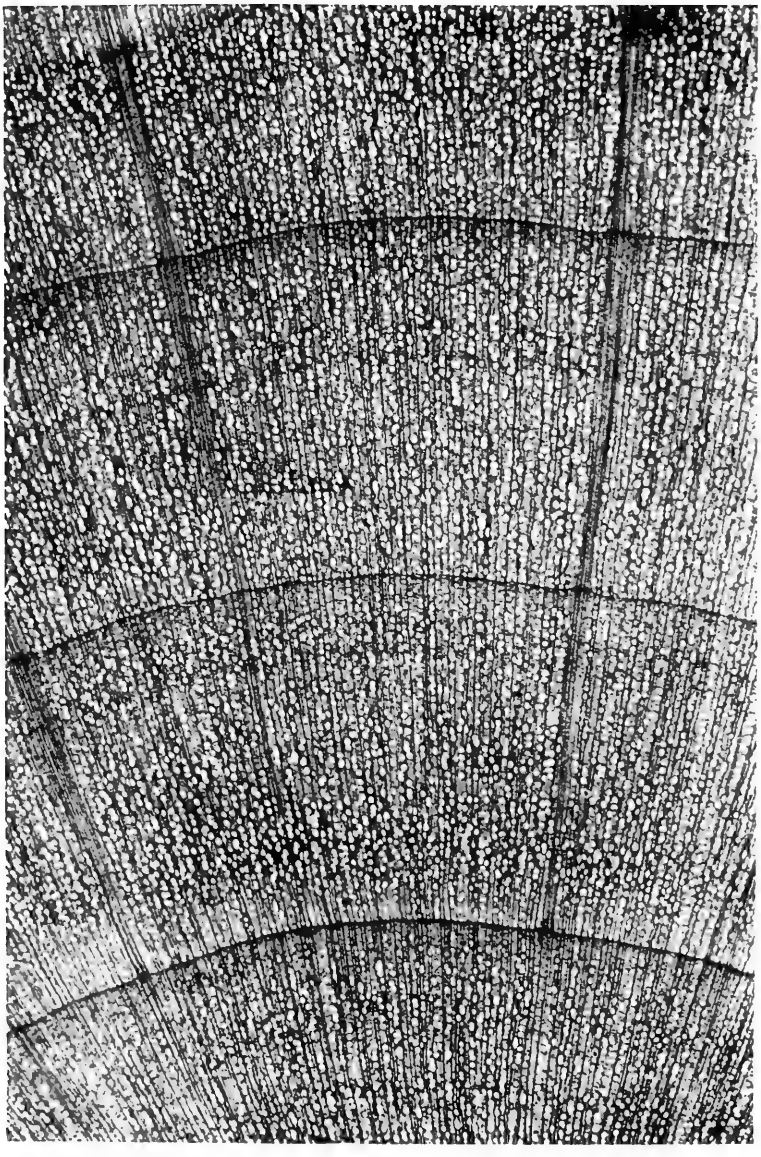


*Photo: H. Irving, Horley.*

ALDER.



TRANSVERSE SECTION OF ALDER WOOD (X 10 DIAMETERS)

the leaves do not appear till the end of April or the first half of May. The male catkins are from two to four inches long, and of a dark red colour, from the shield-like scales which protect the anthers and their pollen from rain and premature winds; whilst those bearing the female flowers are seldom an inch in length, and resemble miniature Fir-cones of a reddish brown hue. When the small winged fruits have been ripened and set free, the woody bracts hanging in catkins on the bare boughs still more forcibly suggest this resemblance.

The Alder can be reproduced either by layers, or by large cuttings, or "truncheons," two or three feet long. These it is recommended to leave during a winter and spring with their ends in water before planting. The tree is, however, preferably multiplied by seed. The cones should be gathered in dry weather, when their scales are beginning to open; and the seeds are best sown in November or December, in soil not exceptionally moist, and kept covered with Pine-needles, or other light dry litter, until April, when the seedlings will be fairly up. These may be transplanted in the nursery when a year old, and planted out at two years old.

The glossiness of its foliage gives the chief value to the Alder in a landscape. Folded in the bud like a fan, and enclosed by two pale-coloured "stipules," the leaves are at first hairy, as well as glutinous. They can thus shoot off moisture that might induce decay in the buds, or subject them to the action of frost. They somewhat resemble

those of the Beech, but are duller and darker in hue. In fact, the dark green of the tree and its compact growth in rounded masses render it sombre and heavy when the sun is not on it. The cut-leaved variety gains considerably in lightness; but, though there are many trees more valuable and more beautiful, there is yet an undeniable charm belonging to the glossy clumps of the ordinary forms. When we see it overhanging some stream or pool, contrasting with the blue-grey of the Iris or the Reed-mace, or with the gay flowers of the Water-crowfoot or Arrowhead, while the dab-chick or the water-vole finds a home among its roots, or a temporary shelter beneath its boughs, the Alder forms by no means an unpleasing foil to its gay surroundings.

SPRUCE.

# THE SPRUCE FIR.

*Pi'cea excel'sa*, Link.

THERE has been considerable confusion as to the name, whether classical, popular, or scientific, of this tree. The word "fir," the torch or fire tree, was originally applied to the Scots Pine (*Pi'nus sylves'tris* L.), and *Picea* and *A'bies* were used almost indiscriminately by classical writers for the Norway Spruce or for the Silver Fir of Central Europe, whilst modern botanists have been hardly more decided. Thus this tree is the *Pinus Abies* of Linné, *Pinus Picea* of Duroi, *Pinus excelsus* of Lamarck, *Abies Picea* of Miller, *Abies excelsa* of De Candolle, and—the name now in use—*Picea excelsa* of Link. In his "Names of Herbes" (1548), William Turner says:—

"Picea is called in greeke as Theodore Gaza turneth, pitys, and after Ruellius peuce, and it is called in duch rottē Dan, wherfore it maye be called in englishe a red firre tree."

It is, however, very doubtful whether the Norway Spruce had been then introduced into this country, though it is probably the tree which both Pliny and Turner knew as *Picea*. The controversy as to whether the Spruce or the Silver Fir is the better entitled to the classical name *Abies* turns partly upon Virgil's lines in the Æneid with reference to the wooden horse of Troy:—

"Instar montis equum, divina Palladis arte
Ædificant, sectaque intexunt abiete costas."

This Dryden translates:—

> "by Minerva's aid, a fabric rear'd,
> Which like a steed of monstrous height appeared;
> The sides were planked with pine."

But Messrs. Lonsdale and Lee in their more literal prose render it:—

> "The leaders of the Greeks . . . build, with the aid of the divine skill of Pallas, a horse as huge as a mountain, and form the sides of interlacing planks of fir."

Now on Mount Ida, the modern Kas Dagh, there is no Spruce, but a form of the Silver Fir is abundant. As this tree differs from the ordinary Silver Fir (*Abies pectina'ta* D.C.) of Europe in having spinous-pointed leaves and shorter cones, it has been named as a variety *A. p. E'qui Troja'ni.* The Spruces differ from the Pines, Larches, and Cedars in that their leaves are arranged singly in a spiral along elongated shoots, and not tufted or grouped on lateral dwarf shoots. From the former group they are further separated by the absence of any woody thickening at the ends of the scales of their cones; their seeds, too, ripen in a single year. From the Firs proper, of which the Silver Fir (*A. pectinata* D.C.) is the best known, they differ in their leaves being four-angled and prismatic in section, instead of flattened and two-edged, and having stomata on the upper surface; in the anthers splitting longitudinally; and in their cones hanging downwards after fertilisation, and (after having shed their seeds) dropping off whole instead of falling to pieces while on the tree.

The Spruce is the loftiest of European trees, reaching a height of 125 to 150 feet, or even, in its native

country, as much as 180 feet, with a straight, tapering stem from two to six feet in diameter, and sweeping branches disposed very regularly round it, giving it, with the long straight leading shoot, a very conical outline. The secondary branches are produced mainly at the sides of the primary ones, so as to form broad horizontally spreading sprays. In young trees the branches are nearly horizontal; but in older ones, if free scope is given for growth, a very graceful pendent habit is assumed, branches sweeping down to the ground, and even taking root and again following a vertical direction, so as to form a grove of young trees round the original stem. Similar anomalies of growth are not uncommonly exhibited by Spruces that have been blown over. Such specimens may be seen among the forests of Norway, and have been described from the Whim, an estate at the foot of the Pentland Hills. They serve to illustrate the fact that the Spruce may be readily reproduced by the system of "layering," or pegging down considerable branches. The root generally spreads a good deal horizontally, which, together with the preference of this species for soft and somewhat moist soil, renders it more liable to be prostrated by wind than the tap-rooted Pine. The bark of the trunk is rather thin, warty, and of a reddish brown, becoming scaly as the tree gets older.

The buds are dry, not resinous, and conical. The leaves are generally less than an inch long, sharp-pointed, slightly curved, very stiff, and of a dark though clear green; and, although spirally "inserted," they are so arranged on the shoot, the upper ones directed forwards along the stem and the lower ones

sideways, as to give a somewhat flattened appearance to the individual sprays, though not so regular as those of the Yew.

Individually the leaves are four-edged, and narrow to a slight petiole which is inserted on a prominent angular pulvinus. There are fine lines of stomata along all the sides of the leaf; the hypoderm is only a single layer of small polygonal cells with thickened walls; and the thick mesophyll is made up of irregularly polygonal thin-walled cells. There is only a single vascular bundle in the midrib, and generally one resin-canal near the under surface.

The pollen-bearing catkins are produced near the apex of the lateral shoots, generally several together, on stalks, which elongate considerably. They are of a yellowish colour, tipped with red, and cylindrical in form, becoming ultimately curved, and as much as an inch in length; but in their earlier stages they have been compared to half-ripe strawberries.

The cones are borne mainly at the ends of the upper branches, and in the flower stage stand erect, and vary in colour, according to soil or situation, from green or yellow to pink, dark red, or purple. After fertilisation they become pendent and green, taking the form of a pointed cylinder, from five to seven inches long and from an inch and a half to two inches broad. Their scales are thin, with their edges slightly curved inwards and notched at the top. There are from 160 to 180 of them in each cone; and as each bears two seeds at the base of its inner surface, an ordinary cone may yield from 300 to 350 seeds. In autumn the cones ripen to a rich and glossy brown

CONES AND NEEDLES OF SPRUCE.

hue; but it is not generally until the drying wind and warm sun of the following spring that they discharge their seeds. These are furnished with oval, semi-transparent, pale brown wings.

The Spruce grows almost as rapidly from seed as does the Scotch Pine; for, though for three or four years not exceeding six or eight inches per annum, after reaching a height of three feet the plants will grow from two to three feet a year until they are fifty feet high, so that they may be as much as fifteen feet at ten years old, whilst they may attain in fifty years to a height of a hundred feet. In its native country the tree is not thought to live much beyond a hundred or a hundred and fifty years, and the best Spruce timber brought into the market is from seventy to ninety years old.

The species is widely distributed both in latitude and longitude—more so, in fact, than many of its allies, being indigenous alike in the Kurile Islands and Siberia, and from the Swiss Alps to beyond the Arctic Circle. Though in its extreme northern area it seldom occurs at an altitude of more than 750 feet above sea-level, in the south of Norway it reaches more than 3,000 feet, at the same time descending the shores of some of the fjords down to the water's edge. It is, in fact, the prevalent tree of the basin of the Baltic, and Loudon states that the finest Spruce forests which he had seen were between Memel and Königsberg, growing in peaty soil that rested on sand, and was liable to inundation during a great part of every winter. It is, in fact, owing to its requirement, for its successful cultivation as a timber tree, of

soil that in England or Scotland can be profitably cultivated for agricultural crops, that the Spruce has not been so extensively planted as the Pine and the Larch, which flourish in drier and more barren soils.

The wood of the Spruce is generally white, more elastic, less resinous, and consequently lighter, than that of the Scotch Pine. When grown in the open, where large branches may be broken off, it is apt to be very knotty; but in denser forests, where it is drawn up, it is fine and even in grain. It has been largely imported from Norway "in the round," for masts, spars, scaffolding, and ladders. These are, however, the smaller trees, imported with the bark on. The larger trees are sawn up, and are known as White Baltic, Norway, Christiania, or Danzig deal. They are much used in building, both for joists and for flooring, while of late years immense quantities have been brought over in a manufactured state as door and window frames or cheap furniture. This timber is undoubtedly inferior to that of the Scotch Pine, and one cause which has hitherto militated against its employment for some purposes, such as paving-blocks, is the fact that it is found very difficult to treat with creosote. By the recently introduced system known as Powellising it may, however, be easily treated with a saccharine solution. The waste is used in Sweden and Belgium for matches and paper-pulp. The wood is durable when kept dry, and its grain adapts it for carving, polishing, or gilding.

