



A key to lichens on willows and sallows in Beds, Cambs and Northants

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Of 1700 British lichens, about 300 are recorded in the three counties, and around 100 are fairly common. Of these, I have seen only about 30 growing on *Salix* species - willows, sallows and osiers. *Salix* bark is particularly good for lichens in polluted areas, because it is rather alkaline, and counteracts the effects of sulphur dioxide. Large trunks, and especially horizontal boughs, of crack and white willows are particularly good, but many lichens will colonise the smooth trunks of other species, and indeed, some can be found on smaller branches and on twigs.

This simple key, avoiding most technical terms, includes these species, with an emphasis on the larger species and those growing on trees. Only features visible with a hand-lens or low-power binocular microscope up to about x20 are used. Spore characters, requiring x300 to x800 magnification, are very useful (and are used quite early in many published keys), but have been avoided here.

The colour reactions of parts of lichens to the two commonest chemical tests, using caustic potash (potassium hydroxide solution, K) and bleach (calcium hypochlorite solution, C) are mentioned in a few species where they are very helpful in identification. Note that some of these affect the white inner part of the lichen: scratch or cut the surface to reveal it, and observe through a hand-lens or microscope.

The accompanying Glossary defines technical terms and specific definitions of general terms, which may help when attempting to use more advanced keys and publications.

1 (Read all 3 options)

Shrubby: with structures which stick up or dangle down from the surface of the substrate, and are attached at one end only; sometimes also with a bed of small leafy scales at the base; usually quite easily removed without damaging substrate. Never jelly-like. **2**

Leafy: composed of separate lobes or leaflets which often curve upwards at the edges; attached to substrate in the centre of the plant, or by much of the lower surface, or by root-like hairs on underside, but usually quite easily removed without damaging substrate. A few species are translucent green-black, 1-3mm thick, and jelly-like when wet, with no obvious upper and lower surface to lobes. **9**

Crusty or powdery: not easy to separate from substrate. Never jelly-like. **30**

2 Simple or branched hollow pointed or cup-like structures sticking up from the surface of the substrate, with a bed of tiny leafy scales, which are green above and whitish beneath. *Cladonia* spp. **3**

Whole plant strap-like, hair-like or lobed structures more or less hanging down, usually from a central holdfast; seldom hollow; no bed of scaly leaves at base. **6**

3 Erect structures cup-like, the apices much wider than the stalks **4**

Erect structures blunt or simply pointed or branched, hardly wider at tip than at base. **5**

4 Cups covered with extremely fine, flour-like powder; cups rather regular and wine-glass-shaped. On soil or bark, sometimes on moss on walls. *Cladonia fimbriata*

Cups covered with small granules, about the texture of caster-sugar; cups often irregular in shape, and rather wide and shallow. On soil, sometimes on moss on walls, seldom on bark. *Cladonia chlorophaea*

5 On bark. Greenish or grey-green, no bluish tinge. Fruits seldom present, if so, brown. Projections usually short and simple (seldom more than 1cm high), tapering to a point. K-. Common on healthy bark of trees.

Cladonia coniocraea

On bark or on soil. Grey-green with a bluish tinge. Often with small red fruits at tips. Often taller (up to 2.5cm), stouter and more blunt at apex. K+ yellow. Usually on heathland soils or on rotting tree-stumps.

