

NATIVE CONIFERS NOTED AS WAYMARKER TREES

Conifers

In simple terms, conifers (cone-bearing plants referred to as gymnosperms in botany) are ancient trees (and shrubs) with a lineage that can be traced back more than 350-million years BCE. Most (but not all) conifers are monoecious – having female and male sexual reproductive parts (not flowers) on the same plant.

Conifers typically produce woody cones (or, occasionally, soft berry-like fruits). Cones quickly disintegrate or are persistent; all ripening to reveal free/unattached ‘naked’ (unenclosed) seeds, each lying upon an open scale, often dispersed by wind. Soft fruits (berries) are usually dispersed by birds. They have a simplified (though highly functional) vascular systems. Gymnosperms are the oldest evolved group of seed-producing plants.

Identification

To assist in identification, the following section provides a brief botanical outline for each native conifer species noted by Wainwright and referred to, as a waymarker tree, in Lakeland’s Waymarker Trees.

Drawings, with permission, are reproduced from:

- Forestry Commission Booklet No. 15 (Edlin, H., 1966).
 - Artist – David Walker.
- Forestry Commission Booklet No. 33 (Mitchell, A., 1972).
 - Artist – Christine Darter.

Drawings are botanically accurate, but do not conform to a scale.

Species are in alphabetical order according to botanical genus.

- Common juniper (*Juniperus communis*).
- Scots pine (*Pinus sylvestris*).
- European yew (*Taxus baccata*).

Common juniper (*Juniperus communis*)

Family: Cupressaceae.

Origin: native.

Reproduction: dioecious.

Habit: sometimes prostrate, a shrub or small tree, up to 10m high.



Common juniper – hard prickly leaves, mainly grouped in threes, bearing rounded green to dark blue-black berries.

Drawing: David Walker (Edlin, H., 1966).

Bark: reddish-brown, peeling.

Twigs: pale-brown, slender, with three-angled ridges.

Leaves: all juvenile, sessile, linear; blue-green, rigid, pointed at tip; aromatic, spreading at right-angles, in whorls of three; with broad white band of stomata on upper surface rarely divided by indistinct midrib and lower surface faintly keeled. Evergreen.

Female cones: (on female plants) fused scales, ovoid/globose, succulent berry-like; ripening in second or third year, changing from green to glaucous-blue to dark blue-black when ripe; containing three-five seeds ingested and dispersed by birds.

Male cones: (on male plants) solitary, yellow, in leaf axils.

Distribution: the widest natural range of any woody plant, dispersed throughout the cool temperate regions of the northern hemisphere; found across Europe, America, Asia and the Atlas Mountains of north Africa.

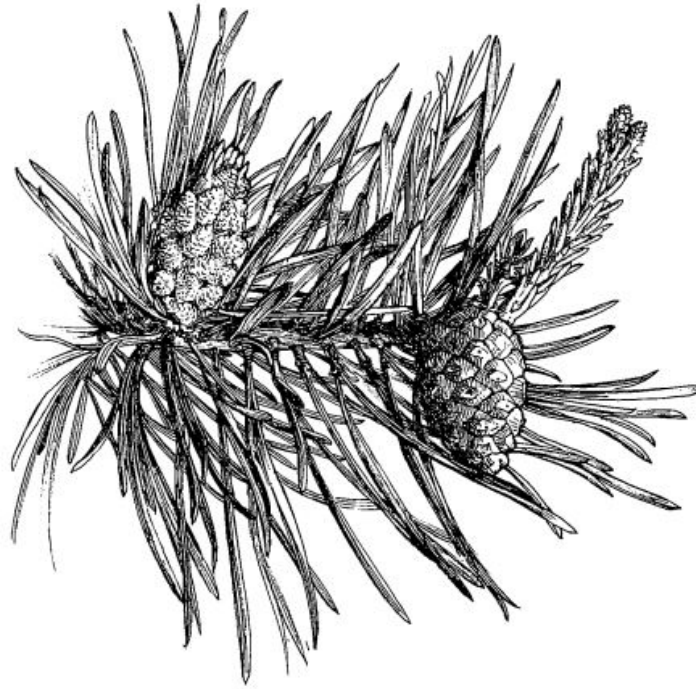
Scots pine (*Pinus sylvestris*)

Family: Pinaceae.

Origin: native.

Reproduction: monoecious.

Habit: moderately tall tree, typically up to 35m high, occasionally more.



Scots pine – clustered male anthers (*left*); small spherical female ‘flowers’ at twig tip (*right*); dry, hard second-year cone on old wood; showing paired leaves with newly-expanding singular needle-like leaves at leading tip.

Drawing: Christine Darter (Mitchell, A., 1972).

Bark: reddish-brown/greyish-brown on lower trunk, with orangey-red papery scales on upper trunk and branches.

Twigs: initially green, smooth/shining, then greyish-brown.

Leaves: in pairs, 25-80mm long; grey-green, glaucous, short-pointed, twisted; well-defined densely packed line of silver-white stomata on lower surface. Evergreen.

Female cones: develop over two years, on whorl one-year behind terminal bud; first green, hard, tightly shut then brown, conical-ovoid shaped, opening to release winged seed.

Male cones: yellow, borne in clusters.

Distribution: across Britain and Europe, northern/western Asia.

European yew (*Taxus baccata*)

Family: Taxaceae.

Origin: native.

Reproduction: dioecious.

Habit: large shrub or moderately tall tree, typically up to 25m high.



European yew – dark-green, forward-pointing, downward-arching, linear, pointed leaves, spirally arranged in ranks each side of shoot; (*upper left*) female ‘flower’; (*upper right*) pollinating male ‘flower’; (*lower right*) bright-red, rounded, succulent berry-like ‘cone’ (called an aril) with deep, inner recess, holding seed.

Drawing: Christine Darter (Mitchell, A., 1972).

Bark: reddish-brown, flaking/peeling to reveal deep-red patches of new bark below.

Twigs: irregular, rather pendulous, leading to stout level or ascending branches.

Leaves: entire, linear, flattened, with central raised midrib on upper surface; tapering at base with abrupt short point; glossy or dull dark-green above with twin pale-green bands below; sessile, arising spirally but appearing as a row each side of twig. Evergreen.

Female cones: (on female plants) green, minute, solitary or in pairs; developing into small ovoid/globose fleshy bright-red fruit with depressed top, referred to as an aril.

Male cones: (on male plants) yellowish, solitary with clustered anthers.

Distribution: widespread across Europe, parts of north Africa and southwest Asia.

NATIVE BROADLEAVES NOTED AS WAYMARKER TREES

Broadleaves

In simple terms, broadleaved trees (flower-bearing plants referred to as angiosperms in botany) are relatively modern in evolutionary terms, with a lineage generally considered to be 140-125-million years BCE. Some broadleaves are monoecious (with female and male flowers on the same plant) – others, equally, are dioecious (with female and male flowers on separate plants).

Depending upon a species' reproductive process they form female, male or hermaphrodite flowers which, following fertilisation, produce enclosed seeds. Seed dispersal is via wind, birds and a host of invertebrate/vertebrate partners. They have specialised vascular systems. Angiosperms are the most recently evolved group of seed-producing plants.

Identification

To assist in identification, the following section provides a brief botanical outline for each native broadleaf species noted by Wainwright and referred to, as a waymarker tree, in Lakeland's Waymarker Trees.

Drawings, with permission, are reproduced from:

- Forestry Commission Booklet No. 20 (Edlin, H., 1968).
 - Artist – Christine Darter.
- Observer's Book of Trees (Stokoe, W. J, 1937).
 - Artist – Mable E. Step.

Drawings are botanically accurate, but do not conform to a scale.

Species are in alphabetical order according to botanical genus.

- Silver birch (*Betula pendula*).
- Hazel (*Corylus avellana*).
- Hawthorn (*Crataegus monogyna*).
- Common ash (*Fraxinus excelsior*).
- Holly (*Ilex aquifolium*).
- Sessile oak (*Quercus petraea*).
- Goat willow (*Salix caprea*).
- Rowan (*Sorbus aucuparia*).

Silver birch (*Betula pendula*)

Family: Betulaceae.

Origin: native.

Reproduction: monoecious.

Habit: moderately tall tree, typically up to 25m high, but frequently smaller. Crown open, delicate, with drooping pendulous branches.



Silver birch – flowering twigs; prominent double-toothed leaves of larger primary and smaller secondary teeth; hanging male catkins with detail (*above*) showing groups (dichasium) of three flowers arranged into smooth drooping 'lamb's tail'; and (initially) erect female catkins (*below*) with detail of bristly drooping 'lamb's tail'.

Drawing: Christine Darter (Edlin, H., 1968).

Bark: thin, silvery-white, becoming gnarled/rugged at base and on lower trunk with age; sometimes peeling, with dark diamond-shaped patterning and rough vertical fissures.

Twigs: slender, pendulous, hairless with tiny warts; small 4mm brown buds in alternate arrangement, lying close to twig; arising on erect young branches that become pendulous with age.

Leaves: typically triangular shaped, with a doubly-toothed margin and leaf-base almost at right-angle to petiole; widely spaced along the twig creating an open airy appearance that allows light to filter through the crown. Deciduous.

Female flowers: very similar appearance to male catkins though bristly and initially standing erect in spring; flowers ripen to fruit in summer, drooping to hang like 'lambs' tails'.

Male flowers: comprising multiple tiny green flowers with bracts (referred to as dichasia) arranged on a long drooping stalk, creating hanging catkins commonly called 'lambs' tails'. Male catkins disintegrate in late spring after shedding their pollen by wind.

Fruits: dehydrating catkins release tiny featherweight single seeds with an aerodynamic wing either side, dispersed on the lightest breezes.

Distribution: common across the British Isles and central/northern Europe. Prefers drier sites than downy birch (*P. pubescens*).

Hazel (*Corylus avellana*)

Family: Betulaceae.

Origin: native.

Reproduction: monoecious.

Habit: multi-stemmed shrub or small tree, typically 5-10m high, occasionally taller.



Hazel – leafy twig with ripe nuts enclosed in leafy cupules.

Drawing: Christine Darter (Edlin, H., 1968).

Bark: smooth, shiny light-greenish/brown; roughened with warty lenticels in irregular horizontal bands.

Twigs: typically hairy, bearing alternately arranged pale-green, ovoid, smooth buds.

Leaves: single, entire, rounded-oval with sharply double-toothed margins; mid-green; pointed tip and heart-shaped base; both leaf and petiole hairy. Deciduous.

Female flowers: female 'catkins' look like buds, but are easily distinguished by a tuft of deep-red styles protruding from the bud-tip.

Male flowers: buds holding male flowers open in January/February, before leaves appear, extending into pendulous pale-yellow 'lambs' tail' catkins. Once pollen is dispersed by wind the catkins disintegrate, typically by March.

Fruits: after pollination a large single-seeded nut develops, enclosed by leafy cupules (bracts) turning from green to dark-brown.

Distribution: across the British Isles and most of Europe.

Hawthorn (*Crataegus monogyna*)

Family: Rosaceae.

Origin: native.