The resin, though less abundant than that of the Pines, is of considerable value. It oozes as a fine yellow turpentine, known as "Spruce rosin" or

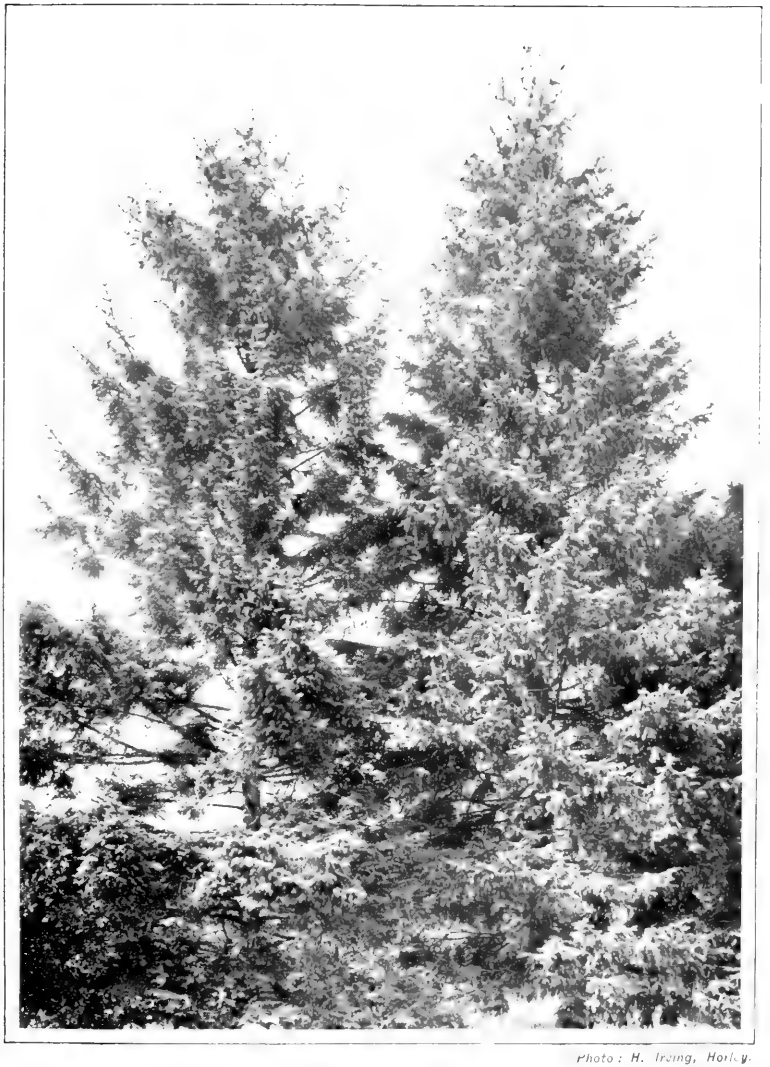
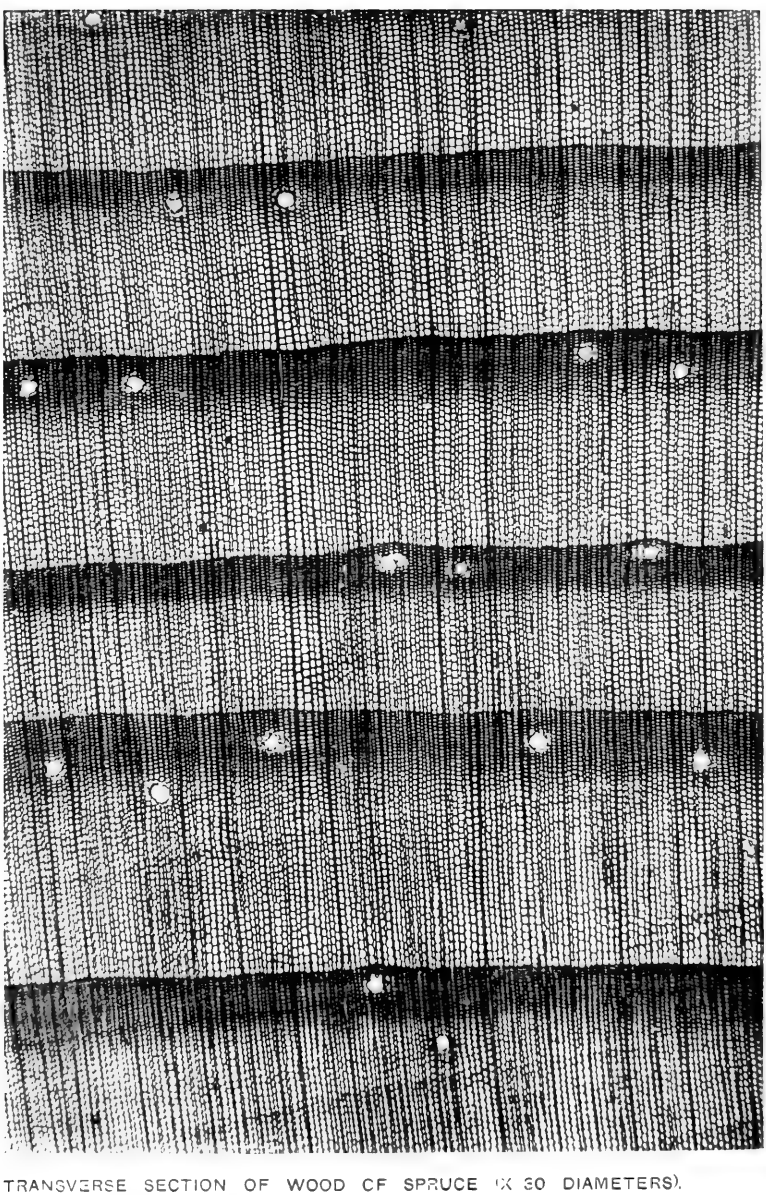


*Photo: H. Irving, Horsley.*

SPRUCE.



TRANSVERSE SECTION OF WOOD OF SPRUCE (X 30 DIAMETERS).

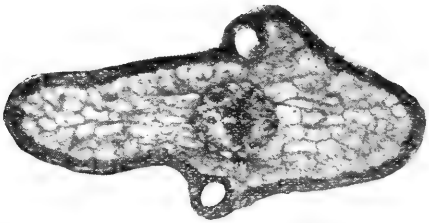
"frankincense," from cracks in the bark or from artificial incisions, for as long as twenty years; but eventually the wood is rendered valueless for timber, and even almost useless for fuel. By melting, boiling with water, and filtration, the medicinal Burgundy pitch is prepared from this resin in the Vosges Mountains, besides small quantities of colophony, lamp black, and spirit of turpentine.

In Norway the bark is used for tanning, though inferior to that of the Larch, and in times of scarcity the sweetish bast is even ground down with meal as a breadstuff. In all countries where the Spruce grows, decoctions of the shoots in fermented liquor are used as a beverage, or as a remedy for scurvy. Thousands of young Spruce trees, or the tops of larger specimens, are used annually as Christmas trees for the amusement of our children.

As a tree, the chief value of the Spruce is as a nurse, its dense foliage and tapering form serving well for the protection of young Oaks or Elms, whilst the thinnings prove fairly remunerative as Hop-poles. Its tendency to preserve its lower boughs renders it a valuable cover for game: and as it bears the shears well it is used on the Continent for hedges in nursery gardens.

Broken down by loads of snow or boisterous wind, the Spruce, as seen in Alpine landscapes, attracted the pencil of Salvator Rosa; but it suffers in the estimation of most people by the extremely symmetrical regularity of outline that accompanies its somewhat sombre coloration. "It is," says Sir Thomas Lauder, "the great tree of the Alps, and is so mentally

associated with the grandeur of Swiss scenery that the sight of it never fails to touch chords in our bosom which awaken the most pleasing recollections. What can be more truly sublime than to behold, opposed to the intensely blue ether, the glazed white summits of Mont Blanc, or the Jungfrau, rising above the interminable forests of Spruce Firs which clothe the bases of the mountains?"



TRANSVERSE SECTION OF NEEDLE-LEAF OF SPRUCE FIR.

HOLM OAK.

## THE HOLM, OR EVERGREEN, OAK.

*Quer'cus Ilex* L.

EVERGREEN trees, so characteristic of the warm and moist insular climates of Sub-tropical, or of Warmer-Temperate latitudes, are at once recognised as exceptional in our colder north; and the idea of an Oak-tree is so closely associated in our minds with boughs bare of leaves during the winter, that we are apt to forget that a considerable number of species of this large genus retain their foliage throughout the year. Among these are the Cork Oak (*Quercus Su'ber* L.), the Kermes Oak (*Q. coccif'era* L.), and the Green or Live Oak (*Q. vi'rens* Ait.); but the only one that has been cultivated to any extent, or that will grow freely throughout the greater part of our island, is the Holm Oak (*Q. Ilex* L).

Though the name "Holly-leaved" more properly belongs to a distinct but allied species, the most prevalent form in Spain, *Q. gramun'tia* L., there can be little doubt that *Q. Ilex* derives its popular name of Holm Oak from the resemblance which its dark leathery leaves bear to those of our native evergreen, the name of which was often written Holm instead of Holly, and not, as has been suggested, from its flourishing on holms or islands in rivers.

It is a native of Southern Asia, from Cochin-

China westward, North Africa, and the South of Europe, occurring wild as far north as Nantes, and growing at an altitude of 3,200 feet on the slopes of Etna. Even in its native countries it seems to have but little power of ousting other vegetation, so that it seldom forms forests; but both where it is indigenous, and with us, it thrives remarkably close to the sea-shore, where no other European Oak will flourish. Considering, therefore, its dense foliage, its evergreen character, and its value as timber, this tree might certainly with advantage be more extensively planted as a screen in such situations. A winter of exceptional severity may cause it to lose its leaves, but is seldom fatal to it.

As the trunk is generally furnished with branches down to the ground, the Holm Oak has, even when of large size, the appearance of a gigantic bush or shrub, rather than that of a timber tree; but when pruned, or drawn up by being planted with other trees, it may form a straight trunk, and reach a height of fifty, sixty, seventy, and even eighty feet and more, with a circumference which, though generally not more than from two to six feet, has reached eleven and even twenty-two feet. Its growth is rapid at first, reaching twenty or thirty feet in from twelve to fifteen years; but afterwards it increases much more slowly, seldom exceeding fifty feet of height when as many years of age, though a tree at Croome, in Worcestershire, is recorded by Loudon as being seventy feet high

when eighty years old. It is, no doubt, to this slow growth that the brown heart-wood of this species owes its close texture, hardness, and high specific gravity, weighing, as it does, as much as seventy pounds per cubic foot. As our photo-micrograph shows, the evergreen character and slow growth of this species are represented in its wood in its greater density and in the uniformly distributed vessels.

Though we cannot altogether believe the stories of its longevity told by Pliny, there can be no doubt that this tree, which, under the name of Ilex, is so commonly referred to by Virgil and Horace, does live to a great age. Pliny would have us believe that in his time—in the first century, that is, of our era—a Holm Oak was still in existence on the Vatican, in the trunk of which Etruscan letters of brass were inlaid, indicating that the tree was older than Rome itself; whilst three other specimens were still growing at Tibur which were in existence when Tiburtus founded that city, ages even before the foundation of Rome!

The Ilex seems, from the reference made to it by Gerard and Clusius, to have been introduced into this country about the middle of the sixteenth century, the oldest specimens in England being probably those at Wollaton Hall, Notts, one of which has a circumference of over fifteen feet. Other examples are those at Harefield Place, said to have been planted at the suggestion of Evelyn; that at Fulham Palace, nearly two hundred

years old, close on fifty feet high and four feet in diameter; and those at Mamhead, Devonshire, one of which is eighty-five feet high and eleven feet in the circumference of its trunk; whilst another, only fifty-five feet high, has the extreme girth of twenty-two feet. There are also excellent specimens of this species at Kew and at Windsor, under one of the latter of which her Majesty Queen Victoria was very fond of breakfasting.

The leaves vary considerably in outline in seedling varieties, in one of which, known as *latifolia*, they are no less than five inches long and nearly three in breadth, though generally not half these dimensions. They are mostly of an ovate-oblong form, with an acute point and an unnotched margin; but they are sometimes serrate, irregularly toothed, like the Holly, or crisped or wrinkled at the edge. Of a very dark glossy green on their upper surfaces, they are more or less hoary beneath; but their stiff leathery consistency prevents them from turning lightly in the breeze, so that it must be admitted that the tree is sombre in its general effect. Unfortunately, too, almost every leaf is discoloured by the attacks of the larva of the moth *Lithocoll'etis messaniel'la*, which causes them to drop off somewhat prematurely. Their perfectly smooth surface, and often inrolled edges, give the leaves, however, a lustrous appearance, and it is remarkable that when any of them are spinous, it is, as in the Holly, those nearest the ground that are so.

The tree flowers in May, the male flowers being

FLOWERS AND LEAVES OF HOLM OAK.

in catkins, springing from the axils of the leaves of the previous year towards the apex of the branch, whilst the female blossoms, varying from four to eight in number, are on a stalk arising from the axils of leaves of the same year, and, of course, still nearer to the apex of the branch. The catkins of male flowers are about an inch and a half long, each flower consisting of a cup-shaped calyx and six stamens, furnished with long stalks, or "filaments," to the pollen-bearing anthers. The stalk, or "peduncle," of the female flowers is between one and two inches long, and they are scattered along it with a "sessile," or unstalked, insertion. The acorns which succeed them do not ripen until the autumn of the second year, only one or two coming to maturity on each peduncle. They are generally rather long, oval, and smooth, being enclosed for a third, or even half, of their length in cups made up of numerous narrow downy scales, which closely overlap one another. The acorns are generally bitter, and this is said to be particularly the case with specimens of this Oak grown in cold, damp situations. On the other hand—though perhaps never as sweet as those of the Spanish Holly-leaved Oak (*Q. gramuntia* L.), which are compared to the best chestnuts and are said to have fattened the tunny-fish as they passed into the Mediterranean by the once Oak-clad shores of Andalusia—some trees of the Holm Oak produce both sweet and bitter acorns, and there is never any recognisable external difference.

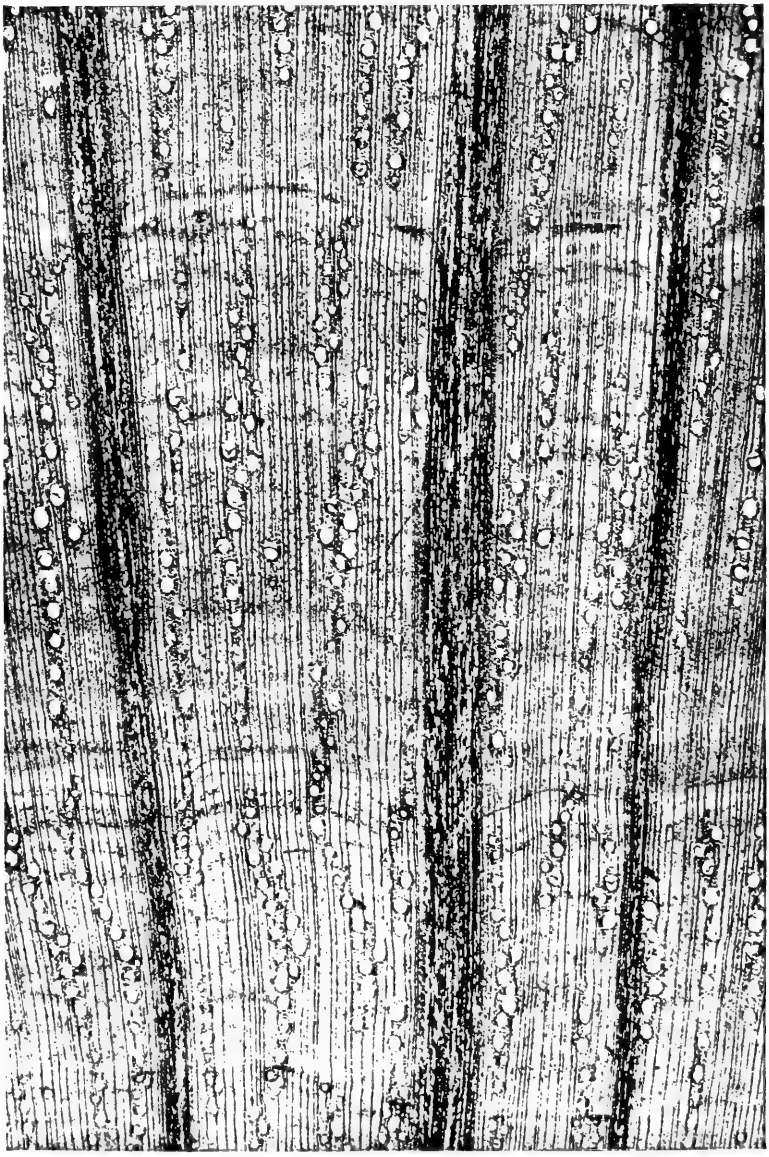
The Ilex is propagated entirely from seed, no

tree, it is said, being more difficult to transplant; so that it is best to plant the acorns where it is wished to have the trees; failing which, they can be raised in pots. The difficulty arises from the long tap-roots, which, in suitable soil, will descend to a very great depth, altogether disproportionate to the height of the trunk, sending out no more lateral branches or fibres than a carrot. As the tree is peculiarly intolerant of cold wet subsoil, it will accordingly thrive best in a deep loam, which should be sandy or calcareous, rather than clayey. If, however, in the nursery-garden young plants are grown in a stiffish soil, and transplanted every other year, they can be compelled to throw out lateral roots, though they will not make the same rapid growth of stem as in warmer and drier soil. The acorns sown in England are generally imported, although in favourable seasons they may be well matured and ripened in this country.