Cladonia macilenta

- 6 Hair-like, made of narrow threads which are circular in cross-section; if pulled, the brittle green-grey outer layer snaps, revealing a tougher, elastic, white inner core (like coaxial electric cable). On bark. *Usnea subfloridana* 7
Leafy or flattened strap-like growths
- 7 Strap-like, the individual lobes flattened, longer than broad, usually dangling down in a bunch from a single holdfast at base. Dull grey-green and/or whitish. On bark. 8
Whole lichen large and sticking up from substrate. Crispy loose-lettuce-like structures, with frilly margins; individual lobes 1-2cm across, grey-blue-green above, pale brown beneath, becoming blackish toward middle underneath. Attached at middle and radiating out from there. Usually on acid bark (esp. oak, birch). *Platysmatia glauca*
- 8 Uniform grey-green colour all over; upper and lower surfaces similar. *Ramalina farinacea*
Upper surface grey-green, contrasting with white lower surface *Evernia prunastri*
- 9 On soil, often among grass, occasionally on mosses at base of trees, rarely directly on bark; individual lobes 1.5-5cm across, and forming patches up to 30cm or more; upper surface greyish when dry, green-brown when wet; lower surface white, with raised veins from which arise white root-like tufts of hairs *Peltigera* spp. 10
On soil, mosses, rock, bark or wood; individual lobes smaller, usually <1cm
- 10 Yellow or orange, sometimes with a white bloom; can look very green when growing on bark in damp or shady situations; if in doubt, test with hydroxide: whole plant K+ purple. 11
Not yellow or orange, usually K-, sometimes white inside is K+ red. 14
- 11 Narrow lobes (less than 2mm, usually about 0.5-1mm wide) very tightly adhering to rock surface, usually neatly radiating at margin, and more bumpy or granular in middle of lichen. Usually on rock or mortar, rarely on bark. *Caloplaca* spp.
Broader lobes, some up to 5mm across, or if small, then lobes standing up well above substrate and whitish undersides visible. On trees, twigs, buildings, rocks. *Xanthoria* spp. 12
- 12 Lobes very small and narrow, mostly <1mm wide, standing upright, up well above substrate, whitish undersides often visible; tips of lobes fringed in yellow powder or granules; forming tight cushions about 1cm across and 5mm deep, seldom with fruits. *Xanthoria candelaria*
Lobes usually larger, more or less held horizontally against the surface, and without yellow granules on lobe edges; often forming larger patches often several cm across; often abundantly fertile. 13
- 13 (3 choices)
Warty in middle, with tiny stump- or finger-like erect lobes; often sterile or with rather few fruits. Often several cm across. Lobes near edge broad and rounded. *Xanthoria calcicola*
Whole lichen all composed of flat leafy lobes, those in the centre not noticeably different from those at the edge; usually with large numbers of fruits in middle (usually with thin margins the colour of the lobes), and large lobes at sides. Often several cm across. Lobes near edge broad and rounded. *Xanthoria parietina*
Each patch never more than 2cm across. Lobes at edge cut into small lobules, but often not visible because of dense cluster of fruits, so whole lichen appears as a convex cushion covered in fruits, which have thick, often wavy, pale margins. *Xanthoria polycarpa*
- 14 Lobes broader, mostly at least 3-5mm across, or if smaller, then lobes standing up well above substrate and whitish undersides visible; never with long root-like whiskers sticking out (though often with a mat of short stiff black hairs underneath). 15
Narrow lobes (less than 2mm, usually about 0.5-1mm wide) either tightly adhering to bark or rock surface, usually neatly radiating at margin, and more bumpy or granular in middle of lichen, or lobes with conspicuous root-like hairs or whiskers, 1-3mm long, usually white with blackish tips, sticking out from beneath; ends of lobes turn up from substrate. 21

- 15 Crispy loose-lettuce-like lobes, with fine, coral-like frilly margins; individual lobes 1-2cm across, grey-blue-green above, pale brown beneath, becoming blackish toward middle underneath; not very rosette-like. Attached at middle and radiating outwards. Usually on acid bark (esp. oak, birch).
Platysmatia glauca
Individual lobes smaller, up to 1cm across; more closely stuck to surface, edges of lobes smooth or sparingly incised; often forming neat rosettes. 16
- 16 Individual lobes hollow or swollen, both upper and lower surfaces convex; upper surface pale grey or bluish, lower surface tan-coloured, becoming darker toward middle of lichen. *Hypogymnia physodes*
Lobes not hollow, either flat on both sides or convex above, concave beneath; variously coloured
Parmelia spp. 17
- 17 Whitish, grey, blue-grey or grey-green, not yellow-green or green-brown 18
Dark olive, green-brown; or pale yellow-green 19
- 18 **(Three choices)**
Lobes small, seldom over 5mm wide, with angular edges; upper surface with a network of whitish raised lines (under hand-lens, these are powdery). Eroded parts and white interior C-. Common.
Parmelia sulcata
Lobes often more than 5mm wide, and with smoothly-rounded edges; upper surface lacking raised white lines, but with small white granules, warts or heaps of white powder. Eroded parts and white interior react C+ red. Fairly common. *Parmelia subrudecta*
Lobes often more than 5mm wide, with smoothly rounded edges; upper surface with neither white lines nor warty granules. Inner white parts C-. Rare. *Parmelia perlata*
- 19 Pale yellow-green, with large (up to 2cm) lobes which are wrinkled near middle; under surface pale brown; whole lichen, inside and out, C-. *Parmelia caperata*
Lobes smaller, seldom over 5mm, dark olive, green-brown; eroding parts and white interior of lichen C+ red. 20
- 20 Upper surface glossy; tiny finger-like or warty lumps on upper surface break off, leaving inconspicuous whitish scars. *Parmelia glabrata*
Upper surface matt; tiny warty outgrowths accompanied by more conspicuous patches of whitish or yellow powder, giving whole lichen a scuffed appearance. *Parmelia subaurifera*
- 21 Lobes mostly horizontal, sometimes sticking up at the ends. When intact, shape is rosette-like, with radiating structure of lobes round the edge, the middle often cracked or warty, but lobes round the edge pointing away from middle. If plant dies back and is irregularly shaped, there will still be outward-pointing lobes around the edges. White, grey, greenish or brownish, sometimes white beneath. Either tightly adhering to substrate, usually neatly radiating at margin, or more loosely attached and irregular, and with conspicuous white or blackish root-like hairs, 1-3mm long, sticking out from beneath and curving upward. 22
Lobes either like overlapping tiles or scales, or more or less vertical. If not tile-like, lobes randomly arranged and not firmly stuck down to substrate, never radiating. Never with 1-3mm conspicuous white or blackish root-like hairs. Pale brown, slightly paler beneath and with pale fawn powder on edges or green above and white beneath. 29
- 22 White or very pale grey; lobes very narrow (less than 1mm wide), radiating around edges are very tightly stuck down to substrate, so they fragment if you attempt to peel them off; a smooth or slightly wrinkled crust in centre, without visible lobes and all adhering very tightly to the bark or rock. No hairs or whiskers sticking out anywhere. *Diploicia canescens*
Darker grey or greenish, lobes less tightly appressed to substrate, and often with hairs or whiskers sticking out from their edges or from underneath. 23
- 23 Lobes with conspicuous root-like hairs or whiskers, 1-3mm long, sticking out from beneath and curving upward; ends of lobes turn up from substrate and often have powdery patches or blobs 24
No long up-curved root-like hairs (sometimes has short, fine 'roots' on underside); lobe ends adhere more closely to substrate; powder-blobs, if present, on surface of lichen, not at ends of lobes. 25