Reproduction: hermaphroditic.

Habit: long-lived, tough large shrub or small tree, typically up to 10m high.



Hawthorn – flowering twig, with spines; indented lobed leaves, some incised (as shown) and others broader in profile; flowers white, five-petaled; with hanging berries (haws) shown in detail.

Drawing: Mable E. Step (Stokoe, W. J., 1937).

Bark: rough, dark grey-brown; cracking into small orange-red rectangles with age.

Twigs: stout; red-brown to purplish, armed with spines 1-2.5mm long; pairs of buds set at base of thorns.

Leaves: glossy, simple, ovate or broadly so, lacinate; three-five lobes, incised two-thirds toward midrib, acutely serrate near apex. Deciduous.

Flowers: hermaphrodite; in corymbs of up to 16 flowers; white petals, sometimes blushed with pink.

Fruits: bright deep red; globose-ovoid (called 'haws') in profuse hanging groups.

Distribution: across the British Isles and all of Europe.

Common ash (*Fraxinus excelsior*)

Family: Oleaceae.

Origin: native.

Reproduction: monoecious or dioecious.

Habit: large tall tree, between 25-35m high.



Common ash – pinnately compound leaf, with clusters of ripening samara (called 'keys').

Drawing: Christine Darter (Edlin, H., 1968).

Bark: light grey-brown, smooth when young; more grey, ridged, fissured when older.

Twigs: smooth, stout, thickened; with large dusty-black buds in opposite pairs, with a larger terminal bud at the end of green-grey shoots.

Leaves: pinnate, to 300mm long; 9-13 leaflets in opposite pairs along rachis with a terminal leaflet, green-grey, pale with fine white-hairs below; rachis hairless and grooved. Deciduous.

Flowers: profuse, in axillary or terminal panicles; without petals, clustered orange-red stamens, occurring before leaves.

Fruits: a samara, to 40mm long; in pendulous groups, persisting after leaf fall.

Distribution: throughout Britain, though infrequent/rare in north Scotland; Norway to the Mediterranean.

Holly (*Ilex aquifolium*)

Family: Aquifoliaceae.

Origin: native.

Reproduction: dioecious.

Habit: medium-large shrub or small tree, typically up to 10m high, rarely taller.



Holly – fruiting branch in winter, with shining bright red berries.

Drawing: Christine Darter (Edlin, H., 1968).

Bark: smooth pale grey, silvered in places.

Twigs: densely branched, forming a compact crowded crown; deep-green shoots may feel angular/ribbed or grooved, with stiff/stout petioles; buds small, alternate.

Leaves: simple, entire, alternately arranged; discolourous, glossy dark-green above with matt mid-green below; undulate, with spiny margins at lower levels and/or where browsed, otherwise elliptical with pointed tips. Evergreen.

Flowers: in axillary clusters (cymes); white, with four petals; female cymes smaller/shorter, open, free, each flower with an obvious green central ovule; male cymes larger/longer, more closely grouped, each flower with four prominent stamens.

Fruits: a drupe, 4-6mm long; globose/ovoid; bright scarlet (occasionally orange/yellow) in clusters on female trees only.

Distribution: throughout Britain (except extreme northern Scotland); from the Atlantic coast across Europe, from Norway to Algiers and eastwards to western Asia.

Sessile oak (*Quercus petraea*)

Family: Fagaceae.

Origin: native.

Reproduction: monoecious.

Habit: prefers western/northern upland sites; large, with broad/domed crown; straight trunk and radiating branches; typically 30-35m high, with some exemplars reaching 40-45m.



Sessile oak – fruiting twig, with stalked leaves and rounded/tapering stalkless acorns attached directly to stem (or, sometimes, on very short ± 10 mm peduncle).

Drawing: Christine Darter (Edlin, H., 1968).

Bark: thick, grey-brown, vertically fissured; on tall straight trunk with radiating branches.

Twigs: green-brown, shiny; leading to straight and spreading branches; alternate singular brown ovoid pointed buds, aligned along twig, with finely pubescent terminal clusters.

Leaves: firm, shapely, flattened, with five-eight shallow rounded lobes on each margin, widest in upper third of lamina; regularly spaced on long (15-25mm) pale-yellow petioles; discolourous, mid-green above with pale green-grey below. Deciduous.

Flowers: female flowers inconspicuous, sessile, smaller/shorter, concealed by new foliage; male flowers form in clusters as yellow-green pendent catkins, up to 100mm long, emerging with new leaves in spring.

Fruits: clusters of two-six singular terete nuts (acorns), 20-30mm long, held in scaly woody cupule; sessile or on very short peduncle, arising directly from the twig.

Distribution: on higher ground throughout northern/western Britain (except the Scottish islands of Outer Hebrides, Orkney and Shetland and also the Channel Islands of Alderney, Guernsey and Jersey); across central/northern Europe to Türkiye and central Russia.

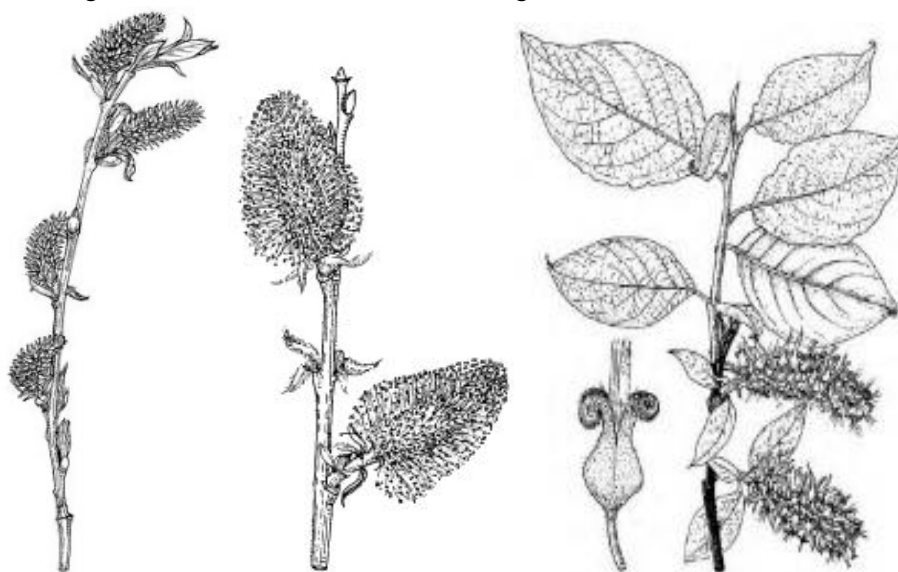
Goat willow (*Salix caprea*)

Family: Salicaceae.

Origin: native.

Reproduction: dioecious.

Habit: medium-large shrub or small tree, 10-15m high.



Goat willow – (left) female flowers; (centre) male flowers (right) leafy twig from female tree.

Drawing: Christine Darter (Edlin, H., 1968).

Bark: grey, smooth initially, becoming cracked and heavily fissured with age.

Twigs: grey, initially with long hairs, becoming shiny, glabrous; alternate conspicuous 4mm brown-red broadly-ovoid buds aligned along straight strong flexible twig.

Leaves: entire, simple and usually obovate (though variable); discolorous, green-grey above with paler green-grey covered in fine pubescence below. Deciduous.

Female flowers: broad catkins, silky soft, to 50mm; green-coloured when flowering, releasing masses of white fluffy seeds.

Male flowers: large catkins, silky soft, up to 30mm; white, maturing to sulphur-yellow when pollen is released. Flowers relate to the colloquial name 'pussy willow'.

Fruits: prolific numbers of small capsules, 5-10mm long; containing numerous minute (± 0.2 mm) seeds embedded in fine, cottony hairs which aid aeolian dispersal.

Distribution: across Britain, Europe and eastwards to central and western Asia.

Rowan (*Sorbus aucuparia*)

Family: Rosaceae.

Origin: native.

Reproduction: monoecious.

Habit: small-medium tree, typically up to 12m high (yet taller trees exist in some places).



Rowan – foliage and flower cluster, with pinnately compound toothed leaflets.

Drawing: Christine Darter (Edlin, H., 1968).

Bark: smooth, pale-grey, gleaming, lustrous when young, becoming rough grey-black, blistered, cracked and fissured with age; lenticels arranged horizontally around trunk.

Twigs: initially hairy, dull grey-purple with obvious lenticels; alternate buds, ovoid, purple-brown with dense grey hairs.

Leaves: pinnate, to 200mm; five-nine oppositely-paired lanceolate leaflets plus terminal leaflet, with serrated margins and rounded bases. Discolorous, dark-green above and grey-green below. Deciduous.

Flowers: strongly scented, creamy-white, held in compound corymbs.

Fruits: profuse clusters of green, globose, 8-10mm berries, quickly turning deep-orange to bright-scarlet; each ripe fruit with persistent star-shaped black sepals.

Distribution: across Britain and Europe, to Russia and China.

OTHER TREES NOTED AS WAYMARKERS

Broadleaves and conifers

Many other broadleaf/conifer species – classified as being alien, archaeophyte, exotic, native, naturalised or neophyte – are encountered on Wainwright's walks.

Identification

To assist in identification, the following section provides brief botanical outlines for various exotic/native broadleaf/conifer species noted by Wainwright where some are referred to as waymarker tree plus others which will be seen on the fell walks as outlined in Lakeland's Waymarker Trees.

Drawings, with permission, are reproduced from:

- Forestry Commission Booklet No. 15 (Edlin, H., 1966).
 - Artist – David Walker.
- Forestry Commission Booklet No. 15, Third Edition (Mitchell, A., 1985).
 - Artists – John Williams and Christine Darter.
- Forestry Commission Booklet No. 20 (Edlin, H., 1968).
 - Artist – Christine Darter.
- Forestry Commission Booklet No. 33, Conifers in the Br. Isles (Mitchel, A. 1972).
 - Artist – Christine Darter.
- Standard Cyclopedia of Horticulture (Bailey, L. H., 1917).
 - Artist – John Myers.
- The Observer's Book of Trees (Stokoe, W. J., 1937).
 - Artist – Mable E. Step.

Drawings are botanically accurate, but do not conform to a scale.

Species are in alphabetical order according to botanical genus.

- Noble fir (*Abies procera*).
- Field maple (*Acer campestre*).
- Sycamore (*Acer pseudoplatanus*).
- Common alder (*Alnus glutinosa*).
- Monkey puzzle (*Araucaria araucana*).
- Downy birch (*Betula pubescens*).

- Hornbeam (*Carpinus betulus*).
- Sweet chestnut (*Castanea sativa*).
- Lawson cypress (*Chamaecyparis lawsoniana*).
- European larch (*Larix decidua*).
- Hybrid larch (*Larix x marschlinsii*).
- Liquidambar (*Liquidambar styraciflua*).
- Tulip tree (*Liriodendron tulipifera*).
- Crab apple (*Malus sylvestris*).
- Norway spruce (*Picea abies*).
- Sitka spruce (*Picea sitchensis*).
- Lodgepole pine (*Pinus contorta* var. *Latifolia*).
- Mountain pine (*Pinus uncinata*).
- London plane (*Platanus x hispanica*).
- Aspen (*Populus tremula*).
- Bird cherry (*Prunus padus*).
- Douglas fir (*Pseudotsuga menziesii*).
- Pedunculate oak (*Quercus robur*).
- Common rhododendron (*Rhododendron ponticum*).
- Elder (*Sambucus nigra*).
- Western red cedar (*Thuja plicata*).
- Small-leaved lime (*Tilia cordata*).
- Common lime (*Tilia x europaea*).
- Western hemlock (*Tsuga heterophylla*).
- Wych elm (*Ulmus glabra*).