The bark is black, thin, hard, and even, or slightly cracked on old stems, but never corky. It contains, like our common Oaks, a considerable quantity of tannin, and could be, but seldom is, used in that remarkable chemical process of the tanyard with which man seems to have been empirically acquainted from a remote antiquity.

The sap-wood is whitish; but the heart is, as has been already stated, very close-grained, hard, and heavy, and of a brown colour. It is susceptible of a fine polish; but like most other hard and heavy woods, it is very liable to twist and

HOLM OAK.



TRANSVERSE SECTION OF WOOD OF HOLM OAK (X 20 DIAMETERS).

split whilst drying. It is, however, very durable and of considerable flexibility, so that it is in use in Languedoc for the handles of hatchets and other tools. Evelyn, who was a great admirer of this species, and an advocate for the more extensive planting of it in England, recommends it also for "mallet-heads, mall-balls, chairs, axle-trees, wedges, beetles, pins, and palisadoes in fortification," and it has been suggested for naval architecture, its weight rendering it suitable for use in the bottoms of ships, whilst its great strength makes it possible to use it in smaller scantlings than Common Oak. In Spain it is used for charcoal, which it yields of excellent quality; and there can be no doubt as to its great value for planting near the sea-coast to screen other trees, which are in general so far less able to bear the sea-breeze. With the trees planted close together in a row in such a situation, a warm and handsome hedge could be grown to a height of forty or fifty feet in even a less number of years. Few things, perhaps, are more striking to the eye of the thoughtful observer of plant-life than the exuberance of this and other evergreens in proximity to the sea. The Holm is also said, owing to its compactly rounded outline and tough and solid wood, to be less liable to injury by wind or lightning than any other species of Oak. However this may be as regards wind, it is not improbable with reference to lightning, though, perhaps, for a reason not generally recognised — its possession, in fact, of a perennial covering of pointed leaves.

It has been observed that winter thunderstorms are more destructive to trees than those in summer; that Oaks overgrown with Ivy are seldom struck; and that perhaps trees with rounded leaves are more liable to injury from this cause than those whose leaves are pointed. The leaves, it is suggested, act as a myriad of discharging points for the atmospheric electricity; in which case, of course, evergreens would have a decided advantage.

When, however, we consider the landscape effect of an exclusively evergreen tree-flora, it must be admitted that the uniform dark tints of its perennial verdure are apt to pall upon the senses. Evergreen leaves are almost invariably thicker than those of deciduous plants, and besides having occasionally an epidermis of more than the usual single layer of colourless cells, they have commonly a "hypoderm," or sub-epidermal tissue, also consisting of more than the usual number of layers of cells, which being, as they are, in a vertical position, and filled with "chlorophyll," or "leaf-green," give the leaf its characteristically dark tint, absorbing far more light than the transparently thin and pale-hued foliage of our northern forests. Beneath the gloom of the Ilex "it is always afternoon," and the heart of the traveller turns to the restful green of northern pastures, and even to the bare boughs of winter that tell of Nature's rest.

BOX.

# THE BOX

*Bux'us sempervi'rens* L.

RECKLESS destruction of both the commoner and the more valuable kinds of timber trees has been, and is, only too frequent in all parts of the world. In not a few cases its effects are already being experienced in an insufficient supply of wood either for general use or for some special purposes. Before the introduction of such substitutes for wood-engraving as zincographs and collotypes, the carelessness as to the Caucasian forests of Box excited apprehensions among the consumers, and stimulated inquiry as to suitable substitutes for this material.

The Box (*Buxus sempervirens* L.) is a member of the large and mostly acridly poisonous Order *Euphorbia'ceæ*, an Order in which the flowers are usually small and inconspicuous, destitute of a corolla, and sometimes of a calyx also, and having the sexes divided. The genus *Buxus*, of which our British species is the best known representative, includes fewer than twenty species of evergreen shrubs, or small trees. Their juice is not milky, like that of the allied Spurges (*Euphorbia*); their leaves are either opposite or alternate, leathery and glossy; and the two sexes are borne on the same plant in greenish yellow flowers. They have a wide distribution through the Warmer-Temperate zones.

Our native species (*B. sempervirens* L.) occurs in

Japan, in the Western Himalayas, in Northern and Western Asia, in North Africa, and as far north as Belgium and this country, where, as we shall see presently, there is considerable reason to believe it to be either indigenous, or a denizen the introduction of which dates from a very early period. In a wild state in this country it is seldom more than twelve or fifteen feet high, or, when fully grown, more than six or eight inches in diameter; but in Turkey and Asia Minor, and even in the Jardin des Plantes at Paris, trees thirty feet high and ten inches in diameter are recorded. Such specimens must, however, be at least 100 years old, as the Box is a very slow-growing plant, rarely making shoots of more than six or eight inches height within the year, and not increasing in diameter more than an inch in ten years. The tree is not only apparently of great longevity, but is so hardy as to be the only evergreen that can withstand the continental cold of the open air of Paris, Berlin, and Vienna without protection.

The young branches, which have generally an upward direction, are downy and have a smooth, yellowish bark; but the older trunks are rough and grey. The twigs are four-angled, and the buds very small. The leaves vary from "ovate" to "oblong," *i.e.* they may be wider across the lower third of their length, or may have parallel sides; they have very short stalks, edged with two lines of minute hairs; they vary in length from half an inch to an inch; their points are rounded or slightly notched; and their colour depends considerably on their age and

position. When young they are of a bright grass-green colour, to which the Box owes the epithets of "greener" and "youthful," as compared to the Holly, in Herrick's verses on "Ceremonies for Candlemas Eve." This brightness also renders it acceptable, as Herrick's rhymes tell us, for house and church decorations between Candlemas and Easter. When produced in the shade, however, or when grown older, the leaves are of a very dark shade of green, which gives groves of this tree an effect as sombre as that of the Yew itself.

The minute pale-coloured florets appear in April or May, forming crowded spikelets of sessile blossoms in the axils of the leaves. In each spike the lower flowers are staminate, the upper ones pistillate. In addition to minute bracts, each flower is surrounded by a calyx, which in the staminate flowers consists of two alternating pairs of sepals, and in the pistillate flowers of a larger number, commonly six, nine, or twelve, in alternating whorls of three. Similarly, while one kind of flower contains two pairs of stamens and a rudimentary ovary, the other kind has three carpels, united below into a three-chambered ovary, but with distinct spreading styles. The filaments of the stamens are comparatively long, so that pollen is very probably carried from the extruded anthers by the wind. The ovary ripens into a dry capsule, about half an inch long, surmounted by the horn-like remains of the three styles; and, when mature, this capsule splits explosively into three valves, each formed of two adherent half-carpels, so that each of the stylar horns splits longitudinally. There are two

black seeds in each chamber of the ovary, which are hurled to some little distance.

The largest numbers of wild Box trees in Europe occur in France, in the Forest of Ligny; at St. Claude in the Jura, and in the Pyrenees; but in these localities it is more mixed with deciduous trees than is the case where it occurs in England. A large proportion of the Boxwood of commerce, shipped from Odessa and Constantinople, is the produce of a distinct species, *B. balea'rica* Willd., a native of Minorca, Sardinia, Corsica, Turkey, and Asia Minor, first introduced into England in 1708, which grows in its native countries to a height of as much as eighty feet.

A great deal has been written as to the claim of the Box to rank as an indigenous tree in England. Judging from such place-names as Boxley, Boxmoor, etc., it would seem to have been at one time more abundant than now, and at least of very early introduction. These names, of which the last-mentioned, in Hertfordshire, may be merely a corruption of Bogsmoor, all belong to places on the chalk or limestone hills of southern England, and there is nothing in the continental distribution of the plant altogether fatal to its being native here. But, as in the case of Sir Roger de Coverley and the Saracen's Head, much may be said on both sides. More than a century ago the Hon. Daines Barrington laid down a threefold test of the truly indigenous character of any species of tree: that such trees grow in large masses, and spread over a considerable breadth of surface; that such masses never end abruptly, except where there

FLOWERS, FRUIT, AND LEAVES OF BOX.

is a sudden change in the soil or the substratum; that the trees ripen readily their seeds, which, when dropped, spring up freely. Tried by these tests he decided the Chestnut, Lime, Common Elm, and Box to be introduced species, whilst he considered the Sycamore, White Poplar, Yew, Spindle-tree, and Privet to be only doubtfully native. "The Box," he says, "is not mentioned by Gerard, and . . . is found nowhere in an apparently wild state, except on Box Hill, where it was planted by Lord Arundel, who designed to build a house there, but who relinquished his intention from the want of water."

In opposition to these arguments it may be urged that some trees, such as the Lime, Spindle-tree, and Yew, even in countries where they are undoubtedly indigenous, seldom occur in large masses; whilst the annual ripening of fertile seed would very probably cease near the margin of the geographical range of a species. As to the Box, it is mentioned both by Gerard and by Turner. The former speaks of it as growing "upon sundry waste and barren hills in Englande," but the latter, who, however, was not very familiar with our south-eastern counties, says that "it groweth on the mountains in Germany plentifully, wild, without any setting; but in England it groweth not by itself in any place that I know, though there is much of it in England."

Parkinson (1640) writes that it is found in many woods; but a still earlier writer, Lambarde, whose "Perambulations of Kent" in 1570 were published in 1576, is a more important witness, and one whose evidence cannot be held to be gainsaid by the fact

that a correspondent of the *Gentleman's Magazine*, 200 years later (vol. lvii., 1787), "was thoroughly convinced, from the strictest inquiries," that the Box was not wild at Boxley, in Kent. Ray says:

"The Box grows wild on Box Hill, hence the name; also at Boxwell, on the Cotswold in Gloucestershire, and at Boxley in Kent, where there were woods of this tree, according to Aubrey. It grows, plentifully on the chalk hills near Dunstable."

As to Box Hill, the most conclusive evidence has been brought forward of late years. Not only did this land never belong to the Earl of Arundel, who died in 1646; but the names of Adam de Buxeto and Henry de Buxeto occur as witnesses to charters in connection with this neighbourhood as early as the reigns of John and Henry III. In 1602 the owner, Sir Matthew Brown, leased a warren and its lodge, which were then at that place, to Thomas Constable, the tenant covenanting to preserve the Yew, Box, and all other trees growing thereupon, and deliver a half-yearly account of what shall be sold. Accordingly, in 1608, we get a return, showing £50 worth of Box trees to have been cut in that year. During a few years preceding 1712 trees were felled to the value of £3,000, and in 1815 the lord of the manor, Sir H. P. St. John Mildmay, sold all the Box upon the hill of more than twenty years' growth for £10,000.

De Candolle points out that the name of the tree, which at first sight appears so indubitably of Latin origin, has its analogues not only in Slavonic but also in Keltic and even Tartar languages. The Greek *Pyxos*, Latin *Buxus*, French *Buis*, and German *Buchs*, are at least traceable in the Illyrian *Bus*, the Breton

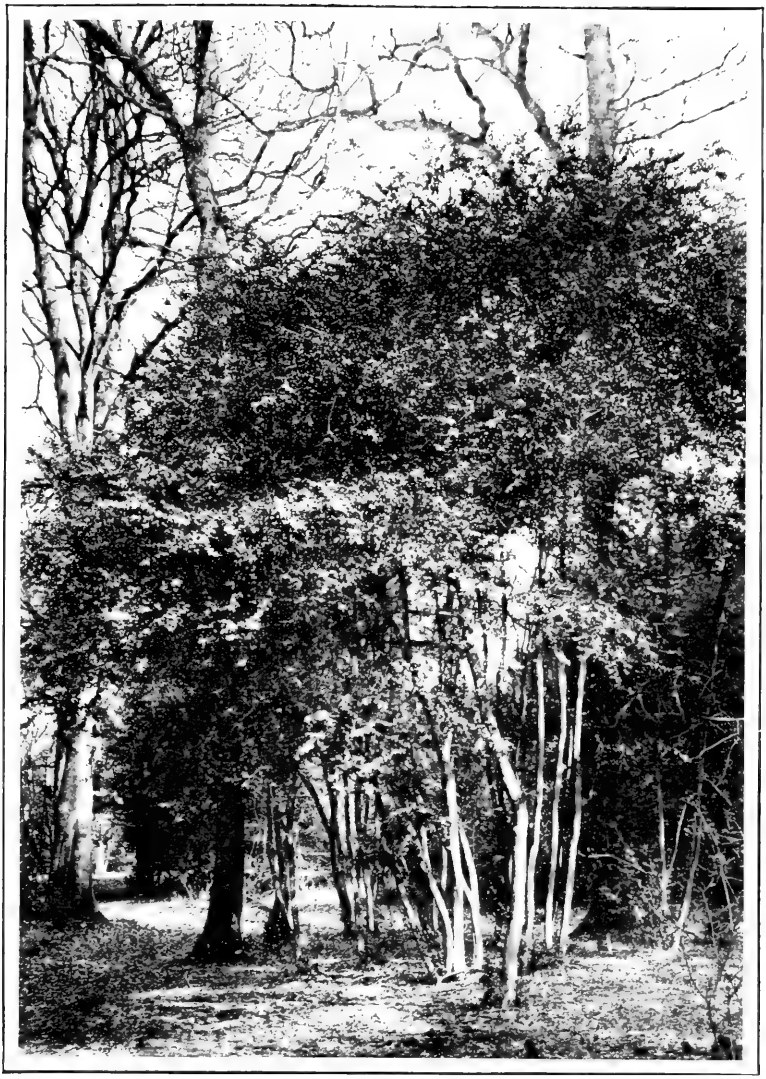


*Photo : H. Irving, Horley.*

BOX TREES.

TRANSVERSE SECTION OF BOX WOOD (X 30 DIAMETERS).

*Beuz*, the Calmuck *Boschton*, and the Georgian *Bsa*; so that the Box may have been carried westward with the earliest migrations of the Indo-European races, or have been found indigenous by them and given a name previously used by their common ancestors.

On the other hand, the Box does not occur in the Channel Islands or in Ireland, whilst in Holland, Belgium, and the North of France it grows mainly in hedgerows and in the immediate neighbourhood of cultivation. Its introduction at a date which is at least remote would seem to be indicated by the fact that a sprig of Box forms the badge of the clan M'Intosh and one of its variegated form that of the M'Phersons.

The Romans employed the Box both when growing for "topiary" work, and as timber. Both Pliny and Vitruvius allude to the clipping of the shrub into hedges ornamented with the figures of animals, whilst Virgil and Ovid refer also to the use of its wood for musical instruments, employing the word *Buxus* as meaning a flute. It may, therefore, well be to the Romans that we owe the introduction of the tree into England. Sprigs of Box have, indeed, been found among the Roman remains at Silchester.

The wood is remarkably heavy, being the only European timber that will sink in water; it is yellow, very hard, compact, and even-grained, so as to be susceptible of a fine polish, neither annual rings, pith-rays, nor vessels being easily seen in it. It is, as Dryden describes it, translating Virgil—

"Smooth-grained, and proper for the turner's trade,
Which curious hands may carve, and steel with ease invade."

It is still employed, both here and on the Continent, for a variety of purposes besides wood-engraving, for which art, however, the finest quality of Boxwood is mainly reserved. It is used in inlaying, for mathematical instruments, especially foot-rules, for weaving-shuttles, and other turned articles. Some of these, however, are made at St. Claude, not from the stem but from the root, the wood of which is often beautifully veined.

The art of wood-engraving is older than that of printing, the old block-books, such as the "Biblia Pauperum" of the first half of the fifteenth century, being engraved on a series of large blocks. It was, however, only from the time of Bewick that wood-engraving became general as a means of book-illustration; and the introduction of the many photographic and electrotypic processes now in vogue has afforded a partial solution of the difficulty as to the supply of Boxwood in the future. Some Boxwood can, undoubtedly, be procured from India and the Cape; and of the various substitutes suggested, whilst our own Hawthorn seems the best, Pear, the American Dogwood (*Cor'nus flor'ida*), the Texas, Ebony (*Diospy'ros texa'na*), and the West Indian Trumpet-flower or Jamaica Box (*Teco'ma pentaphyl'la*), all promise to prove useful.

ACACIA.

# THE ACACIA.

*Robin'ia Pseudaca'cia* L.

FEW exotic trees have been so much discussed, or have undergone such vicissitudes of popularity and neglect, as has the species which is now commonly known in England as the Acacia (*Robinia Pseudacacia* L.).

Originally a native of North America, its seed is said to have been first introduced into Europe either in 1601, by Jean Robin, herbalist to Henri IV., whose "Histoire des Plantes" was published in 1620, or by his son Vespasian, who grew it in the Jardin des Plantes in 1635. A tree planted at this latter date was alive in 1840, and was then 75 feet in height. Parkinson, in his "Theatrum Botanicum" (1640), speaks of it as grown "to an exceeding height" by the elder Tradescant at Lambeth, he having possibly received it direct from Virginia, through his son. This tree was still standing when Sir William Watson examined the remains of Tradescant's garden in 1749. Evelyn, in his "Sylva" (1664), recommends it as "deserving a place among our avenue trees, adorning our walks with its exotic leaves and sweet flowers; very hardy against the pinching winter; but, by reason of its brittle nature, it does not well resist . . . our high winds; and the roots, which insinuate and run like liquorice under ground, are apt to emaciate the soil, and, therefore, haply not so commendable in

our gardens as they would be agreeable for variety of walks and shade. They thrive well in His Majesty's new plantation in St. James's Park." These particular trees were, however, felled before the year 1712. John Ray, the contemporary of Evelyn, mentions the species as growing in Bishop Compton's garden at Fulham, where a wreck of an old tree still remains; whilst by 1731, as recorded by Philip Miller in his "Gardener's Dictionary," it had become common, and was known as ripening seed in this country.

It had long been valued as a timber tree in the United States, and in Virginia and New England was used for trenails in shipbuilding, being hard, strong, inelastic, and durable. Much attention was directed to it in Europe for this and other purposes in 1762, in 1786, and at subsequent dates. It was described as suitable for axletrees, cogs, or wedges, as being a good fuel, and even as capable of cultivation as green forage for cattle; and in 1791 a Mr. Ebenezer Jessup proposed in the *Gentleman's Magazine* that 10,000 acres in the New Forest and Forest of Dean should be planted with this tree for the purposes of the navy, stating that he knew posts made of its wood to last from 80 to 100 years. In 1819, from 50,000 to 100,000 trenails of the wood were imported from America.

William Cobbett, while farming on Long Island, between 1817 and 1819, was struck with its utility, and on his return to England brought home some of the seed, which, from 1823, he cultivated on an enormous scale at Kensington and Barnes. He wrote of the tree in terms of the most extravagant eulogy,

styling it the "tree of trees," and prophesying that it was destined speedily to replace most of the hard-wood trees in cultivation, and that "the time would come when the Locust-tree would be more common in England than the Oak." Ignoring the fact that the *Robinia* was already well known in England under the name "Acacia," not only to botanists but also to nurserymen, he popularised the American name "Locust," and obtained so large a sale for it, though at a price more than six times its ordinary market value, that he not only imported the seed by tons, but even bought up plants raised from English seed to sell again at fancy prices.

Confused in the 17th century with the Acacias of Egypt and Arabia, which it resembles mainly in foliage and fruit, and by the American colonists with the Carob-bean, Locust, or St. John's-bread, of South Europe (*Cerato'nia Si'liqua* L.), whence its French name, "Carouge des Américains," this tree was named by Linnæus after its introducer, and in reference to this confusion, *Robinia Pseudacacia*, the Robinia, or False Acacia.

All three trees belong to the great Family *Leguminosæ*, the Pea and Bean tribe; but the Pea-shaped blossoms of the *Robinia*, which are generally white, as distinguished from the small, many-stamened, yellow, bottle-brushlike flowers of the true *Acacia*, have given to the former the popular names of White Acacia, or "Acacia blanc," White Laburnum, and Silver Chain. We are, however, quite unable to explain the name Whya-tree, which is recorded as applied to this species in East Yorkshire.

*Robinia* is allied to the Restharrows (*Ono'nis*), and to the Brooms and Laburnums (*Cy'tisus*), belonging with them to the Section *Lo'teæ* of the Sub-order *Papiliona'ceæ*.

The genus *Robinia* is distinguished by its pods being flat and furnished with a projecting flange externally along that margin to which the seeds are attached internally—the margin termed "ventral"—and also by its leaves being made up of several pairs of leaflets with an odd terminal one. The distinctive characteristics of the species known as the False Acacia are its scented flowers, generally white, and hanging in a loose raceme or cluster, like that of the Laburnum, the egg-shaped leaflets, and the pair of spines at the base of each leaf representing the "stipules." These appendages are very variable in different plants, being often absent altogether or but small and fugacious, represented by large leaf-like structures as in the Pea, or performing the entire function of the leaves, as in some Vetches. In some of the true Acacias they are also thorns, but are hollowed out so as to furnish lodgings for tribes of ants, which protect the shrub from other species of the same group of insects who would despoil it of its leaves; but the function of the solid prickles in the False Acacia is not so obvious —not, at least, when the tree is fully grown. From these prickles and its pod-like fruits this species derives its German name, "Schotendorn."

This tree can be raised either from seed, from cuttings, or by grafting. It will grow in any soil that is not too wet; and is a quick-growing but short-lived

FLOWERS AND LEAVES OF ACACIA.

plant; but the quality of its timber undoubtedly varies according to the character of the soil in which it is grown. It may reach a height of seventy or eighty feet, with a diameter of two, three, or, in Kentucky, as much as four feet; and even in the neighbourhood of London it has been known to forty feet within ten years, sometimes making shoots reach eight or ten feet long in a single season.

The wood of the best varieties, when well grown, is hard, strong, and durable, takes a good polish, and is prettily veined with brown. The sapwood is very narrow, comprising generally only five annual rings, and of a yellowish white colour. The pith-rays are very fine and far less distinct to the naked eye or under a low-power lens than they appear in the photomicrograph. The vessels in the spring-wood are very large and form a broad pore-circle, but, as all of them are filled up with ingrowths, or "tyloses," as they are called, of thin-walled cells, they appear as clear yellow spots on the dark wood. The small vessels in the autumn-wood are crowded together in groups of as many as ten between two pith-rays, and these groups being side by side produce "peripheral lines," or pore-zones, parallel to the margins of the rings.

Besides its use in shipbuilding and for agricultural purposes, the wood is employed in America for the sills of doors and windows, for cabinet-work, and in the making of toys. When quite dry it weighs forty-eight pounds per cubic foot, being, in fact, heavier, harder, stronger, tougher, more rigid, and more elastic than English Oak. Speaking absolutely, however, it

is an inelastic wood, to which quality, coupled with its hardness, it owes its value for trenails. Acacia wood is somewhat twisted in its growth, and liable to crack, while the branches break off in a brittle, splintery manner. It must, moreover, be noted that the good qualities ascribed to this timber belong only to the variety known in America as the Red Locust.

The species has a latitudinal range from Canada to Carolina, and is very variable, especially when grown from seed, no less than sixteen varieties being described by Loudon. Some of these may be geographical races. Among them are one with yellow flowers, three destitute of prickles, and others with the leaves curled or with nearly erect or very pendulous branches; but the most important distinctions are those based on the colour of the wood, which may be only the result of differences in soil and climate. Of these there are three varieties recognised in the United States: the Red Locust, with red heart-wood, the most beautiful and durable timber of the three; the Green Locust, with a greenish yellow centre, which is the commonest; and the White Locust, which is the least valuable. It is stated that a post made of Red Locust will outlast two made of the White.

The bark remains smooth for ten or fifteen years, but then becomes brown and longitudinally furrowed —in old trees to a considerable depth, and forming a definite pattern. The branches rise slightly when first springing from the nearly cylindrical main stem, but then spread out horizontally, giving off an abundance of secondary branches, which take a similar direction.

The olive-brown twigs are somewhat pentagonal in

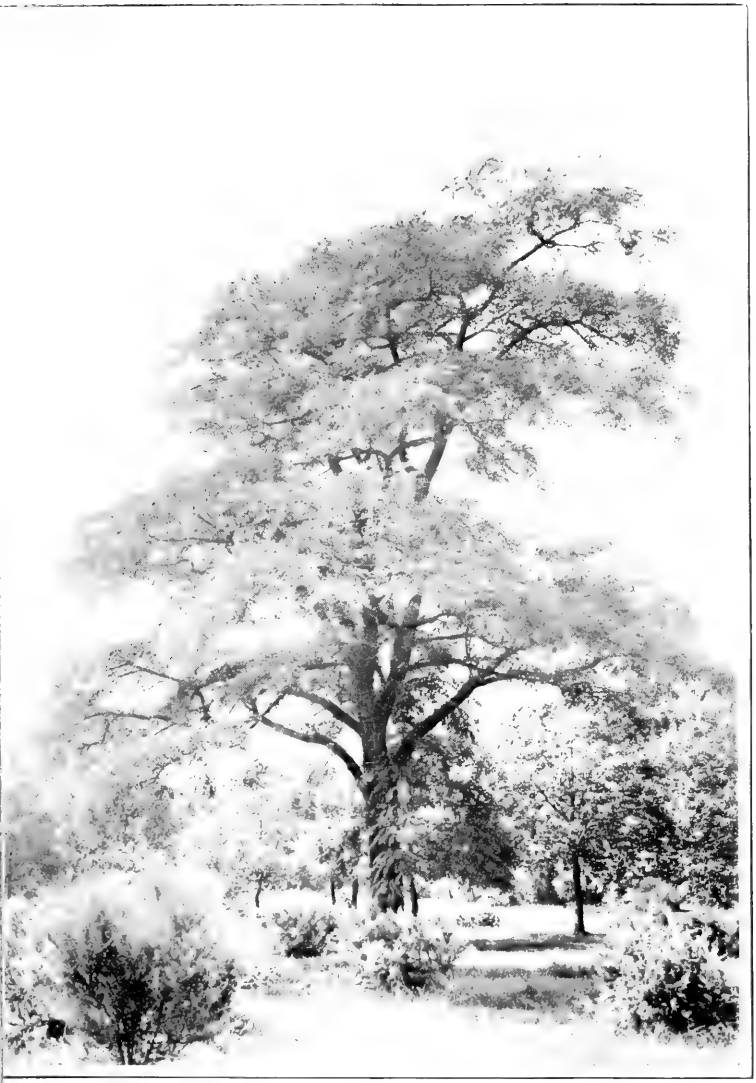
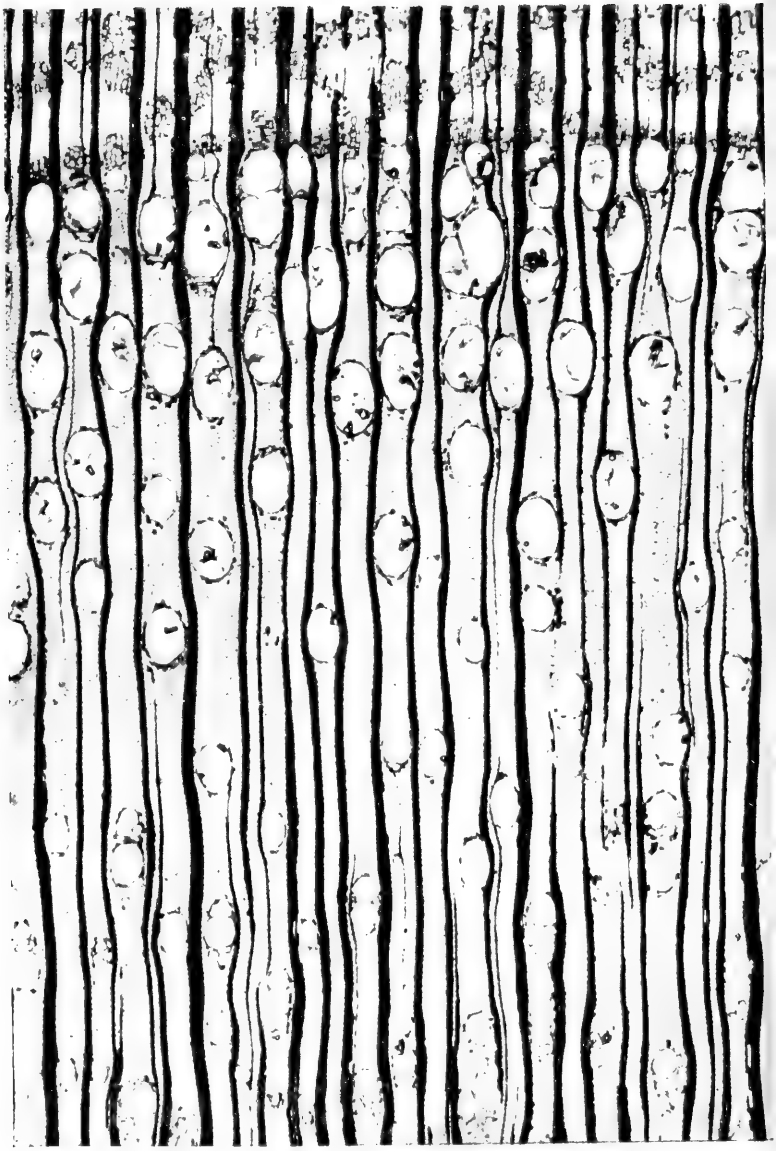


*Photo : H. Irving, Horley.*

CACIA.