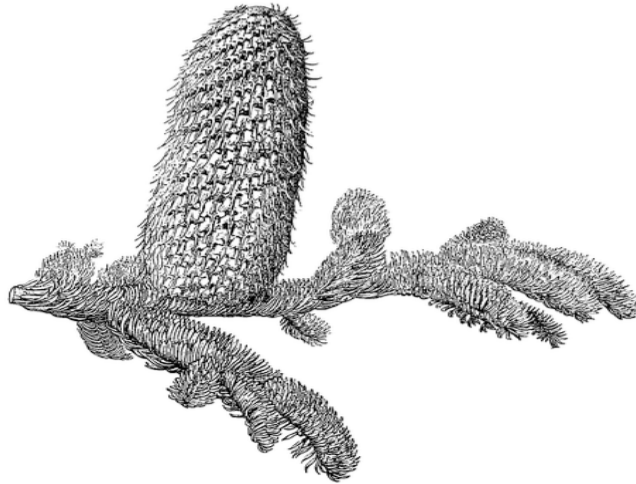
Noble fir (*Abies procera*)

Family: Pinaceae.

Origin: exotic.

Reproduction: monoecious.

Habit: narrowly conic when young, becoming broadly-columnar and flat-topped; typically up to 50m high.



Noble fir – powder blue-green upswept leaves, with erect mature female cone covered in exserted scales.

Drawing: David Walker (Edlin, H., 1966).

Bark: silver-grey, sometimes with a purple hue on mature trees; initially smooth, soon blistering with fine cracks and deep fissures/furrows as tree ages.

Twigs: brown, covered in dense reddish hair; ovoid buds with brown scales, hidden in foliage; stiff, in regular repeated whorls, developing a uniform branch growth pattern.

Leaves: linear, grooved, squared, variable lengths between 10-30mm, blunt-ended; spirally arranged, appearing curved/upswept, all equally level above twig; glaucous powder-blue-green on upper surface with twin pale silver-white stomatal bands below. A tiny peg with a circular base remains on any needle removed, leaving a disc-like scar where the leaf was attached. Evergreen.

Male cones: small, to 20mm; variously red, purple or reddish-brown at pollination; hanging beneath foliage.

Female cones: developing into handsome upright cylindrical brown cones, 15-25mm; green, becoming brown at maturity; dark-brown scales, spirally arranged, overlaid with lighter-brown sharp-pointed downward facing (exserted/reflexed) bracts.

Distribution: plantations, parks and some garden collections in western/northern Britain; native to Washington, Oregon, California, USA.

Field maple (*Acer campestre*)

Family: Sapindaceae.

Origin: native.

Reproduction: monoecious or dioecious.

Habit: a small-medium sized domed/spreading tree, typically 10-15m high, up to 25m.



Field maple – leaves opposite, typically five-lobed (basal lobes often small or absent), with fused pairs of winged fruit (called samara) set at $\pm 180^\circ$.

Drawing: Christine Darter (Edlin, H., 1968).

Bark: pale to dark grey-brown, sometimes cracked and narrowly fissured.

Twigs: brown; straight, sturdy, often glossy, with persistent wrinkled scars and lenticels – sometimes with corky wings where frequently cut/hedged; buds ovoid, 5mm, red-brown with grey hairy tip, in opposite pairs, each pair set at 90° to others along shoot.

Leaves: opposite, unfolding pinkish when new or red on late growth, 40-70mm; palmate, with five (sometimes three) rounded obtuse lobes. Discolorous, mid-green upper surface with pale-green below with hairs in mid-lateral vein axils; petiole slender, 50-90mm long; autumn foliage bright yellow, tinged with red or dark-purple. Deciduous.

Flowers: inconspicuous, emerging with leaves; yellow-green, on erect panicles.

Distribution: across Britain, common in the south but found everywhere, also into Ireland and northern Scotland; frequently planted.

Sycamore (*Acer pseudoplatanus*)

Family: Sapindaceae.

Origin: neophyte.

Reproduction: monoecious.

Habit: a large domed spreading tree, typically 25m high, but frequently taller to 35m.



Sycamore – leaves opposite, typically five-lobed, broadest across centreline, variable, with fused pairs of winged fruit (called samara) set at $\pm 90^\circ$.

Drawing: Christine Darter (Edlin, H., 1968).

Bark: smooth grey-silver on young trees; becoming rough, scaly, metallic grey-brown, old layers falling away in patchy plates to reveal new fawn-coloured bark beneath.

Twigs: sturdy, green-brown, with persistent horseshoe-shaped leaf-scars from where old leaves have fallen; lateral buds in opposite pairs, each pair set at 90° to others along shoot; terminal bud green; all ovoid, 10mm, edged with dark brown, with dark-brown tips.

Leaves: opposite, large, 100-250mm equally broad/long; palmate, with five-pointed (rarely three-seven) coarsely toothed/serrated lobes. Discolorous, dark-green upper surface with pale grey-green below; coarse/leathery texture, with thick net-like veins protruding on the underside; petiole 50-150mm long, often tinged red. Deciduous.

Flowers: relatively inconspicuous, emerging with leaves; yellow-green, on cylindrical pendulous terminal panicles 100-200mm long; 60-100 flowers on each stalk, frequently arranged with female flowers at the base, male flowers clustered towards the middle and sterile flowers (which attract pollinators but are never fertilised) at the tip.

Distribution: across the British Isles and Europe.

Common alder (*Alnus glutinosa*)

Family: Betulaceae.

Origin: native.

Reproduction: monoecious.

Habit: medium-tall tree, typically 20-30m high; single/multiple stems/trunks; tolerant of dry sites but prefers damp/riparian areas.



Common alder – blunt or notched leaves, with maturing male catkins (*left*) and ripened woody persistent female catkins ready to shed seed (*right*).

Drawing: Christine Darter (Edlin, H., 1968).

Bark: dark grey-brown, fissured, in rough small plates; timber highly water-resistant.

Twigs: smooth to warty, lenticel-covered; from pale brown to red-brown, becoming purple by autumn; alternate buds, 5-7mm, dark brown-purple, flattened, ovoid, narrowed at base.

Leaves: dark-green, shiny or waxy in appearance; variable, elliptical to rounded with new leaves (and buds/shoots) feeling sticky; margins wavy, with shallow irregular teeth; often blunt or notched at apex; veins impressed; discolourous, paler green-grey below. Deciduous, leaves falling green (without any autumn colour).

Flowers: female and male catkins occur before new leaves; opening in late spring, with females to 6mm, erect, red and males drooping, yellow.

Fruits: initially green, 1.5mm, ovoid, in clusters of 1-4; becoming narrowly-winged, in compact cone-like structures; maturing to woody persistent 'cones' by autumn.

Distribution: throughout Britain particularly in damp woodlands and beside/near water, streams and lakes to around 500m elevation.

Monkey puzzle (*Araucaria araucana*)

Family: Araucariaceae.

Origin: exotic.

Reproduction: dioecious.

Habit: unmistakable appearance: form narrow, upright when young, becoming broadly-domed; sharp armoured leaves on branches in whorls, near-horizontal at crown apex, drooping elsewhere with upturned tips; typically 15-20m tall, sometimes up to +25m high.



Monkey puzzle – closely-packed, spirally-arranged, sharply-tipped, forward-curving hard, glossy green leaves, with brown spine and parallel veins.

Drawing: Christine Darter (Mitchell, A., 1972).

Bark: single, straight, cylindrical trunk usually mounted on flared root buttresses displays dark-grey fissured surfaces, cracked into vertical ridges; old branch scars evident in rings circling trunk; often appears layered/wrinkled, exuding thickly viscous resin.

Twigs: hidden beneath densely-packed spirally-arranged foliage; stiff, in repeated whorls, presenting pendent/down-swept branches with upturned ends; uniquely identifiable.

Leaves: shining dark-green, very hard and tough, arranged in interlocking spiral pattern; 30-40mm long; ovate to triangular shaped, tapering from wide base to sharp tip, each with yellowish margin and brown keeled spine. Evergreen.

Male cones: terminal; green at first, becoming brown then dry and papery; 60-100mm long, ovoid and tapering; hanging in clusters and persisting for months after pollen is shed.

Female cones: solitary; erect, large, to 150mm, on upper side of shoot; ripening over two years, to lustrous-green globe covered in slim, out-curved golden spines.

Distribution: private and public gardens and parks across Britain, planted as an ornamental, with largest specimens in northern/western areas; native to Chile.

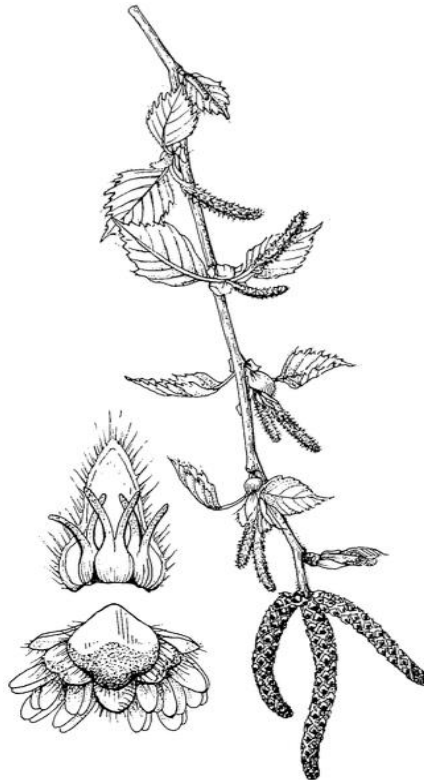
Downy birch (*Betula pubescens*)

Family: Betulaceae.

Origin: native.

Reproduction: monoecious.

Habit: moderately tall tree, up to 28m high, but frequently smaller. Crown irregular, massed branches with tips drooping, pendulous.



Downy birch – flowering twig, with female catkins along the sides and male catkins at the tip.
Detail: (*left, above*): dichasium of three female flowers; (*left, below*): dichasium of three male flowers.

Drawing: Christine Darter (Edlin, H., 1968).

Bark: smooth, thin, papery/peeling, variously pale-brown/bronze, pale-grey or silvery-white with dark ‘eye-shaped’ patterning (but not black diamonds, as in silver birch).

Twigs: slender, finely hairy, without warts; small 6mm brown buds in alternate arrangement, lying close to twig; arising from dense/twisting/spreading branches.

Leaves: lightweight, variable, typically ovate, with a coarsely serrate margin narrowing to sharp apex; held on densely hairy petioles; discolorous, paler below, with hairy midrib.
Deciduous.