TRANSVERSE SECTION OF ACACIA WOOD (X 30 DIAMETERS).

section and bear no visible buds, for these are minute and are covered, with the exception only of a small opening above, by the enlarged and downy margins of the base of the leaf-stalk. Thus hidden, they are grouped together, from two to five, one above the other in a single leaf-axil. Only the uppermost develops as a rule, though others occasionally burst through the leaf-scar lower down.

The leaves consist of from four to nine pairs of shortly-stalked egg-shaped leaflets and a terminal one, in all eight, nine, or twelve inches long, the individual leaflets often exceeding an inch in length. Their late appearance and early fall is one of the chief drawbacks to the planting of the tree for ornamental purposes; but they have the countervailing advantage of being so smooth that the least shower cleans them of what little dirt can adhere to them, so that in the metropolis, or other large towns, they appear fresh and verdant in July and August, when most other foliage has become dull and soot-begrimed. The leaflets, like those of so many of the *Leguminosæ*, close at night or in wet weather in what is termed "sleep," being then folded in a vertical plane, as when in the bud, and hanging below their attachments.

It is not to be supposed that much folk-lore should be associated with a tree of such recent introduction into Europe as the Acacia; but it is in connection with its fragrant clusters of pure white blossoms that this tree enters into the symbolism of the aborigines of its native land. The North-American Indian presents a blossoming branch of the Acacia to the lady of his choice as a declaration of his love. In

San Domingo an excellent liqueur is prepared from the blossoms.

The flowers are succeeded by pods, about three inches long, which ripen to a dark brown, and each contains from five to six brownish black seeds, which ripen readily in this country.

The tree has but few enemies here, though in America its timber sometimes suffers considerably from the ravages of a larva (*Cos'sus robin'iæ*) allied to our own goat-moth. Hares and rabbits devour the bark when young, and cattle are fond of the leaves, which they manage to eat, when within reach, in spite of the prickly stipules. The Acacia will not, however, serve as a cover for game, being intolerant either of shade or of the drip of other trees. Its moist, quick-growing sap-wood and succulent foliage have caused it to be strongly recommended for the planting of railway embankments in forest areas, so as to intercept the sparks before they can spread to more inflammable timber-trees, such as the Firs. On the Continent it is largely grown as a hedgerow tree.

We have many fine specimens in England, especially at Syon House, Claremont, and Goodwood, whilst Loudon mentions one at Niddrie Mareschal, near Edinburgh, four feet in diameter at the base of its stem.

Though it becomes straggling from a habit of dying piecemeal when by no means an old tree, the airy lightness of its sprays of pure green foliage certainly renders the Acacia one of the most desirable of our town trees.

LARCH.

# THE LARCH.

*La'rix europæ'a* DC.

THOUGH having no claim whatever to rank as indigenous, the Larch has been far more extensively cultivated in Scotland and the north of England during the last hundred years than any other tree; and few trees are, therefore, more familiar to us at the present day.

Though now so largely grown, it was described by Parkinson, in 1629, as "rare, and nursed up with a few, and those only lovers of variety." In Evelyn's time it was still but seldom seen in cultivation; and even in 1731, Philip Miller, in his "Gardeners' Dictionary," can only say "this tree is now pretty common in English gardens." The introduction of the Larch as a forest or timber tree is undoubtedly due to James and John, Dukes of Atholl, between 1727 and 1774. The story goes that the first Larches brought to Scotland were sent to Duke James, at Dunkeld, in 1727, from Italy, with some Orange-trees, and were accordingly planted in a hot-house. Soon withering under such treatment, they were thought to be dead, and thrown on a rubbish-heap, where they speedily revived and grew into strong trees. The planting operations at Dunkeld and Blair Atholl were so perseveringly carried out by Duke John, between 1774 and 1830, as to cover nearly 10,000 acres with Larch plantations, numbering over 14,000,000 trees; whilst it

was demonstrated not only that the Larch would flourish in very poor soil, at an altitude of 1,800 feet, in the Scottish Highlands, where the Pine will only flourish up to 900 feet, but also that this species does better in plantations by itself, and, when so planted, has a marked effect in improving the character of the soil in which it grows. The example of Scotland was soon followed in England and Wales; but it is found that in plains, or near the sea, though it will make rapid growth for thirty years or more, its timber is very liable to heart-rot. It seems to require a clear and dry atmosphere, a moist surface soil, and a moderately but habitually damp subsoil. It wants, in fact, plenty of light and air, and will not grow on stiff clay or in peat, nor form much wood when crowded together, as the trees are in our hop-pole plantations in the South of England.

The Larch is essentially a mountain tree. It abounds on the Alps up to an altitude of 5,000 feet, and occurs on the Apennines and Carpathians, but is unknown in a wild state on the Pyrenees, or in the Spanish or Scandinavian peninsulas. It forms large woods in Russia, but is represented in Northern Asia by a variety (*Larix sibi'rica*) with smooth, grey bark, sometimes considered a distinct species.

Though it grows well on a limestone subsoil, it is on sloping mountain sides that the Larch is seen in its greatest beauty. The regularly-tapering stem, with its scaly, reddish grey bark, so prone to become covered with the shaggy tufts of hoary lichen, then loses its stiff, erect posture.

The genus *Larix*, to which the Larch (*L.*

*europæa*) belongs, is distinguished among Firs by its deciduous foliage, and the whole joyousness of spring seems epitomised in the emerald glory of its April frondescence. The light-green needles appear in tufts, as they do also in the evergreen Cedars, upon the old wood of the slender branches, surrounding the extremities of "dwarf shoots," which gradually lengthen out until, as on the youngest shoots, each needle stands alone as one of a spiral series.

The catkins soon follow the leaves,

"When rosy plumelets tuft the Larch,"

in April or May, the yellow male flowers being in nearly spherical clusters, whilst the female ones form the said "rosy plumelets." These young cones are sometimes greenish white; but the red or purple-coloured ones are said to belong to varieties yielding better timber. The scales of these cones, after fertilisation, become reddish brown in hue, and the cones lengthen to more than an inch, with an egg-shaped outline, before these scales spread outwards to discharge their winged seeds in autumn. The cones stand erect upon a short, but strong, bent foot-stalk or peduncle, and often remain for years upon the branches after having discharged their seeds, becoming then of a dead grey colour. The small ovate seed is more than half surrounded by the broad membranous wing, which often causes it to be carried some distance by the wind, this tree ripening its seed and sowing itself in this country as freely as does the Scots Fir.

In favourable situations the Larch grows to a

height of from eighty to upwards of a hundred feet, and has been known to reach 140 feet, with a diameter of from three to five feet; and it is stated sometimes to exceed eighty feet in height in fifty years, and to live to an age of from 150 to 200 years. Unlike the Spruce and many other Firs, its growth is rapid from the first, reaching fifteen or twenty feet within twelve years of its being sown, whilst for the first forty or fifty years of its life its average annual increase in girth in Scotland is stated to be from an inch to an inch and a half.

The Larch was not apparently known to the Greeks; but, being abundant on the Apennines, is often referred to by Pliny, who speaks of the incorruptible and incombustible nature of its timber. Cæsar, too, terms it "robusta larix, igni impenetrabile lignum," the fact being that its wood does kindle slowly, instead of blazing up like Pine. The woody fibres being closely interwoven, Larch timber cannot be readily split in a straight line, and, when properly seasoned, is so hard as to be difficult to work. It is, however, difficult to season; and accordingly, in thin boards, though not liable to crack or to shrink to any great extent, is very prone to warp or twist—a fact which renders it more suitable for use either "in the round" or when merely squared. The heart-wood is reddish brown when grown in a cold situation, and very light in weight, weighing when dry about thirty-six pounds per cubic foot; but the wood of the richer soils of lowland forests is often of a yellowish white. Owing to the small size of the lateral branches the wood is comparatively free from knots, and those

MALE FLOWERS, CONES, AND LEAVES OF LARCH.

which occur do not rot or become loose. No wood remains longer uninjured by water, so that it was once largely used on the Continent for water-pipes; and when the bark is left on, it is extremely durable, both above and under ground, and therefore suited for use for posts, vine-props, and hop-poles. For these purposes it is planted close, so that the trunks are drawn up in a long and slender form. The closeness of the grain, moreover, renders Larch timber but little liable to splintering, which adapts it for the superstructures of warships.

Though the bark is of use for tanning, it is inferior to Oak, so that it is not renumerative to sacrifice any of the value of the timber by felling the trees, for the sake of the bark, at an unsuitable season.

Its leaves, though they come at a season when grass is generally plentiful, are eaten by sheep and cattle in Switzerland; and valuable charcoal can be made from the branches. But next to its timber, the most important product of the Larch is undoubtedly Venice turpentine. This is collected in the Valais and Briancon, by tapping fully-grown trees, when the resinous spring sap begins to flow. Holes slanting upwards are then bored with an auger into the trees and fitted with wooden tubes, through which the turpentine distils from May to September, a full-grown and healthy Larch yielding, if tapped when at the proper age, from seven to eight pounds of turpentine annually for forty or fifty years. This turpentine takes the name of Venice from being shipped from that port. The wood from which the turpentine has been thus extracted is of no value except as firewood; but

from the Alpine valleys, where the drooping Larch branches have, it is suggested, determined the angle of the low roofs of the chalets, Venice has derived not only turpentine, but also the piles upon which the city is built—a strong testimony to the durability of Larch timber under the most destructive conditions.

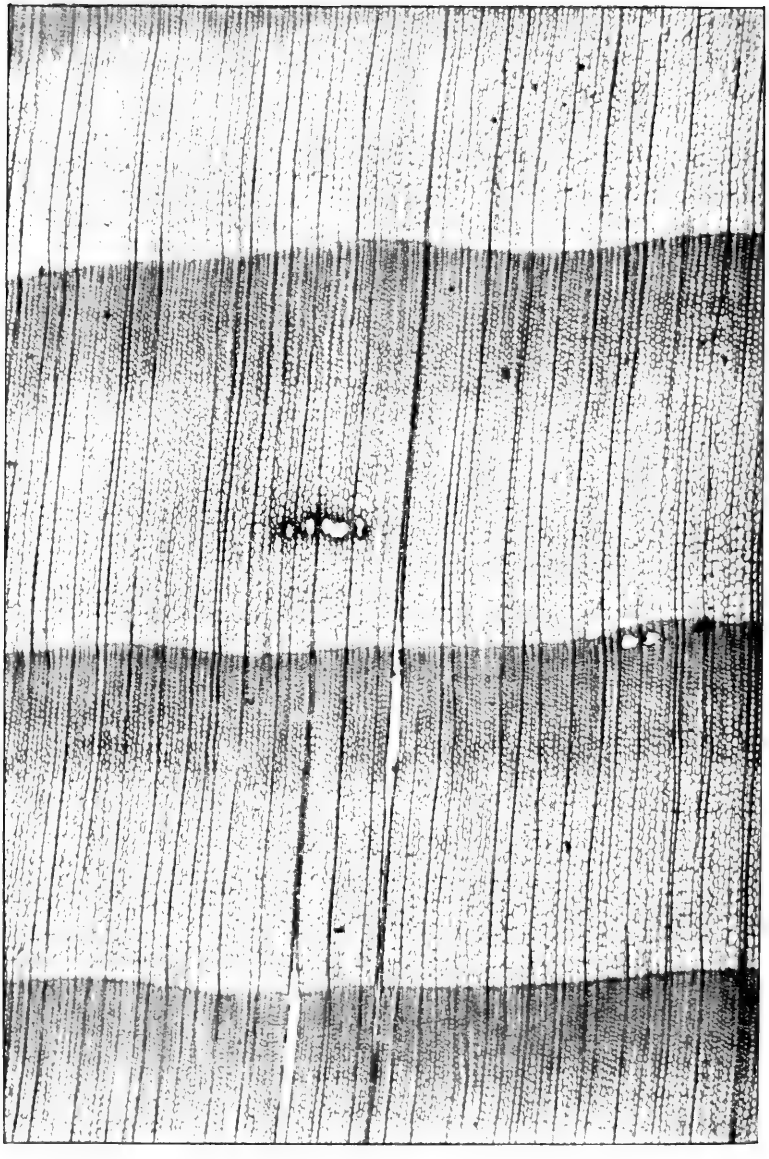
The Larch is generally raised from seed, that grown in Germany being preferred, since with us the cones are often incompletely ripened. The seedlings are transplanted when two or three years old, and their rapid growth, the utility of the thinnings at all ages and the great value of the mature timber, especially in shipbuilding, caused the Larch, though practically it has only been in cultivation for a century, to be generally recognised, until it proved liable to canker, as affording a safer, greater, and more rapid return to capital than any other tree grown in Britain.

Though admirably suited, from its rapid growth and absence of large lateral branches (which might do damage in windy weather), to be used as a "nurse" in Oak or other hard-wood plantations, one of the specially valuable features in the Larch is its suitability for growth at high altitudes in barren soils, and its power of improving these soils. The soft needles annually deposited decompose into a soil that soon reaches a considerable depth, and when light is readmitted by thinning this soil will grow valuable pasture grasses.

Probably neither Gilpin nor Wordsworth had seen the Larch in England under the most favourable circumstances, and it must be admitted that it harmonises but little with other trees, and is inevitably

*Photo : H. Irving, Horley.*

LARCH.

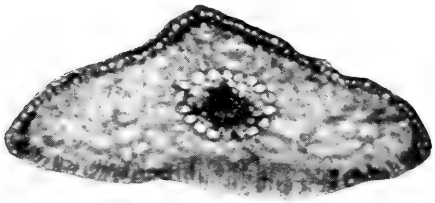


TRANSVERSE SECTION OF LARCH WOOD (X 30 DIAMETERS)

monotonous in plantations. Still, the indictment drawn up by Wordsworth, in his "Description of the Scenery of the Lakes," is severe. "It must be acknowledged," he says, "that the Larch, till it has outgrown the size of a shrub, shows, when looked at singly, some elegance in form and appearance, especially in spring, decorated as it then is by the pink tassels of its blossoms; but, as a tree, it is less than any other pleasing. Its branches (for boughs it has none) have no variety in the youth of the tree, and little dignity even when it attains its full growth. Leaves it cannot be said to have; and, consequently, it affords neither shade nor shelter. In spring, the Larch becomes green long before the native trees; and its green is so peculiar and vivid, that, finding nothing to harmonise with it, wherever it comes forth a disagreeable spot is produced. In summer, when all other trees are in their pride, it is of a dingy, lifeless hue; in autumn, of a spiritless, unvaried yellow; and, in winter, it is still more lamentably distinguished from every other deciduous tree of the forest; for they seem only to sleep, but the Larch appears absoltely dead."