Female flowers: initially standing erect in spring; flowers ripen to tiny winged fruit in summer, arranged in compact cone-like structure, disintegrating from its axis at maturity.

Male flowers: comprising multiple tiny green flowers with bracts (referred to as dichasia) arranged on a long drooping stalk, creating hanging catkins commonly called 'lambs' tails'. Male catkins disintegrate in late spring after shedding their pollen by wind.

Fruits: dehydrating catkins release tiny featherweight single seeds with an aerodynamic wing either side, dispersed on the lightest breezes.

Distribution: across the British Isles and central/northern/southern Europe.

Hornbeam (*Carpinus betulus*)

Family: Betulaceae.

Origin: native.

Reproduction: monoecious.

Habit: moderately tall, typically 20-25m high, though may grow to 32m. Crown an irregular ovoid or broadly conic shape, with dense ascending branches.



Hornbeam – fruiting twig, with fruits in pairs attached to a three-lobed wing-like bract, arising from one dichasium. Single nut and bract shown in detail. Typical double-toothed margins on leaves.

Drawing: Christine Darter (Edlin, H., 1968).

Bark: smooth, silvery green-grey, with fine pale-brown/grey striping. Irregularly black fissures. Timber hard, strong. Trunk frequently fluted/fused, sinuous and oval-shaped.

Twigs: dark brown-grey, with few long hairs; fine, slightly zig-zagged, leading to straightly ascending branches; carrying slender 6-8mm green-brown buds, pressed closely to twig.

Leaves: alternate; oblong-ovate with slightly oblique rounded bases; 7-15 pairs of parallel impressed veins; finely double-toothed margins leading to acuminate tip; shiny dark-green above, paler beneath with white hair tufts in vein axils. Deciduous.

Female flowers: terminal; pale green-white pendent catkins appear in spring.

Male flowers: emerging with leaves, from buds near shoot-ends; greenish-yellow catkins, showing reddened outer scales.

Fruits: hanging involucre of about eight nuts in pairs, each set within three-lobed bract (at first pale-green, maturing to papery pale-brown) in distinctive whorled arrangement.

Distribution: mainly southern England, on clays, westward to Somerset and Monmouth. Frequent in gardens and parks. Widely planted in woodlands across Britain, north to Scotland. Across Europe, from the Pyrenees to southern Sweden, east to southeast Asia.

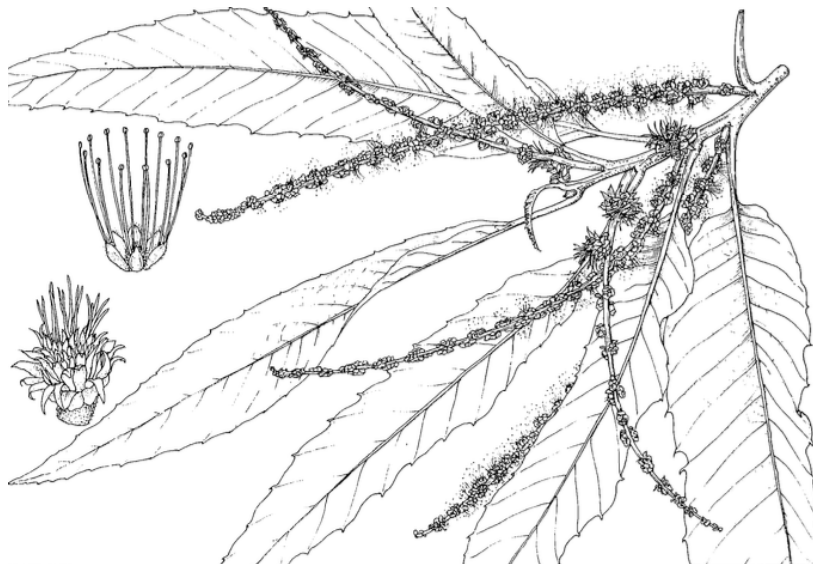
Sweet chestnut (*Castanea sativa*)

Family: Fagaceae.

Origin: archaeophyte.

Reproduction: monoecious.

Habit: moderately tall, typically 25-30m high, though may grow to 35m. Crown broadly columnar, narrowing to domed top.



Sweet chestnut – long, large, glossy dark-green leaves with acute tips; parallel veins with coarsely serrated margins of finely pointed teeth. Numerous slender twisting catkins carry many groups of male flowers; female flowers are clustered at the base of some catkins. Note details: (*left, above*) single male flower, with a ringed arrangement of stamens/anthers; (*left, below*) single female cluster, comprising leafy bracts concealing three hidden flowers with protruding styles/stigmas.

Drawing: Christine Darter (Edlin, H., 1968).

Bark: initially smooth, purplish-grey, becoming silvery-grey, with dark vertical cracks. Mature trees have brown or grey deeply fissured bark, darkening in colour with age, increasingly forming heavy ridges of longitudinally spiralled furrows.

Twigs: stout, often ribbed, purple-brown with grey bloom and long silky hairs, carrying red-brown ovoid buds.

Leaves: alternate; oblong-lanceolate, glossy dark-green above, paler beneath, 150-200mm long; saw-tooth margins, with about 20 parallel side veins, irregularly alternate or opposite ending in fine sharp spine. Deciduous.

Female flowers: borne at base of some (not all) pendent catkins bearing male flowers; slender spreading white styles grouped within a rosette of bright-green hairy spines.

Male flowers: a crowded mass of whitish-yellow stamens, borne on hanging catkins; some catkins all-male, others mainly male with a few female flowers at the base.

Fruits: in bunches of 2-3, enclosed within 300-400mm yellow-green husk covered in hard sharp radiating spines; usually two shiny dark red-brown nuts, one globose the other concave, narrowing to a hard pale tip.

Distribution: naturalised across most of Britain, central/southern Europe eastwards to Romania; frequent in southern England and countrywide, particularly in parklands and estates. Native to northern Spain, Italy, Greece, Turkiye east to Caucasus Mountains.

Lawson cypress (*Chamaecyparis lawsoniana*)

Family: Cupressaceae.



Lawson cypress – flattened sprays of fragrant discolorous foliage, tightly appressed, appearing translucent; with (*upper left*) crimson-red male ‘flowers’, (*upper centre*) immature cone and (*upper right*) translucent glands on leaves; hard green or blue-green globose female cones, wrinkled scales, each with central spine.

Drawing: Christine Darter (Mitchell, A., 1972).

Origin: exotic.

Reproduction: monoecious.

Habit: narrowly conical with branches and foliage to ground level when young, with a curving/drooping leading shoot; becoming open and broad in maturity, sometimes with basal branches layering in a ring around the central trunk; trunk frequently forked with age; up to 40m high (though no Lawson cypress in Britain have yet reached their full potential height).

Bark: smooth at first, dark greyish-green, becoming cracked into grey-brown vertical-fissured plates with age; oldest trees have coarse bark plates lifting/peeling at ends.

Twigs: numerous shoots covered by leaves; new shoots may be thread-like/pendulous.

Leaves: scale-like, in opposite pairs; small (0.5-2mm long) and closely-pressed together, with each pair set at a right-angle to the other, creating flattened sprays. Discolorous, dark-green above and pale-green translucent below. Crushed foliage emits a strong fragrance of resinous parsley. Evergreen.

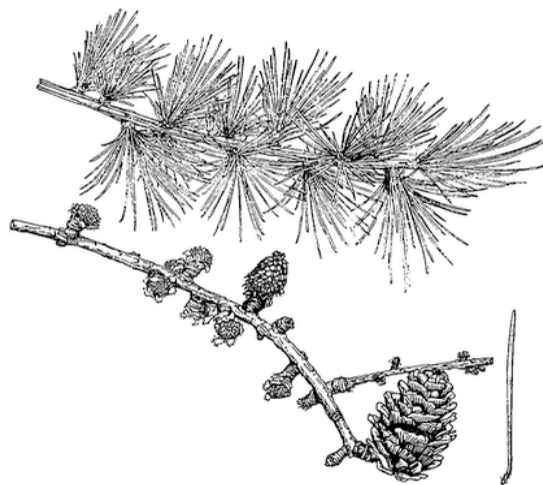
Female cones: 6-8mm, ovoid/globose, changing from green to dark purple-brown when mature; scales hard, wrinkled with small central spine protruding.

Male cones: crimson-pink, 2-3mm long, abundant on the ends of fine branchlets.

Distribution: originating from a small area on the California-Oregon border, but widely planted across all Britain as a fast-growing screening plant and ornamental.

European larch (*Larix decidua*)

Family: Pinaceae.



European larch – single, soft, linear leaves at new tips, otherwise out-curved, in feathery whorls on short woody spurs set spirally around shoots; showing small male ‘flowers’ and fertilised female ‘flower’, with fully developed open mature cone pale-brown, persistent, with blunt rounded scales.

Drawing: Christine Darter (Mitchell, A., 1972).

Origin: neophyte.

Reproduction: monoecious.

Habit: elegant, upright, conical tree, with mostly regularly upswept branches, though some may ascend or droop at more acute angles; overlapping/pendulous foliage; up to 45m high. Pale-green spring foliage followed by deep-golden colours as leaves fall in autumn create striking contrasts and are always attractive in the landscape.

Bark: green-grey in early years, then typically grey for decades, when in plantations and coverts; older trees pinkish-brown, scaly and fissured with age.

Twigs: pale straw-yellow or pale pinkish brown, grooved, glabrous.

Leaves: soft, blunt or pointed, narrow, linear leaves, 20-30mm long, borne singly on vigorous leading shoots, otherwise curled, in dense clusters resembling a feathery rosette, on short woody spurs arranged spirally around older shoots/stems. Foliage drapes, hanging elegantly. Yellow autumn colour. Deciduous.

Female cones: initially pale-green, rose-red or white, ripening to pale-brown ovoid cone with rounded leathery scales. Persistent, falling whole after two years, with many dead cones retained for over a decade.

Male cones: initially whitish with purple edges, becoming yellow-white as pollen is shed.

Distribution: locally, in older forest plantations or as copses/shelterbelts in suitable sites; native to alpine areas of central/southeast Europe, from the French Alps through to the Tatra/Carpathian Mountains in Slovakia/Poland.

Hybrid larch (*Larix x marschlinsii*)

Family: Pinaceae.



Hybrid larch – single, soft, curled linear leaves at new tips, otherwise in regular whorls on short woody spurs set spirally around shoots; cones pale-brown, persistent, with reflexed scales.

Drawing: Christine Darter (Mitchell, A., 1972).

Origin: neonative.

Reproduction: monoecious.

Habit: upright, conical tree, with regularly upswept branch tips forming a neat crown shape; open, pendulous foliage; up to 35-40m high. A natural hybrid between European and Japanese larch, first arising in 1897 at Dunkeld, Perthshire and noticed in 1904. Today referred to as *Larix x marschlinsii* (syn. *L. x eurolepis*).

Bark: initially smooth, greyish then reddish-brown, scaly, fissured with age.

Twigs: orange-brown or pinkish red/brown, grooved, glabrous or slightly downy.

Leaves: soft, blunt, narrow, linear leaves, 30mm long, borne singly on vigorous leading shoots, otherwise splayed in regular clusters resembling an open rosette, on short woody spurs arranged spirally around older shoots/stems. Foliage drapes, hanging elegantly. Yellow autumn colour. Deciduous.

Female cones: pinky-red with reflexed bracts when young, ripening to pale-brown with rounded scales, margins exposed, loosely recurved at maturity. Persistent, falling whole after two years.

Male cones: small, 10mm, borne singly, pale white-green globose.

Distribution: established since mid-1900's as the most-planted larch in British forestry, as it exhibits the best characteristics of its parents, but exceeds both in rapid growth and higher yield. European larch occurs naturally in the mountains of northern and central Europe; Japanese larch originates from across Japan.

Liquidambar (*Liquidambar styraciflua*)

Family: Altingiaceae.

Origin: exotic.

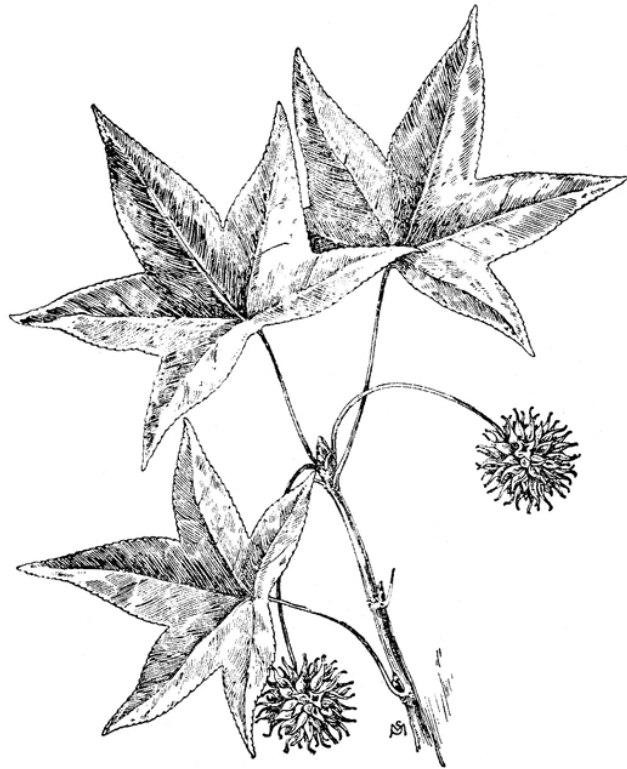
Reproduction: monoecious.

Habit: conic/ovoid when young, maturing to a broad dome; often 15-20m, up to 28m high.

Bark: young trees pale-grey, turning dark orange-brown, fissured, flaking with corky wings (referred to as 'alata') on some branches; maturing to dark-grey with rough ridges.

Twigs: pale yellow-brown or deep-green, initially covered in brown 'wool'; carrying ovoid-conic shining-green 5mm buds closely pressed to shoot.

Leaves: maple-like, but alternate (all true maples [*Acer* spp.] being opposite); usually five obovate lobes with coarsely-toothed margins (though variable; young trees may display three lobes, mature trees five-seven lobes); shiny rich-green above, paler below; small tufts of white hairs in vein axils, with thin brown 'wool' on veins. Deciduous.



Liquidambar – alternate maple-like leaves, typically having five lobes with coarse-toothed margins; single or multiple globular fruits with paired dehiscent beak-like vessels, green initially becoming dark brown.

Drawing: John Myers (Bailey, 1917).

Female flowers: dense cluster of yellow-green stigmas, forming a globose structure.

Male flowers: small, 5-8mm on 5-10mm spike; green, inconspicuous; stamens only.

Fruits: fruits hanging throughout winter, singular or multiple; globular; dehiscent, paired vessels shaped as a curved beak; whitish-green at first, drying to dark purple-brown.

Distribution: frequent in gardens and parks across eastern/southern Britain, less so in northern/western areas; native to eastern/southern USA and tropical montane regions of Mexico and Central America.

Tulip tree (*Liriodendron tulipifera*)

Family: Magnoliaceae.

Origin: exotic.

Reproduction: monoecious.

Habit: younger trees columnar/conic, narrowly domed, then ascending, with many upcurving lower branches becoming multi-domed with age; aged trees with heavy buttresses, massive lower trunks supporting tall ascending crowns.

Bark: grey, a network of shallow ridges, older trees tinted orange.

Twigs: initially smooth, bloomed a shade of lilac, turning shiny greenish-brown/coppery red-brown; obvious bud scars; carrying flattened, lateral obovoid blue-green buds, curved, enclosed by stipules.

Leaves: unique; almost squared, parallel-sided, with four 'eared' lobes leading to indented/notched apex (appearing as a tulip if viewed in profile). Deciduous.

Female flowers: terminal (as all flowers in Magnoliaceae); partially 'hidden' in foliage; emerging cup-shaped, widening; central conical mass of ovaries yellowish-green.

Male flowers: stamens 50mm long, fleshy, at first erect, becoming spreading.



Tulip tree – flowering shoot; unique leaves, squared/parallel-sided with four distinct lobes and notched apex; terminal flowers, erect and typically 'hidden' within foliage unless viewed from above.

Drawing: Mable E. Step (Stokoe, W. J., 1937).

Fruits: narrowly-conical, erect, pointed; dark-brown; 50-80mm long; persisting over winter.

Distribution: frequent in gardens and parks across southern England, to north Midlands, then infrequent northwards to Scotland and in Ireland. Native to southeastern and midwestern USA.

Crab apple (*Malus sylvestris*)

Family: Rosaceae.

Origin: native.

Reproduction: monoecious.

Habit: rounded, small tree or large shrub with dense crown of twisted branches; typically around 8-10m, though up to 16m high; often thornless, but frequently with stout thorns.

Bark: grey-brown, fissured, often broken into small irregular plates; carrying small (5mm), dark-brown/purple, rounded/conical buds with grey hairs.

Twigs: two-tone, purple above, brown beneath, ribbed; downy at first, becoming glabrous. Often armoured with stiff sharp-tipped thorns (10-30mm) on short woody leaf/fruit spurs.

Leaves: elliptical or rounded, with acuminate tip; 50-60mm long on 25mm grooved, pubescent petiole; dark-green above, paler green-white and pubescent beneath. Deciduous.

Flowers: perfect (hermaphrodite); male stamens have yellow/gold anthers, surrounding 3-5 fused, pale white-green female styles; five-petalled, white, lightly flushed with pale-pink.



Crab apple – flowering/fruiting shoot, sometimes unarmed but often thorny; five-petalled flowers, white, flushed pale-pink with yellow anthers at centre; small rounded crabs (apples) yellowish-green flushed red.

Drawing: Mable E. Step (Stokoe, W. J., 1937).

Fruits: small, 20-30mm, globose; yellow-green with reddish flush; depressed at both (peduncle and calyx) ends.

Distribution: scattered in copses, hedges and woods across Britain (though largely absent from central/northern Scotland) and throughout Europe to southwest Asia.

Note: the genus *Malus* is complicated: crab apple is easily/frequently misidentified (usually mistaken for apple (*M. domestica*) which is rose-pink/pale-pink flowered and other species found occurring naturally. Check flower colour which, for *M. sylvestris*, is reliably white (sometimes flushed with pale-pink) – thereby, pure pink flowers or variants are invariably not crab apple.

Norway spruce (*Picea abies*)

Family: Pinaceae.

Origin: exotic.

Reproduction: monoecious.

Habit: tall, narrowly conical, with tapering apex; upper branches ascending, middle tiers level and lowest branches descending, all with upswept tips; trunk apical, spire-like; typically reaching 45-50m high, with some growing up to 65m high.



Norway spruce – dark-green, stiff, pointed, upswept linear leaves with four sides; long, cylindrical, pendulous cones with smooth notched or rounded scales.

Drawing: John Williams (Mitchell, A., 1985).

Bark: initially copper-brown or reddish, with small papery scales; older trees looking purplish, cracked with rounded smooth plates.

Twigs: leading branch-end shoots outstretched, stiff, with those on branchlets slender, relaxed; yellow to orange-brown, grooved, usually glabrous; buds dark-brown, non-resinous, conic/ovoid, to 5mm.

Leaves: hard, stiff, pointed, 10-20mm long; four-sided, dark-green on each surface; arranged each side of and above shoot, parted below, to spread radially, those on the upper-side forward-pointing. Evergreen.

Female cones: initially crowded on upper branch whorls of younger trees, more widely dispersed in crown when mature; dark crimson-red, erect at first; turning downwards early, developing green cones, becoming brown, 120-200mm long; cylindrical, pendulous with rounded scales notched at apex.

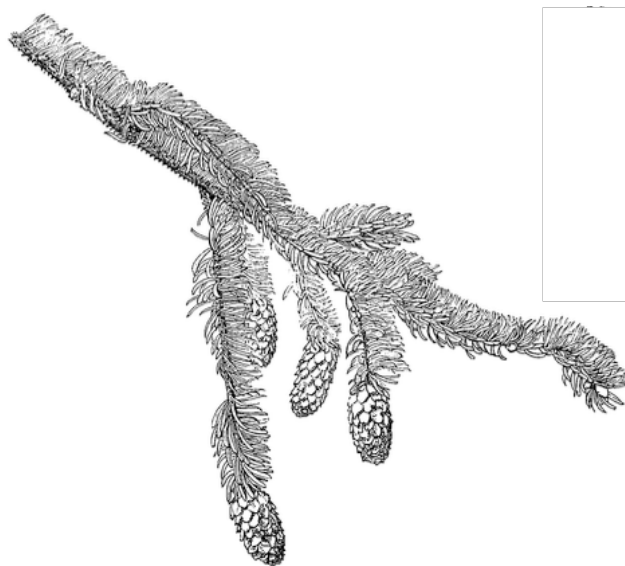
Male cones: hanging from the tips of weak side shoots only; globular, to 10mm long; crimson-red at first, becoming yellow prior to pollen dispersal.

Distribution: common, locally abundant as a garden ornamental, in shelterbelts and woodlands; major forest tree in plantations across northern/western Britain. Native across Europe, from the Pyrenees and throughout the central Alps, to Scandinavia, the Balkans and into Russia.

Sitka spruce (*Picea sitchensis*)

Family: Pinaceae.

Origin: exotic.



Sitka spruce – stiff, sharply-pointed foliage, blue-green above with silver below; pendulous pale-green cones in summer, becoming pale white-brown, scales papery with crinkled coarsely-toothed margins.

Drawing: David Walker (Edlin, H., 1966).

Reproduction: monoecious.

Habit: narrowly conical, with slender tapering apex; branches ascending; trunk stout, often heavily buttressed on larger/older trees; growing up to 60m high (with potential maximum of ± 85 m not yet attained).

Bark: younger trees dark-grey, speckled/flaking becoming purplish with coarse lifting scales; older trees purplish-grey with lifting, small, cracked plates.

Twigs: shoots white to pale-buff, grooved, knobbly; buds blunt/ovoid, pale-brown and purplish with resin.