Wordsworth's want of appreciation of this species may have been partly due to its unfamiliarity to his childhood, and but few of his objections would apply to the Larch as it appears in its native mountains—as, for instance, in the Tyrol—where the trees often stand apart, but with no other species to contrast with them, inclined at every angle, and often damaged by storm or avalanche, so as to show no absolute geometrical regularity of outline. To other tastes,

however, even in England, the slightly curved needles, spreading with feathery gracefulness from the drooping but upturning branchlets, seem as beautiful an object as any in our spring woodlands, and we should nowadays be loath indeed to be without the rosy young cones.



TRANSVERSE SECTION OF NEEDLE-LEAF OF LARCH.

WEEPING WILLOW

# THE WEEPING WILLOW.

*Sa'lix babylon'ica* L.

THOUGH of comparatively recent introduction, there is no Willow so popular and familiar, from its exceptional form and beauty, as the Babylonian or "Weeping" species (*Salix babylonica* L.). It is an interesting physiological fact that, though the first Weeping Willows introduced into this country, and also the original trees over the tomb of Napoleon at St. Helena, were female, cuttings from those trees have occasionally borne male catkins. In the genus as a whole, the number of stamens, as we have seen, is variable; but in the Weeping Willow, as in many other species, there are two in the axil of each scale of the male, or "golden palm" catkin, which, however, is little known in this case.

The Weeping Willow proper seems to be a native of extra-tropical Asia, from Japan and China to Armenia and the banks of the Euphrates, and of Egypt and North Africa; but pendulous varieties of other species are also known in cultivation.

Though some kinds of Willow inhabit the barren tops of Alpine mountains, or the equally barren plains of Arctic latitudes, the Weeping Willow agrees with the majority of its genus in frequenting the water-side, or at least some situation where its roots can obtain a good supply of moisture. In such spots it may attain a height of forty or fifty feet in as many

years, with a diameter of two or three feet. In addition to many fine young trees on the banks of the Thames and in other parts of Britain, slightly exceeding these dimensions, one seventy years old is recorded at Finborough Hall, Suffolk, as being, in 1838, seventy feet high and three and a half feet in diameter, with a head fifty-four feet across.

The Weeping Willow is a member of the group known as Crack Willows, from the brittleness of the twigs at the joints. These belong to the section of the genus known as *Vitisa'lix*, characterised by producing their leaves and flowers simultaneously; by their flower-stalks bearing fully developed leaves; by their catkin-scales being of a uniform generally pale colour; by the filaments of their stamens being perfectly free from one another and hairy on the lower part, while the capsules are free from hairs; and by their leaves being "convolute"—*i.e.* rolled together in the bud, like a scroll of paper, with one free edge. Considering that we have between ninety and a hundred distinct kinds of Willow in this country alone, the above apparently elaborate description of one of the three main divisions of the genus is not mere technical refinement. The section *Vitisalix* contains three series, distinguished by having five, three, or two stamens respectively to each flower; and the last of these three series, to which, as has been implied, the Weeping Willow belongs, contains two minor groups, the *Al'bæ*, or White Willows, and the *Frag'iles*, or Crack Willows. The White Willows have minute stipules, "ovate-lanceolate" in form, capsules almost stalkless,

and stigmas not only forked but recurved. The Crack Willows, on the other hand, have good-sized "semi-cordate" stipules, stalked capsules, and merely forked stigmas.

The species in the last-mentioned group are distinguished from one another by the colour of the young shoots and the forms of the leaves. The shoots of the Weeping Willow are pale green, very slender, and with a slight twist at the point of origin of each leaf, being, of course, also distinguished by their drooping habit of growth. The leaves are technically termed "lanceolate-acuminate," being some five inches long and only an inch across, tapering to a point, with a finely serrated edge, smooth above, and with a grey bloom on their under surfaces. The leaf-stalk is short and hairy on its upper surface and has at its base two minute, lanceolate, finely serrated stipules, which, however, fall off early. The veining of the leaf is practically identical with that of the Crack Willow (*S. fragilis* L.). From the midrib, the one prominent vein, a number of fine secondary veins proceed pinnately, alternately from either side, and sometimes reaching as many as twenty on each side, at acute angles of about 45°, towards the edge of the leaf, and with a slight curve. Before reaching it, however, they break up into branches, and between them is an intricate and very fine polygonal meshwork of tertiary veins. Rapid as is the ascending transpiration current in Willows, and large as is the volume of moisture given off, it passes almost entirely through the under surfaces of the leaves, there being very few "stomata" or transpiration-pores, on their upper sur-

faces. Almost all known trees in Britain are female, and this form—for we can hardly term it a species—is also characterised by the ovate form of its ovary.

As to the scientific name *Salix*, we are told, in Thomas Newton's "Herball for the Bible" (1587), that "the Willow is called *Salix*, and hath his name *à saliendo*, for that it quicklie groweth up, and soon becommeth a tree. Herewith do they in some countres trim up their parlours and dining roomes in sommer, and sticke fresh greene leaves thereof about their beds for coolness."

Though this etymology "from leaping" may be doubtful, even with the analogous case of our own word "quick" applied to the Hawthorn, there can be little doubt that the old English name "Sallow" is a corruption from the Latin, whilst the other two names, Willow and Withy, both probably refer to the flexibility of the young branches.

Though the Weeping Willow is commonly planted in burial grounds both in China and in Turkey, its tearful symbolism has been mainly recognised in modern times, and among Christian peoples. As has been well said: "The Cypress was long considered as the appropriate ornament of the cemetery; but its gloomy shade among the tombs, and its thick, heavy foliage of the darkest green, inspire only depressing thoughts, and present death under its most appalling image, whilst the Weeping Willow, on the contrary, rather conveys a picture of the grief felt for the loss of the departed than of the darkness of the grave. Its light and elegant foliage flows like the dishevelled hair and graceful drapery of a sculptured mourner

LEAVES OF WEEPING WILLOW

over a sepulchral urn, and conveys those soothing, though melancholy reflections that made the poet write—

> "'Tis better to have loved and lost
> Than never to have loved at all.'"

In the classical poets, we meet with only a few allusions to the Willow as growing by the water-side, and as twisted into baskets by the ancient Britons, the word "basket" itself being one of the few words which, under the form "bascauda," ancient Britain seems to have given to the Latin vocabulary. The word Willow itself, from the early English *welig*, indicates pliability or willingness, and is assuredly more appropriate to the Weeping Willow, with its long, slender, flexible shoots, than to some other species; but from Elizabethan times the tree has invariably been the symbol of forsaken love. This is remarkable, since, with one exception, all the Biblical references to this group of trees are associated with joyfulness and fertility. Yet for Spenser it is—

> "The Willow worne of forlorne paramoures";

whilst in addition to the ballad fragment sung by Desdemona, the beautiful description of Ophelia's death, and various other allusions to the tree, Shakespeare, in the *Merchant of Venice*, represents Dido lamenting the loss of Æneas

> "with a Willow in her hand
> Upon the wild sea banks, and waved her love
> To come again to Carthage."

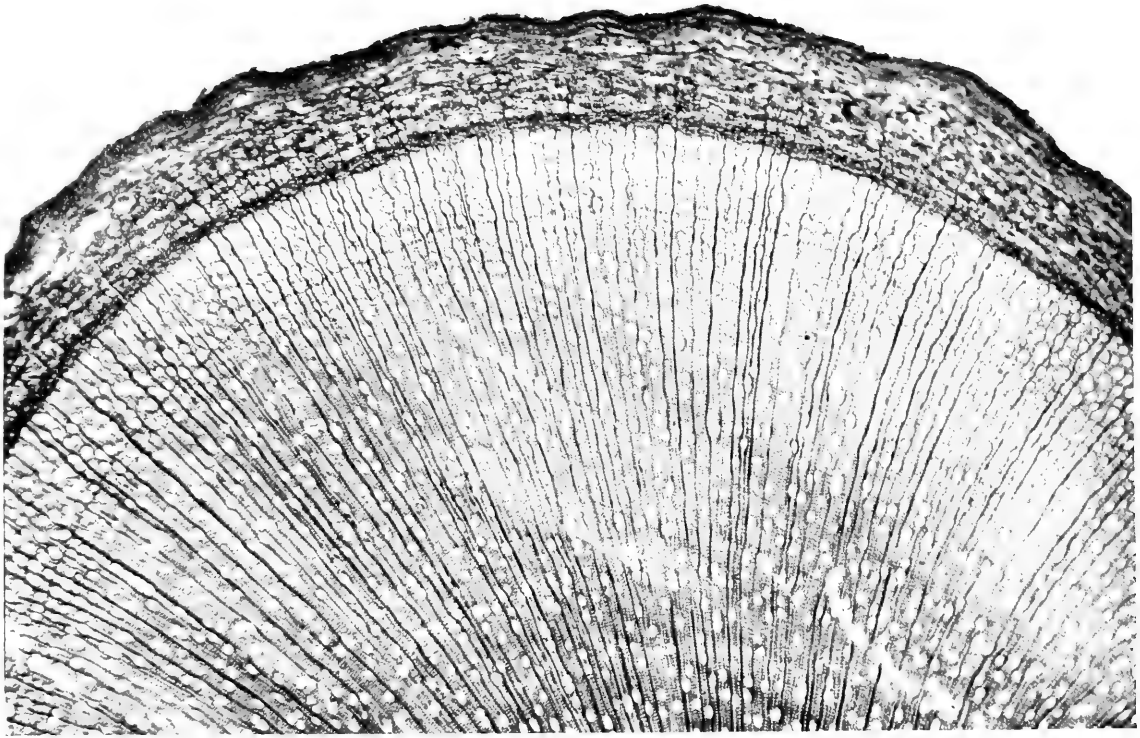
It is difficult not to associate the Willow that

> "grows ascaunt the brook,
> That shows his hoar leaves in the glassy stream,"

with the Babylonian species, which, however, Shakespeare certainly never saw; but so pathetic is the lament of the Jewish captives, that one can well believe it may have permanently altered the symbolism of the once joy-inspiring Willow. There is a pretty legend that its boughs first drooped under the weight of the harps, as the exiled Hebrews sang: "By the rivers of Babylon, there we sat down, yea, we wept, when we remembered Sion. We hanged our harps upon the Willows in the midst thereof." The Arabian story-tellers, however, have a very different tale to tell. They relate that David, after he had married Bathsheba, was one day playing on his harp in his private chamber, when two angels appeared before him and convinced him of his sin. Thereupon he threw himself upon the ground, and lay forty days and forty nights weeping bitter tears of penitence; and in those forty days he wept as many tears as the whole human race have, or will, shed on account of their sins, from then until the Day of Judgment; so that two streams of tears flowed out into the garden, whence there sprang up two trees, the Weeping Willow and the Frankincense-tree, the boughs of the one drooping in grief, whilst the other constantly distils tears of sorrow.

The torches used at funerals by the ancients were made of Willow wood; and it may have been a tree of ill omen, seeing that the soothsayers of Babylon are said to have foretold the early death of Alexander the Great, from the fact that the boughs of a Weeping Willow swept the crown from his head as he was crossing the Euphrates in a boat.

WEEPING WILLOW.



TRANSVERSE SECTION OF WOOD AND BARK OF WEEPING WILLOW (X 30 DIAMETERS).

This beautiful tree is said to have been introduced into Europe by Tournefort, and was almost certainly first brought to England, in 1748, by Mr. Vernon, a Turkey merchant of Aleppo, who planted a tree, from the Euphrates, at his seat at Twickenham Park. Its alleged introduction by the poet Pope is a poetical fiction, of which there are several versions. The poet, it is said, was with his friend Lady Suffolk, when she received a basket of figs from Turkey, or Spain, and noticing that some of the twigs of the basket seemed to have life in them, he exclaimed: "Perhaps these may produce something that we have not in England," and accordingly planted them in his garden. The poet's tree, the outcome, it is alleged, of this incident, was afterwards cut down because the owner of Pope's villa was bothered by too many hero-worshipping visitors.

As the greenish yellow flowers that appear in May never produce seed in this species, and as almost all Willows can be readily propagated by slips, this is the way in which the tree is always multiplied, and in this way it was introduced by Governor Beatson into the island of St. Helena, where there are no native Willows. The form, however, planted over the tomb of Napoleon, from which many cuttings have now grown into large trees in England, seems to be a distinct variety, having reddish shoots and no stipules to the leaves.

Though its wood might be used, like that of other Willows, for crayon charcoal or for paper pulp, and its bark possesses some of the medicinal and tanning properties of the group, the Weeping Willow is

practically a purely ornamental tree. As Gilpin says, it is "a perfect contrast to the Lombardy Poplar. The light, airy spray of the Poplar rises perpendicularly, that of the Weeping Willow is pendent. The shape of the leaf is conformable to the pensile character of the tree, and its spray, which is lighter than that of the Poplar, is more easily put in motion by a breath of air. The Weeping Willow, however, is not adapted to sublime subjects. We wish it not to screen the broken buttresses and Gothic windows of an abbey, or to overshadow the battlements of a ruined castle. These offices it resigns to the Oak, whose dignity can support them. The Weeping Willow seeks a humble scene—some romantic foot-path bridge, some quiet grave, which it half conceals, or some glassy pond, over which it hangs its streaming foliage." In the words of Cowper, a poet who would be familiar with the newly introduced species—

"the Willows dip
Their pendent boughs, stooping as if to drink."

# BOTANICAL SYNOPSIS.

THE following is a summary, in language as little technical as is consistent with our limited space, of the distinctive botanical characters of the trees dealt with in this work :—

## ANGIOSPERMIA (FRUIT-BEARERS).

### *NATURAL ORDER, RANUNCULACEÆ (BUTTERCUP FAMILY).*

**Clematis Vitalba** L.—Traveller's Joy. Bark in long strips. Leaves opposite, pinnate, of three or five ovate leaflets, climbing by their stalks. Flowers greenish white, one inch across, scented. Fruit a head of numerous dry achenes with long feathery white styles. Flowering July, August. Distribution, Central Europe, North Africa, and West Asia. —Vol. I., *p.* 121.

### *NATURAL ORDER, TAMARISCINEÆ (TAMARISK FAMILY).*

**Tamarix anglica** Webb.—Tamarisk. Bark reddish. Branches slender, upright, feathery. Leaves minute, closely overlapping. Flowers pinkish, minute, crowded on lateral spikes. Fruit a three-cornered capsule. July to September. West and North coasts of France and South and East of England.—Vol. I., *p.* 145.