Leaves: hard, flat, sharp, strongly keeled, 20-30mm long; shiny slate-blue-green above, with two broad blue-white (stomatal) bands below; at first radiating from all around shoot, but later mostly parted below to spread horizontally, those on the upper-side forward-pointing obscuring shoot. A tiny 'tail' remains when needles fall or are removed, leaving a rip-like scar on the shoot. Foliage appears dark blue-grey from a distance. Evergreen.

Female cones: cylindrical, pendulous, pale-green at first, becoming pale-brown with papery scales, each having a crinkly coarsely-toothed margin.

Male cones: drooping, ovoid, red at first then yellow with pollen.

Distribution: narrow strip of west-coast USA, Alaska to mid-California, particularly Olympic Peninsula, Washington. Main forest tree in plantations across northern/western Britain.

Lodgepole pine (*Pinus contorta* var. *latifolia*)

Family: Pinaceae.



Lodgepole pine – persistent needle-like leaves in pairs, broad (hence '*latifolia*') and twisted (hence '*contorta*'), sometimes serrated; with backward-facing cones, covered in small spines.

Drawing: Christine Darter (Mitchell, A., 1972).

Origin: exotic.

Reproduction: monoecious.

Habit: open, narrowly conic crown; horizontal branches with upswept tips; up to 30m high.

Bark: red-brown, finely scaled.

Twigs: pale-brown new shoots, with egg-shaped reddish-brown buds, 20-30mm long; short-pointed, slightly rotated around longitudinal shoot axis, resinous.

Leaves: in pairs, 60-100mm long; yellowish-green, spreading and twisted; rotated around shoot axis. Evergreen.

Female cones: ovoid-conical, symmetrical; pale brown-yellow, shining; each scale carrying a slender, fragile, sharp prickle.

Male cones: clustered in dense whorls at shoot base; yellow-orange.

Distribution: widely planted in Britain as forestry tree in northern/western plantations; native to interior Alaska, inland British Columbia, Washington, Oregon, Montana, Idaho, Wyoming, Utah and Colorado, through central/eastern Rocky Mountains.

Mountain pine (*Pinus uncinata*)

Family: Pinaceae.

Origin: exotic.



Mountain pine – stiff dark grey-green needle-like leaves in pairs; mid-brown cones with curved/hooked scales (hence '*uncinata*') with prickle at/near each scale tip.

Drawing: Christine Darter (Mitchell, A., 1972)

Reproduction: monoecious.

Habit: straight, erect trunk with ovoid-conic crown; appears dark, sturdy; up to 20m high.

Bark: grey-brown, cracked into small angular scales; becoming blackish-grey with age, thickened at base of trunk, with scales curling/lifting.

Twigs: orange-brown first-year shoot, becoming purple-brown in second year; carrying ovoid-conic, red-brown, very resinous buds, 6-9mm long.

Leaves: in pairs, dense, whorled; bright dark-green with greyish tinge, straight or slightly twisted; margins finely serrulate, 60-75mm; rigid, grooved, persistent. Evergreen.

Female cones: ovoid-conic, 50mm long; pale-brown, with unique scales, curved and hooked downwards/outwards, each with small central hooked prickle at/near tip.

Male cones: yellow-orange tipped, numerous, clustered at base of growing shoots.

Distribution: across Europe, at higher elevations through Spain, France, Italy, Germany, Switzerland and Austria, but absent from southeastern Europe.

Note: the taxonomy, distribution and ecology of the tree simply referred to as mountain pine (*Pinus uncinata*) is, in fact, complicated. Mountain pine is sometimes mis-named using the synonym *Pinus mugo* (which is, specifically, dwarf mountain pine) though this is now regarded by most botanists/ecologists as being taxonomically incorrect. Briefly, mountain pine (*Pinus uncinata*) is the tree form of the closely related dwarf mountain pine (*Pinus mugo*). The two trees are regarded as separate species – with a complex relationship. Detailed comment/information for these pines (and other conifer species) is available online from The Gymnosperm Database (Earle, C. J., 2024).

London plane (*Platanus x hispanica*)

Family: Platanaceae.

Origin: exotic.

Reproduction: monoecious.

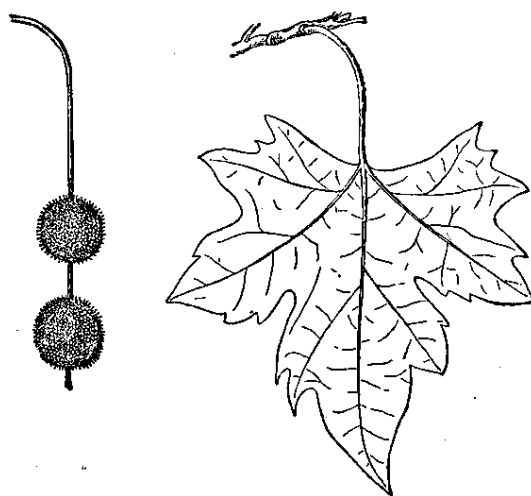
Habit: at all ages attractive, shapely, with maple-like foliage; old trees becoming massive, domed, with large spreading/twisting branches (sometimes fused/inosculated when in contact); peeling/exfoliating bark, shed annually in irregular flakes, creating dappled cream/grey/yellow patches; typically reaching 30-35m high, with some specimens to 45m.

Bark: generally smooth and thin, but continuously flaking/peeling; pale-brown/grey revealing cream-yellow patches; older trees with heavy wide trunks often appear darker grey-brown or reddish-brown with fine vertical fissures/folds.

Twigs: green at first, with white fluff/hairs, turning orange/purple-brown with age; carrying red-brown, ovoid, 6-8mm buds with curved tips.

Leaves: maple-like, but alternate (all true maples [*Acer* spp.] being opposite); variable, though always palmate; typically five-lobed, 200x250mm width/length, with central lobe largest, all main lobes having fine/soft curved teeth. Discolorous; shiny bright-green above with dense wool along veins, paler beneath, with denser wool. Leaves typically cut (incised) only about one third of tip-petiole length, or less, never deeply incised (as with oriental plane). Deciduous.

Female flowers: on separate hanging catkins, 20-80mm long; yellow-green with bright-red tips; borne on 2-5 globose heads.



London plane – (left) hanging spherical fruit (typically 2-4) protecting densely-packed seeds surrounded by stiff aerodynamic hairs; (right) alternate, palmate leaves with (typically) five lobes, the centre lobe always longest.

Drawing: Mable E. Step (Stokoe, W. J., 1937)

Female flowers: on separate hanging catkins, 20-80mm long; yellow-green with bright-red tips; borne on 2-5 globose heads.

Male flowers: on separate hanging catkins, 20-80mm long, soon disintegrating; yellow-green; borne on 2-6 globose heads.

Fruits: spherical, 20-30mm across, comprised densely-clustered achenes, each with numerous stiff aerodynamic hairs to aid wind dispersal; slowly breaking apart over winter.

Distribution: abundant cross Britain in towns and cities, particularly as a street tree; frequent in large gardens and public parks; vigorous in almost any environment, being tolerant of difficult sites and atmospheric pollution and capable of quickly regenerating above/belowground parts if pruned/damaged.

Note: London plane is considered a natural hybrid between the (western) American plane (*P. occidentalis*) and the (eastern) oriental plane (*P. orientalis*) arising around Mediterranean southern Spain and/or France in the mid-1600's. It was first planted in England around 1680 and was popularised due to widespread planting in the capital city of London (hence the common name). Sometimes referred to by its synonym *P. x acerifolia*.

Aspen (*Populus tremula*)

Family: Salicaceae.

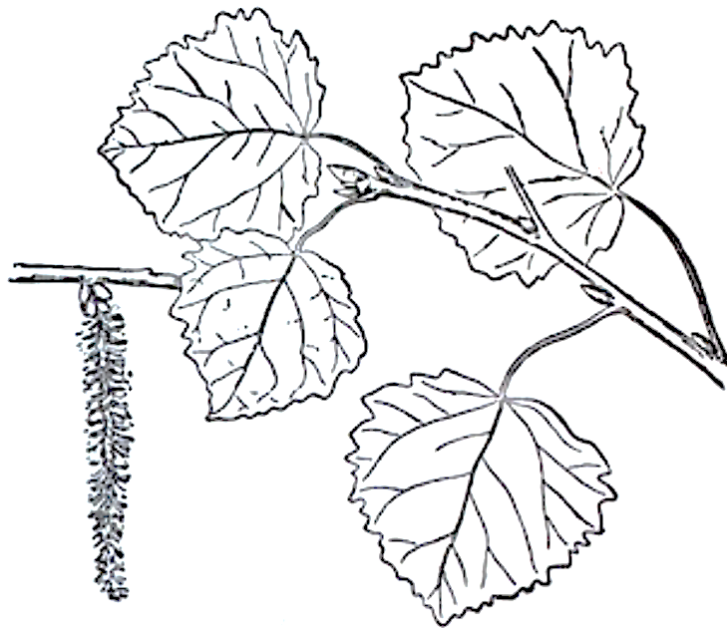
Origin: native.

Reproduction: dioecious.

Habit: a small-medium sized tree, up to 20m high; frequently growing with numerous suckers forming a surrounding thicket. Young trees conical and narrow, becoming broader and irregular, often leaning, with age. Noticeable in spring for new copper-red foliage and autumn for good yellow colour plus delicate fluttering leaves which 'tremble' in any wind.

Bark: shiny-smooth, greyish-green, showing random vertical diamond-shaped scars overlaid onto horizontal wrinkles with obvious lenticels; becoming pale grey-brown with shallow ridges, although upper branches and stems remain smooth.

Twigs: glabrous, shiny dark-brown shoots, carrying alternate ovoid-pointed buds; leaf buds yellow to deep-brown, flower buds broader, shiny-brown and closer to shoot-tip; carried on light, open and twisting branches, some lower limbs level.



Aspen – downy, thin, rounded leaves with short blunt teeth and sinuous margins; flattened petioles that quiver in the slightest breeze (hence '*tremula*'); producing masses of pendent female and male catkins.

Drawing: Mable E. Step (Stokoe, W. J., 1937).

Leaves: ovate-orbicular (oval-circular), 40-60x50-70mm, with very short tip; margins crinkled, with irregular, blunt, shallow curved teeth. Emerging copper-brown, turning dull rich grey-green above, paler grey-green beneath. Held on slender, flattened, pale yellow petioles which allow foliage to move (shimmer) in the lightest breeze. Deciduous.

Female flowers: slim, drooping, green catkins, 40mm long; grey hairs with minute red bracts, becoming woolly and quickly dispersing wind-borne seeds by early summer.

Male flowers: thickened grey-brown pendent catkins, yellow with pollen at first, quickly becoming dull-brown once shed.

Fruits: aerodynamic, lightweight; minute seeds within a tiny capsule; wind-dispersed, surrounded by fluff able to float long distances on air currents.

Distribution: throughout Britain, on most soil types, particularly in damp/wet or riparian/streamside locations in valleys and hillsides; often suckering, forming thickets; across mainland Europe and Asia, northwards to the Arctic Circle and eastwards to the Kamchatka Peninsula.