### *NATURAL ORDER, TILIACEÆ (LINDEN FAMILY).*

**Tilia europæa** L.—Linden, or Lime. Sub-species, *T. cordata* Mill. Bark smooth. Twigs yellowish brown. Leaves

alternate, cordate, oblique, serrate, with tufts of yellowish hair at the branching of the veins beneath. Flowers in umbellate cymes of three or four, with leafy bract adherent to the peduncle, sweet-scented. Fruit spherical, faintly ribbed, quarter of an inch in diameter. July, August. Europe (excluding Balkan Peninsula) and Siberia.—Vol. I. *p.* 89.

Sub-species, *T. platyphyllos* Scop. Twigs downy. Fruit with five prominent ribs. Europe from Denmark southward.—Vol. II., *p.* 89.

*NATURAL ORDER, ILICINEÆ (HOLLY FAMILY).*

**Ilex Aquifolium** L. — Holly. Bark smooth, ash-grey. Shoots slightly pubescent. Leaves evergreen, alternate, glossy, with waved spinous margins, except sometimes on the upper ones. Flowers white, quarter of an inch in diameter, in axillary clusters. Fruit a scarlet, four-seeded berry. May to August. Europe, from South Norway to Turkey and the Caucasus, and West Asia.—Vol. II., *p.* 9.

*NATURAL ORDER, CELASTRINEÆ (SPINDLE-TREE FAMILY).*

**Euonymus europæus** L.—Spindle-tree. Bark smooth, grey. Shoots quadrangular, green, fetid. Leaves opposite, ovate-lanceolate, finely serrate, smooth. Flowers pale green, half an inch in diameter, parts in fours. Fruit a rose coloured, four-angled, fleshy capsule, containing four orange seeds. May, June. Europe, West Siberia, and North Africa.—Vol. III., *p.* 9.

*NATURAL ORDER, RHAMNACEÆ (BUCKTHORN FAMILY).*

**Rhamnus catharticus** L. — Common Buckthorn. Bark blackish. Twigs spinous. Leaves tufted, ovate, serrate. Flowers yellow-green, axillary, sub-sessile, small, parts in fours, dioecious. Fruit small, round, black, with four stones.

May to July. Europe, North Africa, and Siberia.—Vol. II., *p.* 25.

**R. Frangula** L. — Alder Buckthorn. Without spines. Leaves scattered, obovate, entire. Flowers greenish white, parts mostly in fives. Fruit with two stones. May, June. Europe, North Africa, and Siberia.—Vol. II., *p.* 25.

*NATURAL ORDER, ACERINEÆ (MAPLE FAMILY).*

**Acer Pseudo-Platanus** L.—Sycamore. Bark smooth. Leaves opposite, palmately five-lobed, unequally serrate, four to eight inches across, dull. Flowers in pendulous clusters, green. Fruit a two-winged samara; wings divergent, scimitar-shaped, one and a half inches long. May, June. Middle Europe and West Asia.—Vol. I., *p.* 153.

**A. campestre** L.—Maple. Bark furrowed, corky. Leaves opposite, cordate, two inches across, palmately five-lobed, lobes obtuse; stalks red. Flowers in erect, terminal clusters, green, downy. Fruit a two-winged samara, wings spreading horizontally, oblong, half an inch long, reddish. May, June. Europe, from Denmark southward, and West Asia.—Vol. I., *p.* 137.

*NATURAL ORDER, HIPPOCASTANEÆ (BUCK-EYE FAMILY).*

**Æsculus Hippocastanum** L.—Horse-chestnut. Bark smooth. Leaves opposite, palmate, of seven obovate-cuneate leaflets, serrate, one foot to two feet across. Flowers in an erect thyrse, white, splashed with pink and lined in yellow, with seven stamens. Fruit a spinous leathery capsule, containing two to four brown chestnuts (seeds). May. Probably native of the Balkan Peninsula.—Vol. I., *p.* 9.

*NATURAL ORDER, LEGUMINOSÆ (PEA AND BEAN FAMILY).*

**Cytisus Laburnum** L.—Laburnum. Bark smooth, grey-green. Leaves scattered, pinnate, of three elliptical leaflets.

Flowers in long pendulous racemes, yellow, papilionaceous. Fruit a silky green pod, becoming black. May. Central Europe.—Vol. I., *p.* 17.

**Robinia Pseudacacia** L.—Acacia. Bark furrowed. Leaves pinnate, of from four to nine pairs of egg-shaped leaflets, and a terminal one, each about an inch long, with two stipular thorns. Flowers in long pendulous racemes, white, fragrant, papilionaceous. Fruit a flat pod with a ventral flange. June, July. Carolina to Canada.—Vol. III., *p.* 129.

*NATURAL ORDER, ROSACEÆ (ROSE FAMILY).*

**Prunus communis** Hudson.—Plum. Bark smooth. Branches spinous. Leaves alternate, convolute, variable. Flowers solitary or in pairs, shortly stalked, white. Fruit a glaucous, purple, black, or yellow drupe. March, April. Europe, West Asia, and North Africa.—Vol. I., *p.* 113.

Sub-species *P. spinosa* L. — Sloe or Blackthorn. Bark black. Branches numerous. Flowers preceding leaves. Drupe globose, erect, black, half an inch in diameter. Europe.—Vol. I., *p.* 114.

Sub-species *P. insititia* L.—Bullace. Bark brown. Branches fewer, less spinous. Flowers with the leaves. Drupe globose, drooping, yellow or black, over three-quarters of an inch in diameter. Europe, North Africa, and Western Asia.—Vol. I., *p.* 113.

Sub-species *P. domestica* L. — Plum. Bark brown. Branches mostly without spines. Drupe oblong, drooping, black, an inch or more in diameter. Western Asia.—Vol. I. *p.* 113.

**P. Padus** L.—Bird Cherry. Bark smooth, grey, astringent. Leaves alternate, conduplicate, with glandular serrations. Flowers in pendulous racemes, white. Fruit a small, black, round, polished, bitter drupe, with a wrinkled stone. May. Arctic Europe and Siberia, North Africa, and the Himalayas. Vol. I, *p.* 57.

**P. Avium** L.—Wild Cherry, or Gean. Leaves drooping. Flowers in umbels. Fruit heart-shaped, bitter, black or

red. Few suckers. May. Europe to the Himalayas.—Vol. I., *p.* 57.

**P. Cerasus** L.—Dwarf Cherry. Leaves erect. Flowers in umbels. Fruit round, red, acid, and juicy. Many suckers. May. Not extending into Scotland or Africa.—Vol. I., *p.* 57.

**P. Laurocerasus** L.—Common or Cherry Laurel. Bark dark green. Shoots green. Leaves evergreen, alternate, conduplicate, yellowish green. Flowers in erect racemes, shorter than the leaves, white. Fruit a smooth, black, ovate-acute drupe. April, May. Persia, the Caucasus, and the Crimea.—Vol. II., *p.* 49.

**Cratægus Oxyacantha** L.—Hawthorn. Bark smooth, dull grey. Branches crowded, spinous. Leaves very variable, obovate-cuneate, three- to four-lobed. Flowers in sessile, corymbose cymes, white, with pink anthers, fragrant. Fruit a sub-globose pome, usually crimson, with white mealy flesh and a bony core. May, June. Europe, North Africa, Siberia, West Asia to India. Introduced into North America. —Vol. III., *p.* 49.

Sub-species *C. oxyacanthoides* Thuill.—Flower-stalks and calyx-tube smooth. Carpels, two to three.—Vol. III., *p.* 50.

Sub-species *C. monogyna* Jacquin.—Flower-stalks and calyx-tube downy. Carpel solitary.—Vol. III., *p.* 50.

**Mespilus germanica** L.—Medlar. Much branched, spinous. Leaves downy beneath. Flowers solitary, white, one and a half inches across. Fruit large, globose, surmounted by persistent leafy calyx and with a five-chambered bony core. May, June. Europe, Asia Minor, Persia.—Vol. II., *p.* 73.

**Pyrus communis** L.—Pear. Bark rough. Branches more or less pendulous and spinous. Leaves alternate, ovate-oblong, acute, serrate, on slender stalks. Flowers white, one to one and a half inches in diameter. Fruit a turbinate pome, one to two inches long, gritty. April, May. Europe, from Ireland and Denmark to the Balkans.—Vol. II., *p.* 129.

Sub-species *P. Pyraster* Bor.—Leaves acuminate, downy beneath when young. Fruit obconic at the base.—Vol. II., *p.* 131.

Sub-species *P. Achras* Bor.—Leaves acute, slightly downy beneath. Fruit rounded at the base.—Vol. II., *p.* 131.

Sub-species *P. cordata* Desv. — Leaves cordate, nearly smooth. Fruit small, globose. Devon and Cornwall.—Vol. II., *p.* 129.

**P. Malus** L.—Apple. Branches spreading, sometimes with thorns. Leaves oblong, acuminate, serrate. Flowers in sessile umbels, pink and white, one to one and a half inches in diameter. Fruit an umbilicate pome, one inch or more in diameter, red or yellow when ripe. May. Europe.—Vol. II., *p.* 33.

**P. Aucuparia** Ehrhart.—Rowan or Mountain Ash. Bark smooth, silver-grey. Branches ascending. Leaves alternate, pinnate, of thirteen to seventeen linear-oblong, acute, serrate leaflets, each one to two inches long, pale beneath and downy at first. Flowers cream-white, small, in corymbose cymes four to six inches across. Fruit a small scarlet pome with yellow flesh. May, June. Europe and Northern Asia.—Vol. I., *p.* 97.

**P. Aria** Ehrhart.—White Beam. Bark reddish brown. Young shoots white with mealy down. Leaves elliptic, irregularly serrate, snow-white beneath. Flowers small, white, in loose corymbs. Fruit sub-globose, scarlet, dotted with brown points, with orange flesh. May, June. Europe, North Africa, North and West Asia. Vol. I., *p.* 105.

**P. fennica** Bab.—Leaves partly pinnate, grey-webbed beneath. Probably a hybrid between *P. Aucuparia* and *P. intermedia*. Arran.—Vol. I., *p.* 112.

**P. intermedia** Ehrh.—Leaves pinnatifid at base, white beneath. Fruit with yellow pulpy flesh. North-west Europe, West of England, Wales, Arran.—Vol. I., *p.* 112.

**P. rupicola** Syme.—Leaves entire at base, lobed at apex, white beneath. Fruit smaller.—Vol. I., *p.* 111.

**P. latifolia** Syme.—Leaves broad, lobed, grey beneath. Flowers with sickly smell. Fruit reddish brown. North-west Europe, Cornwall. Vol. I., *p.* 111.

**P. torminalis** Ehrh.—Service-tree. Bark smooth, grey. Twigs reddish brown, polished. Leaves pinnately lobed, the

basal lobes being enlarged. Fruit oval, brown. April, May. Europe, West Asia, and North Africa, but not extending to Scotland or Ireland.—Vol. II., *p.* 65.

*NATURAL ORDER, CORNACEÆ (CORNEL FAMILY).*

**Cornus sanguinea** L.—Cornel. Much branched. Branches and leaves red in autumn. Leaves opposite, stalked, ovate, entire. Flowers cream-white, small, in dense, sub-globose terminal cymes, parts in fours. Fruit a small globular black berry. June, July. Europe and North and West Asia.—Vol. II., *p.* 113.

*NATURAL ORDER, CAPRIFOLIACEÆ (HONEYSUCKLE FAMILY).*

**Sambucus nigra** L.—Elder. Bark corky, brownish grey. Leaves opposite, pinnate, of three to nine ovate-lanceolate, serrate leaflets, each two to three inches long. Flowers small, creamy-white, in flat corymbose cymes nearly a foot across, sweet-scented. Fruit a small, round, juicy berry, generally black. June, July. Europe and North Africa.—Vol. III., *p.* 65.

**Viburnum Lantana** L.—Wayfaring-tree. Bark fissured, grey-brown. Twigs and leaves mealy, with stellate hairs. Leaves opposite, simple, ovate. Flowers small, white, in flat-topped cymes with stout branches. Fruit flattened, turning from coral-red to black. May, June. Central Europe, North Africa, North and West Asia.—Vol. I., *p.* 89.

**V. Opulus** L.—Guelder Rose. More slender, glabrous. Bark brown. Shoots green. Leaves opposite, simple, downy when young, palmately three-lobed. Flowers in corymbose clusters, white, the outer ones three-quarters of an inch across and neuter, the inner ones small and perfect. Fruit a translucent, blood-red, sub-globose berry. June, July. Europe, North and West Asia, and North America.—Vol. I., *p.* 73.

*NATURAL ORDER, ERICACEÆ (HEATH FAMILY).*

**Arbutus Unedo** L.—Strawberry-tree. Bark, red brown, flaking. Leaves alternate, oblong-lanceolate, serrate, dark green, evergreen. Flowers small, bell-shaped, creamy white, in hanging clusters Fruit a globose, scarlet berry, two-thirds of an inch across, with a roughened surface. September, October. Mediterranean region and Killarney.—Vol. I., *p.* 49.

*NATURAL ORDER, OLEACEÆ (OLIVE FAMILY).*

**Fraxinus excelsior** L.—Ash. Bark smooth, olive-grey. Buds black. Leaves opposite, pinnate, of from four to seven pairs of oblong-lanceolate, serrate leaflets, each from one to three inches long. Flowers preceding the leaves, in erect clusters, without perianths. Fruit a linear-oblong samara, notched at the apex, glossy green, streaked with black. April, May. Europe and North Africa.—Vol. I., *p.* 65.

*NATURAL ORDER, EUPHORBIACEÆ (SPURGE FAMILY).*

**Buxus sempervirens** L.—Box. Bark rough, grey. Branches downy when young. Leaves evergreen, sub-opposite, oblong, obtuse, not more than an inch long. Flowers monœcious, in axillary cymes, minute, whitish. Fruit a small, dehiscent, horned capsule. April, May. Europe, from Belgium southward, North Africa, and Asia.—Vol. III., *p.* 121.

*NATURAL ORDER, MORACEÆ (MULBERRY FAMILY).*

**Morus nigra** Poir.—Mulberry. Bark rough, reddish brown. Leaves ovate, cordate, irregularly serrate. Flowers monœcious, in catkins, inconspicuous, greenish white. Fruit multiple, oval, about an inch long, turning red and reddish black, very juicy. June, July. Northern Persia and Armenia ; but cultivated throughout Southern and Central Europe. —Vol. I , *p.* 25.

*NATURAL ORDER, ULMACEÆ (ELM FAMILY).*

**Ulmus surculosa** Stokes.—Common Elm. Bark furrowed. Suckers. Branches often long and horizontal. Leaves alternate, oblique, irregularly serrate, acute, variable in size. Flowers preceding the leaves, vinous red. Fruit a samara, winged all round, obovate, with the seed above its centre. March, April. Middle and Southern Europe, Siberia, and North Africa.—Vol. I., *p.* 41.