Bird cherry (*Prunus padus*)

Family: Rosaceae.

Origin: native.

Reproduction: hermaphroditic.

Habit: small-medium sized tree, up to 15m high, but frequently smaller. Younger trees conical with slender ascending branches; mature trees more rounded and drooping.

Bark: smooth, dark grey-brown; sometimes emanating a fetid smell.



Bird cherry – elliptic-ovate, firm, leathery leaves, 70-100mm long; producing masses of white fragrant flowers in late spring, densely crowded on long drooping/extending spikes.

Drawing: Christine Darter (Mitchell, A., 1974).

Twigs: slender, shiny, dark-brown, with alternate sharp conic-ovoid buds pressed close to shoot, dark-brown at base, pale at tip; lifting to ascending branches in domed canopy.

Leaves: obovate or elliptic, with finely serrulate margins and sunken veins; petiole dark-red, stout, grooved, with two small pale-green raised/rounded nectar-emitting glands near leaf base. Deciduous.

Flowers: 15-35 individuals, each with showy white petals, carried on a short pedicel; crowded along elongated erect or pendant spikes, 10-15mm long; fragrant.

Fruits: globose, black, shiny, 6-8mm long, with a bitter astringent taste to humans though palatable to many animals/birds/insects; bark and seed recorded as toxic in some cases.

Distribution: the widest distribution range of all *Prunus* species; across Britain and Europe (except western France/Spain/Portugal), into Scandinavia, Russia and northern Asia.

Douglas fir (*Pseudotsuga menziesii*)

Family: Pinaceae.

Origin: exotic.

Reproduction: monoecious.

Habit: tall, slender, conical when young, becoming columnar and irregular with age; mature/old trees may be flat-topped with drooping heavy lower branches; over 60m high in Britain (with potential maximum of ± 100 m not yet attained).



Figure 45: Douglas fir – soft needle-like leaves, typically dark-green, grooved above in two loose ranks; dull-brown hanging cone with distinctive three-pronged bract projecting from each scale.

Drawing: David Walker (Edlin, H., 1966).

Bark: changing over life stages: young, dark grey-green and resin-blistered; mid-life, purple-brown with fine vertical cracking; mature, dark-purple to black, ridged with deep, thick, corky brown fissures. Bark of old trees rugged, heavily cracked and creviced.

Twigs: pale-brown, slender, with three-angled ridges.

Leaves: soft, arranged in two loose ranks rising above and forward along shoot; emitting a strong sweet fruity-resin fragrance when crushed/handled; colour ranging through greens, yellowish to dark blue-green above, with two silver-white (stomatal) bands beneath. Evergreen.

Female cones: cylindrical, elongated, pendulous; green at first, becoming dull-brown, with distinguishing three-pointed bract hanging downward from each scale.

Male cones: single, loosely arranged on underside of shoot tip; conic, yellow.

Distribution: a valuable timber tree in many northern/western plantations; often seen as a statuesque ornamental in parks, gardens and collections. Native to coastal regions of British Columbia, southwards through the Pacific Northwest and Rocky Mountains to California and Mexico.

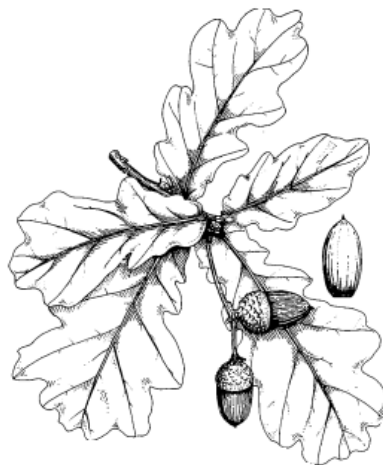
Pedunculate oak (*Quercus robur*)

Family: Fagaceae.

Origin: native.

Reproduction: monoecious.

Habit: across eastern/southern lowland sites; large, irregular/wide domed crown; short, stout main trunk, merging to multiple main stems with massive/twisting lower branches; up to 35-40m high.



Pedunculate oak – rounded/tapering acorns on long peduncles with stalkless leaves.

Drawing: Christine Darter (Edlin, H. 1968).

Bark: pale-grey, narrowly fissured into vertical plates.

Twigs: sturdy, brownish-green, pubescent, becoming grey-bloomed and glabrous; carrying alternate, small (3-6mm), light-brown ovoid-conic buds.

Leaves: similar to sessile oak (*Q. petraea*) though less regular in shape with shallow wavy-edged lobes on margins and, distinctively, having backward-facing basal lobes (auricles) overlapping the short (4-10mm) petiole; widest in upper half of lamina; discolourous, dull dark-green above, paler below. Deciduous.

Flowers: female flowers terminal, on new shoot, with 20-50mm peduncles bearing 2mm long, globular, pale-brown flowers; male flowers form in clusters as yellow-green pendent catkins, up to 100mm long, emerging with new leaves in spring.

Fruits: pairs of terete nuts (acorns); 15-40mm long, whitish-green becoming dark-brown, wrinkled, held in shallow scaly woody cupule; on 40-80mm peduncle.

Distribution: common throughout lowland sites in Britain; in southern Scandinavia and across central Europe from northern Spain to Ukraine, Türkiye and southwest Russia.

Common rhododendron (*Rhododendron ponticum*)

Family: Ericaceae.

Origin: neophyte-naturalised.

Reproduction: monoecious.

Habit: dense suckering shrub or small tree, typically 5-8m high; rapidly spreading, able to colonise large areas (quickly choking out other native/exotic flora). Attractive, bold, colourful blooms. Negative ecological/environmental impacts make its retention controversial (often resulting in strict control or complete eradication).



Common rhododendron – showy mauve-purple flowers, with dense glossy green foliage.

Drawing: adapted from: Küçük, S., Kurkcuoglu, M. & Husnu Can Baser, K. (2018).

Bark: smooth light-brown/grey on younger stems; becoming pale-grey, flaky/scaley on older open/scrambling/spreading plants.

Twigs: grey-brown; carrying prominent conic/pointed buds, within pale-green sepals.

Leaves: alternate, entire, flat; mid-green leaves may be lustrous, but usually matt, elliptic to oblong, 50-200mm long, glabrous. Leaves curl inwards and droop in cold/freezing temperatures (a mechanism that reduces surface area and prevents transpiration (moisture) loss. Evergreen.

Flowers: conspicuous, held in dense terminal racemes; five petals with indistinct/small (2mm) lobes, free or fused to form a bell-shaped corolla; showy, mauve-purple, with yellow/pink spotting patterned on 'upper' petal of flower only and 5-10 obvious mauve-purple stamens tipped with yellow anthers.

Fruits: an elongated, oblong capsule; green-brown, becoming brown; dehiscent.

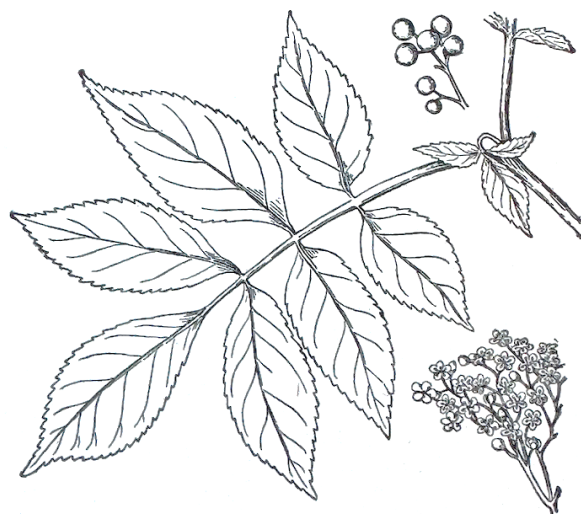
Distribution: across Britain, favouring woodlands, moors and uplands on peaty/rocky/sandy acid soils. A specimen in some larger botanical collections or gardens. Widely regarded as invasive. Stace (2019) indicates common rhododendron in the UK originate from early stock of *R. ponticum* subsp. *baeticum*, native to the southwest Iberian Peninsula, introduced into Britain in the mid-1700's.

Elder (*Sambucus nigra*)

Family: Adoxaceae.

Origin: native.

Reproduction: hermaphroditic.



Elder – leaves matt-green, pinnate, typically with 5-7 leaflets in 2-3 opposite pairs with terminal leaflet; glossy purple-black berries in drooping clusters.

Drawing: Mable E. Step (Stokoe, W. J., 1937).

Habit: large shrub or small tree, typically 2-4m high, up to ± 6 m; dense, bushy, appearing almost herbaceous, but with lightweight woody stems.

Bark: stippled, light-grey on young stems, becoming darker-mid-grey with longitudinal furrows on older wood; young stems are hollow, pithy, becoming solid, pliant, with age; covered with many obvious lenticels.

Twigs: often arching/hanging, smooth pale-green, grooved on upper side; carrying axial buds in opposite pairs, rich shiny-brown, bluntly ovoid.

Leaves: pinnate, discolorous with matt mid-green above, pale grey-green beneath; finely serrated margins, in 2-3 opposite pairs plus single terminal leaflet, all with tapering pointed tips; producing a musty odour when crushed. Deciduous.

Flowers: conspicuous masses of creamy-white flowers, held in lax compound cymes.

Fruits: small, soft, round berries (technically, a drupe); each 3-5mm, carried on hanging pink-red peduncles; in drooping massed clusters; glossy shining black when ripe, often greenish-yellow when maturing.

Distribution: common across Britain (though introduced to islands of Orkney/Shetland) and Eire within hedges and woods, often on derelict sites, scrub and wastelands; tolerant of most fertile soil conditions/types; throughout Europe, into the northern margin of north Africa and eastward to Turkiye and southwest Asia.

Western red cedar (*Thuja plicata*)

Family: Cupressaceae.



Western red cedar – deep-green, shiny, flat foliage, streaked white beneath; strongly aromatic; scale leaves appear plaited (hence '*plicata*'); small cones with spreading spine-tipped scales when mature.

Drawing: Christine Darter (Mitchell, A., 1972)

Origin: exotic.

Reproduction: monoecious.

Habit: initially narrowly conic or pyramidal, with erect apical tip; older crowns becoming broader with heavy rising branches that take root if in ground contact, forming a ring of ascending stems/trunks; ages with wide buttresses and fluted trunk.

Bark: dark red-brown; wide ridges broken into lifting/peeling plates/strips; soft and thick.

Twigs: shoots copper/red-brown; carried at ends of upswept branches that sometimes layer when in contact with the ground, forming a surrounding ring of upright stems.

Leaves: small scale leaves, oblong, with pointed tips; set in opposite pairs, laid at 90° to each other; rich shiny-green above with obvious bright-white patterning of stomatal areas beneath; overlapping/incurved, tightly appressed (flattened) to shoot. Foliage typically appears healthy/luxuriant. An aroma of pear-drops/pineapple surrounds the tree, evident even before or without handling. Evergreen.

Female cones: small, 10mm, abundant; at first green, then pale-yellow turning to brown; ripening as brown 15mm-long cones with thickened scales, each with a recured spine tip.

Male cones: minute, inconspicuous, pale-yellow; on smaller shoots only.

Distribution: common across the UK as a specimen in gardens and parks, sometimes used for boundary hedgerows, shelterbelts and forestry; native to the US Pacific North West, from Alaska to California, eastwards to Idaho.

Small-leaved lime (*Tilia cordata*)

Family: Malvaceae.

Origin: native.

Reproduction: hermaphroditic.

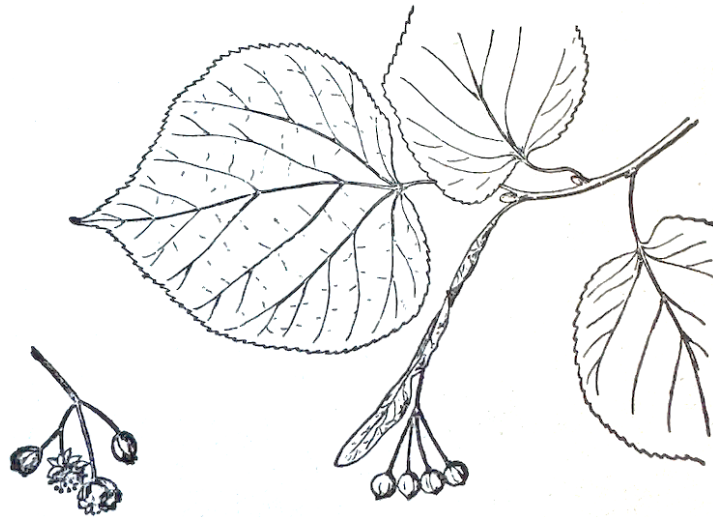
Habit: a tall, irregularly domed tree, typically above 25m and up to ±32m high. Densely-crowned, with branches ascending then arching downwards on older trees. Older trees typically carrying burrs and epicormic shoots at the base. An elegant tree in all seasons.

Bark: smooth, dull-grey at first; turning dark-grey or brown, cracked and flaking, at maturity.

Twigs: smooth, reddish-green above, olive-green below, in a shallow zig-zag pattern, sometimes downy; carrying alternate, small (5mm) smooth, shiny, ovoid, dark-red buds comprised two obvious overlapping scales.

Leaves: alternate, 40-70mm long, on slender 35mm yellow-green petiole; often rather thick/hard-textured, shiny dark-green (yellowing on older trees); quite rounded, cordate (heart-shaped), with rounded/indented slightly oblique (asymmetrical) leaf bases; sharply toothed margins, with abrupt pointed tip; large buff-orange tufts of hair in the vein axils beneath. Deciduous.

Flowers: clusters of 5-10, star-like, translucent-white petals with bright-yellow anthers, held erect and above foliage (unlike other *Tilia* species with pendent flowers); hanging midway beneath an oblong bright pale-green bract, which ripens to light-brown.



Small-leaved lime – small, rounded, dark-green leaves; heart-shaped (hence, '*cordata*'), with finely-toothed margins and abruptly tapering acuminate tips; flowers on short peduncle with a twisted aerodynamic leaf-like bract attached.

Drawing: Mable E. Step (Stokoe, W. J., 1937).

Fruits: a nut, 6mm long, containing 1-3 seeds; globose, shell thin and membranous, often smooth; at full maturation the fruits fall, suspended below the dried paper-thin bracts, which are aerodynamic and disperse the seeds some distance.

Distribution: on fertile soils throughout southern/central England and Wales; locally common northwards, introduced/naturalised elsewhere; across Europe, from northern Spain eastwards across Europe, to southern Scandinavia, the Caucasus and Siberia.

Common lime (*Tilia x europaea*)

Family: Malvaceae.

Origin: native.

Reproduction: hermaphroditic.

Habit: a tall, billowing, irregularly domed tree, typically above 35m and up to 45m high. Densely-crowned, with branches ascending then arching downwards on older trees. Distant leafless silhouette identifiable by statuesque upright crown shape which appears veiled within a dark-red/purple 'haze' from overwintering buds and shoots. Some trees (not all) produce bushy epicormic growth at the trunk base. A graceful tree in all seasons.

Bark: smooth, pale-grey on young trees; becoming finely fissured with flattened ridges at maturity; some trees with epicormic shoots arising from the buttresses and lower trunk.

Twigs: green, tinged red above, in a shallow zig-zag pattern, sometimes downy; carrying alternate, small (7mm) smooth, ovoid, reddish-brown buds.



Common lime – large, pale-green leaves; cordate (heart-shaped), finely-toothed margins and acutely-tapering tips; flowers on long peduncle with a curved leaf-like bract attached.

Drawing: Christine Darter (Edlin, H., 1968).

Leaves: alternate, 60-100mm long, on slender 25-50mm petiole; soft-textured, dull-green; cordate (heart-shaped), with rounded/indented sometimes slightly oblique (asymmetrical) leaf bases; finely toothed margins, with a short pointed tip; whitish-buff tufts of hair in the axils of the veins beneath. Deciduous.

Flowers: clusters of 5-10, fragrant, yellowish-white, in pendulous cymes 15-35mm long; hanging midway beneath an oblong yellow/green bract, which ripens to light-brown.

Fruits: a nut, 8mm long, containing 1-3 seeds; almost globose and lobed, shell thick, woody, often downy; at full maturation the fruits fall, suspended below the dried paper-thin bracts, which are aerodynamic and disperse the seeds some distance.

Distribution: a natural hybrid between small-leaved lime (*T. cordata*) and large-leaved lime (*T. platyphyllos*); rare in the wild, only where both parents occur, in woods across central England from Gloucestershire/Herefordshire to Lancashire/Yorkshire; widely planted and naturalised elsewhere throughout Britain/Eire. Very common as a southern street tree; widely used in significant avenue planting; often on broadacre estates; and also as specimens in gardens and parks. Found across Europe in scattered/widespread populations where both parentages are present.

Note: when identifying *Tilia x europaea* in the field the leaves are often affected by debilitating/problematic pests, as in: a) incursions from lime nail gall mite (*Eriophyes tiliae*) which, by contaminating leaf mesophyll chemical balances, create yellow-green or bright-red, upright, nail-like galls on upper leaf surfaces; and/or b) infestations of lime aphid (*Eucallipetrus tiliae*) that, using piercing/probing mouth parts, extract sugar-laden sap from leaf veins then, following digestion, excrete copious amounts of waste ('honeydew') onto all/any surfaces beneath, coincidentally attracting c) the lime-associated saprophytic fungal diseases *Aureobasidium pullulans* and/or *Cladosporium herbarum* (both generally termed 'sooty mould' and the most prolific in an array of species from multiple genera) which, by dispersing/spreading absorbing/feeding mycelium throughout the honey-like residue, blacken the leaves, branches and trunks of *Tilia* species.

Western hemlock (*Tsuga heterophylla*)

Family: Pinaceae.

Origin: exotic.

Reproduction: monoecious.

Habit: tall elegant tree, typically narrowly conic with spire-shape top and graceful arching leading shoot; slender branches with drooping tips; up to 50m high (with potential maximum of 70m not yet attained).



Western hemlock – flat, dark-green, needle-like leaves of variable length (hence '*heterophylla*') with blunt tips, some turned back and twisted to reveal white stomata; numerous small pendulous cones hanging from the end of short shoots.

Drawing: Christine Darter (Mitchell, A., 1972)

Bark: initially smooth, on younger trees dark grey-green with lifting circular flakes; becoming dark-brown, flaking, shedding on mature-aged trees.

Twigs: shoot mid-brown above, cream-brown beneath; ribbed, covered in dense, long, curled pale-brown hairs. Buds small, globular, brown.

Leaves: broad, oblong, needle-like leaves tapering to blunt/rounded tips; first bright-green, matt, becoming dark-green, shiny, with two bright-white (stomatal) bands beneath; varied lengths; arranged in upper/lower sometimes overlapping rows; typically with occasional leaves twisted back along shoot, revealing white underside. Evergreen.

Female cones: small, blunt-ovoid cones with few rounded leathery scales; green at first, sometimes purplish, ripening to pale-brown.

Male cones: small, globular, densely arranged beneath foliage; starting bright-red, turning pale-crimson, becoming yellow.

Distribution: throughout northern and western forestry plantations; native to temperate rainforests of northwest North America, from Alaska to northern California and some high-rainfall of southeastern British Columbia and northern Idaho.

Wych elm (*Ulmus glabra*)

Family: Ulmaceae.

Origin: native.

Reproduction: hermaphrodite.

Habit: short/stout trunk, heavily buttressed, rising into broad/domed crown comprised several arching/ascending main stems/trunks; typically up to ± 32 m high.

Bark: smooth, grey on young trees; becoming cracked, ridged and grey-brown when older.

Twigs: stout, sturdy, dark red-brown with stiff hairs when young, becoming smooth and grey over time; forming a shallow zig-zag pattern; buds are alternate, ovoid, to 6mm long, reddish-brown with reddish hairs.

Leaves: alternate, large, 120-180mm, with occasional minor pointed 'shoulder' lobes; doubly-toothed margins and acuminate tips. Discolorous, dark-green upper surface, paler beneath. Harshly rough (scabrid) texture on both upper/lower surfaces. Deciduous.

Flowers: dense clusters close to shoots; dark purple-red in early spring before leaves.

Fruits: pale green at first, broadly oval, notched membranous with single seed at centre; prominent before leaves; drying to paper-thin brown disc prior to dispersal.



Wych elm – (left) detail of single hermaphrodite flower, borne in profuse clusters before leaves; (centre) masses of single rounded seed within paper-thin aerodynamic wing (samara) develop soon after leaves emerge, sometimes in such abundance they appear to be foliage; and (right) leaves alternate, large, rough, with finely serrated margins and markedly oblique leaf-bases which is a characteristic common to all *Ulmus* species.

Drawings: Christine Darter (Edlin, H. 1968).

Distribution: (once) common across Britain, more in north and west, less in south and south-east; also throughout Europe towards west Asia.

Note: wych elm (*U. glabra*) is the only elm that is certainly indigenous (all others being subject to debate and ongoing taxonomic study). In broad terms Britain's elm population (comprising several *Ulmus* species) was devastated in the 1970's by a vascular wilt (Dutch elm disease [DED] caused by the fungus *Ophiostoma* [syn. *Ceratocystis*] *ulmi*) resulting in the loss of approximately 26 million trees from the English countryside over the decade 1970-1980. Wych elm's naturally cooler northern/western habitat/range proved less suited to the two DED vectors (larger/smaller European elm bark beetle: *Scolytus scolytus* and *S. multistriatus* respectively) causing comparatively less wych elm (*U. glabra*) infection/decline/death, with greater numbers surviving. Other *Ulmus* species (plus zelkova [*Zelkova carpinifolia*] a close relative within the family Ulmaceae) being generally distributed across warmer central/southern England are more highly susceptible to vector infestation and/or reinfestation, having only low-nil surviving numbers in many regions, with current populations very restricted and recovery slow.