**U. montana** Stokes.—Wych Elm. Bark furrowed. No suckers. Branches ascending and pendulous. Leaves and flowers much as in the above. Samara sub-orbicular, with the seed below its centre, more often ripening. March, April. Europe and Siberia.—Vol. III., *p.* 81.

*NATURAL ORDER, BETULACEÆ (BIRCH FAMILY).*

**Betula alba** L.—Birch. Bark smooth, silvery-white, scaling off in transverse strips. Branches copper-brown, often weeping. Leaves alternate, deltoid or rhomboid, irregularly serrate, on long stalks. Flowers monœcious. Male catkins one to two inches long, pendulous. Female catkins. sub-erect at first, their scales deciduous. Fruit minute, winged. April to May. Europe and North Asia.—Vol. III., *p.* 1.

Sub-species *B. verrucosa* Ehrh.—White Birch. Leaves truncate at the base, acuminate, with raised veins.—Vol. III., *p.* 4.

Sub-species *B. glutinosa* Fries. — Leaves cordate-acute, with veins on the under surface.—Vol. III., *p.* 1.

**Alnus glutinosa** Gaertn.—Alder. Bark black, with clefts. Branches triangular when young. Leaves alternate, obovate, blunt, wavy, serrate, glutinous when young, dark. Flowers in monœcious catkins. Female catkins not an inch long, their scales woody and persistent. Fruit hardly winged. March, April. Europe, Asia, and North Africa.—Vol. III., *p.* 97.

*NATURAL ORDER, JUGLANDACEÆ (WALNUT FAMILY).*

**Juglans regia** L.—Walnut. Bark furrowed. Branches smooth, grey. Leaves pinnate, of three or four pairs of oval, acute, somewhat fleshy leaflets, and a terminal one, aromatic when bruised. Flowers monœcious. Male flowers in solitary drooping catkins on shoot of previous year. Female flowers terminating the shoot of the year. Fruit inferior, bicarpellary, drupaceous, oval, with nut-like endocarp and one seed. April, May. Persia.—Vol. I., *p.* 81.

*NATURAL ORDER, PLATANACEÆ (PLANE FAMILY).*

**Platanus orientalis** L.—Oriental Plane. Bark green, scaling off in square flakes. Outline compact and rounded. Leaves alternate, deeply palmately five-lobed, cuneate at the base, six to eight inches across, glossy. Flowers monœcious, collected in globular unisexual capitula ("buttons"), two to five on a branch. Fruit small, one-seeded nuts similarly arranged in buttons. May, June. Native in Persia.—Vol. II., *p.* 145.

**P. occidentalis** L.—Western Plane. Scarcely distinct from the above. Outline looser and less rounded. Leaves lobed to a moderate extent, not cuneate at the base. Fruit button solitary on a branch. Canada to Mexico, and Atlantic to Rocky Mountains.—Vol. II., *p.* 145.

*NATURAL ORDER, SALICINEÆ (WILLOW FAMILY).*

**Populus alba** L.—Abele. Bark smooth, grey. Suckers numerous. Leaves of suckers lobed, those of the branches white and cottony beneath, broadly ovate, cordate. Leaf-stalk very long, compressed. Flowers diœcious, in drooping catkins. Catkin-scales lobed, ciliate. Anthers purple. March, April. Central Europe, North Africa, North and West Asia.—Vol. III., *p.* 33.

**P. tremula** L.—Aspen. Branches becoming pendulous. Shoots downy, reddish. Buds slightly viscid. Leaves silky beneath when young; those on the suckers heart-shaped; those on the branches rounded, with incurved teeth. March, April. Europe, North Asia, Asia Minor, and North Africa. —Vol. II, *p.* 121.

**P. pyramidalis** Roz.—Lombardy Poplar. Branches ascending. Shoots smooth. Buds viscid. Leaves rhombic, ciliate, and silky beneath when young; but more rounded, finely serrate, and smooth when older. Suckers. March, April. Probably native in Western and Northern Asia.—Vol. III., p. 73.

**Salix fragilis** L.—Crack Willow. Branches smooth, yellow-brown, brittle in spring. Leaves elliptic-lanceolate, pilose when young, afterwards smooth, three to six inches long, with semi-cordate deciduous stipules. Flowers in dioecious erect catkins, appearing with the leaves and with leaves on the flower-stalks. Catkin-scales not notched, linear-lanceolate. Stamens two, distinct, hairy below. Capsules stalked, with bifid but not recurved stigmas. April, May. Native in South-west Asia, but doubtfully so in Europe. Introduced in America.—Vol. III., *p.* 26.

**S. decipiens** Sm.—Orange Willow. Similar to the above, but with polished orange or reddish brown branches, crimson when young, smaller leaves, and longer styles.—Vol. III., *p.* 29.

**S. Russelliana** Sm.—Bedford Willow. Very similar to *S. fragilis*, but with smooth green flexible twigs and long tapering leaves, very glaucous beneath.—Vol. III., *p.* 29.

**S. Babylonica** L.—Weeping Willow. Branches drooping, pale green, very slender, slightly twisted at each node. Leaves lanceolate-acuminate, finely serrate, five inches long and one inch across, smooth above and glaucous beneath. Otherwise like *S. fragilis*. Extra-tropical Asia, from Japan to Armenia and Syria, and North Africa.—Vol. III., *p.* 145.

**S. alba** L.—White or Huntingdon Willow. Bark deeply furrowed. Branches silky, olive green. Leaves narrowly lanceolate-acuminate, convolute, silky on both surfaces, two

to four inches long, with minute ovate-lanceolate, deciduous stipules. Flowers much as in *S. fragilis*, but with nearly sessile capsules and recurved bifid stigmas. May. Europe, North Africa, Siberia, and West Asia.—Vol. III., *p.* 25.

**S. cærulea** Sm.—Blue Willow. Similar to the above, but with leaves which are grey beneath and become smooth when old.—Vol. III., *p.* 30.

**S. vitellina** Sm.—Golden Willow. Similar to the last, but with yellow or reddish twigs.—Vol. III., *p.* 30.

**S. viminalis** L.—Osier. Branches long, slender, silky when young, polished later. Leaves sometimes ten inches long, with wavy, recurved margins. Catkins before the leaves. April. Northern Asia and Russia.—Vol. III., *p.* 31.

**S. cinerea** L.—Sallow. Twigs and buds downy. Leaves obovate-lanceolate, wrinkled, dark green, glaucous, with reddish brown hairs beneath, and large, kidney-shaped stipules. March.—Vol. III., *p.* 31.

**S. Caprea** L.—Goat Willow. Buds smooth. Leaves ovate, wrinkled, with wavy margins. Closely allied to the last. March to May.—Vol. III., *p.* 25.

### *NATURAL ORDER, CUPULIFERÆ (OAK FAMILY).*

**Quercus Robur** L.—Oak. Bark corky, deeply furrowed, grey. Branches tortuous. Leaves alternate, obovate-sinuate, with blunt lobes, three to six inches long. Catkins monœcious, appearing with the leaves, two to three inches long. pendulous, lax. Stamens ten. Ovary inferior, three-chambered, forming a one-seeded "acorn," surrounded at base by a cupule of numerous, adpressed, imbricate scales. April, May. From Syria and Mount Atlas almost to the Arctic Circle. Var. *pedunculata* Ehr., White Oak. Leaves sessile, downy beneath when young. Acorns on long stalks. Var. *intermedia* D. Don, or *pubescens* Willd. Durmast Oak. Leaf-stalks and peduncles both short. Leaves remaining downy beneath. Fruit dark-coloured. Var. *sessiliflora* Salisb. Red Oak. Young branches downy.

Leaf-stalks long. Leaves smooth beneath. Acorns subsessile.—Vol. II., *p.* 1.

**Q. Ilex** L.—Holm or Evergreen Oak. Generally branched down to the ground. Leaves evergreen, ovate-oblong, acute, entire or serrate, dark, glossy green, hoary beneath, one to five inches long. Catkins one to two inches long. Acorns long, oval, half-enclosed by cupule of downy adpressed scales. May. South Asia, North Africa, and South Europe. —Vol. III., *p.* 113.

**Castanea sativa** Miller.—Sweet or Spanish Chestnut. Bark deeply and often spirally furrowed, grey. Shoots red-brown, smooth. Leaves alternate, simple, oblong-lanceolate, mucronate, serrate, glossy. Catkins five to six inches long, monœcious. Fertile flowers in threes, surrounded by a prickly cupule. Fruit a brown nut, surmounted by the six-leaved perianth and five to eight styles, and enclosing one to three seeds. May. South and Central Europe.—Vol. II., *p.* 41.

**Fagus sylvatica** L.—Beech. Bark smooth, olive-grey to white. Buds chestnut-brown, long, acute. Leaves alternate, ovate, plicate, and ciliate when young, glabrescent, glossy. Male catkins globose. Female flowers in twos in a four-cleft prickly cupule. Fruit a three-cornered, polished, brown nut. April, May. Asia Minor and Spain to Norway.—Vol. II., *p.* 105.

*NATURAL ORDER, CORYLACEÆ (HAZEL FAMILY).*

**Corylus Avellana** L.—Hazel. Bark split, ash-grey on stem. Shoots brown, hairy, glandular. Leaves alternate, roundish, obliquely cordate, irregularly serrate. Flowers monœcious, preceding the leaves. Male catkins one to two inches long, pendulous. Female catkins short, erect, ovoid, with crimson stigmas. Fruit a nut, surrounded at base by a leafy involucre. February, March. Europe, Siberia, and North Africa.—Vol. II., *p.* 57.

**Carpinus Betulus** L.—Hornbeam. Bark smooth, light grey. Buds short, adpressed. Leaves alternate, elliptic-ovate

acuminate, plicate, doubly serrate. Catkins monœcious, pendulous. Male ones, one to two inches long, of ovate acute bracts, each with five to fourteen forked stamens: female ones, two to four inches long, of three-lobed leafy bracts, each with two flowers. Fruit a nut, a quarter of an inch long. May. Central Europe and West Asia.—Vol. III., *p.* 17.

## GYMNOSPERMIA (CONE-BEARERS).

### *NATURAL ORDER, PINACEÆ (PINE FAMILY).*

**Pinus Pinaster** Ait.—Cluster Pine. Bark coarse, deeply fissured longitudinally. Branches whorled, bending upward. Needle-leaves in pairs, six to twelve inches long, light green. Cones in star-like clusters of from four to eight together, four to six inches long, glossy light brown, with ash-grey, pointed "umbo" in the centre of each "apophysis" or enlarged end of the cone-scale. June. Mediterranean region. —Vol. I., *p.* 33.

**P. Laricio** Poiret.—Corsican Pine. Bark reddish grey, scaling off in large, thin plates. Branches whorled, with a lateral spiral twist round the tree. Needle-leaves in pairs, four to eight inches long, dark green. Cones, one to three together, two or three inches long, glossy, tawny, with a very small, pointed umbo to each apophysis. June. Corsica and the Maritime Alps.—Vol. II., *p.* 17.

**P. Pinea** L.—Stone Pine. Bark reddish grey, fissured longitudinally, often deeply. Branches large, ascending, rendering the tree flat-topped. Needle-leaves in pairs, five to eight inches long, dark green. Cones solitary, sometimes four inches wide, very light brown, with a broad, blunt umbo to each apophysis. Seed large, edible, very slightly winged. May, June. Possibly a native of China, but long grown in the Mediterranean region.—Vol. II., *p.* 137.

**P. sylvestris** L.—Scots Fir. Bark red-brown, furrowed, scaling, much as in *P. Laricio*. Needle-leaves in pairs, two to three inches long. Cones, one to three together, ovoid acute, one to two inches long, with deciduous umbo. Seed

half an inch long, with a wing thrice as long. May, June. Europe and Siberia.—Vol. III., *p.* 41.

**Larix europæa** D.C.—Larch. Bark scaly, reddish grey. Branches drooping. Outline pyramidal. Leaves short, needle-shaped, tufted, light green, deciduous. Cones red when young, erect, ovate, one to one and a half inches long, persistent, the scales becoming grey, but not thickening at the ends. April, May. Central Europe, from Russia to the Apennines.—Vol. III., *p.* 137.

**Cedrus Libani** Barr.—Cedar of Lebanon. Bark brown, scaly. Branches horizontal, dorsi-ventral. Needle-leaves tufted at first, afterwards spirally arranged, glaucous when young, dark green, evergreen. Cones erect, ovate, from three to five inches long, of broad, thin, brown scales, persistent. Seeds broadly winged. May, June. Lebanon.—Vol. III., *p.* 89.

**Picea excelsa** Link.—Spruce. Bark thin, warty, reddish brown. Branches whorled, spreading, dorsi-ventral. Outline pyramidal. Leaves needle-shaped, four-angled, acute, stiff, less than one inch long, bright green, evergreen. Cones at first erect, then pendulous and falling whole, five to seven inches long, their scales thin, notched, bright brown. May, June. Northern Europe.—Vol. III., *p.* 105.

**Pseudotsuga Douglasii** Carr.—Douglas Fir. Stem tapering. Bark thick, scaling, reddish brown. Branches drooping. Outline pyramidal. Leaves needle-shaped, flat, slightly twisted so as to be sub-distichous, bright shining green above, with two white lines below. Cones egg-shaped, two and a half to four inches long, "feathered" with three-lobed bract scales, reddish brown, falling whole. Western North America.—Vol. II., *p.* 97.

### *NATURAL ORDER, TAXODINEÆ (REDWOOD FAMILY).*

**Sequoia gigantea** Dec.—Wellingtonia. Stem tapering. Bark thick, spongy, fibrous, reddish brown. Branches slender, sweeping to the ground. Outline pyramidal. Leaves

short, awl-shaped, rigid, spirally arranged, closely adpressed to the branch, bluish green at first, becoming a dull grass-green, evergreen. Cones solitary, egg-shaped, two inches long, woody, with twenty-five to thirty peltate scales, each bearing five to seven seeds. California and Oregon.—Vol. I., *p.* 129.

*NATURAL ORDER, CUPRESSINEÆ (CYPRESS FAMILY).*

**Cupressus sempervirens** L.—Cypress. Bark scaly, reddish brown. Branches ascending. Shoots quadrangular. Leaves minute, needle-shaped on main stem, broader and adpressed in four rows on the shoots, dark evergreen. Cones globose, from one inch to one and a half inches in diameter, of a few polygonal scales which have a central point and become woody. May, June. Persia, Asia Minor, and the Eastern Mediterranean region.—Vol. III., *p.* 57.

*NATURAL ORDER, TAXACEÆ (YEW FAMILY).*

**Taxus baccata** L.—Yew. Bark furrowed, brown, pink-tinged, flaking. Branches dorsi-ventral. Leaves linear, acute, one inch long, dark, apparently distichous, evergreen. Flowers dicœcious, male of peltate stamens, female of solitary ovule, surrounded later by pink, fleshy, cup-like aril. March, April. Northern Temperate Zone.—Vol. II., *p.* 81.

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