- 24 Tips of lobes raised up, hooded or helmet-shaped with a smooth upper surface, with a ball of powder inside hood, hidden underneath so scarcely visible from above. *Physcia adscendens*
 Tips of lobes raised and curled back or splitting at tip, so an oval or lip-shaped blob of yellow-grey powder developing on underside of lobe is visible from above. *Physcia tenella*
- 25 Lobes broad and short, up to 3mm wide and long, often with wavy edges and overlapping each other; fawn, brown or pale yellow-green when dry, green when wet, speckled with white granules or waxy powdery 'bloom', especially toward tips. 26
 Lobes narrower and longer, up to 1.5mm wide; usually greyish, white, yellowish or dull green; never any white speckles or powder on lobe surfaces. 27
- 26 Sterile. Surface of lobes with white granules or 'bloom'. With patches of granular powder along margins of lobes, and sometimes covering whole middle of lichen. Fawn-brown when dry. On bark or rock. *Physconia grisea*
 Usually fertile, with thick pale grey margin and red-brown or dark-brown discs. Surface of lobes with granules or 'bloom', but seldom with powder patches. Pale grey or fawn. On bark. *Physconia distorta*
- 27 **(Three choices)**
 Lobes pale, whitish or bluish-grey (no yellow tinge), with well-defined round blobs of powder grey powder with bluish flecks, up to 3mm diameter, on the surface of the lobes near the middle of the thallus. White insides of lobes K+ yellow. On stone, mortar or trees. *Physcia caesia*
 Lobes pale, yellowish, with irregular flat patches of yellowish powder on surface of lobes, especially in middle of thallus. White insides of lobes K+ yellow. On trees. *Foraminella ambigua*
 Lobes darker grey, green when wet, sometimes edged darker; powder-patches greenish or dark grey, rarely bluish, irregular, usually elongate along edges of lobes. White inside of lobes K- (rarely, K+ purple). On stone, mortar or trees. 28
- 28 Lobes 0.2-1mm wide. Underside of lobes black. On nutrient-rich bark or rock. *Phaeophyscia orbicularis*
 Lobes no more than 0.2mm wide. Underside of lobes white or pale brown. Usually on nutrient-rich basic rock. *Phaeophyscia nigricans*
- 29 Lobes in quite regular tile-like arrangement; pale brown, slightly paler beneath; edges of lobes smooth and fairly straight, often with pale fawn powder at edges. *Hypocenomyce scalaris*
 Lobes irregular, often with deeply incised margins; green above, white beneath; often with antler-like or cup-like structures arising from basal scales. *Cladonia* spp.
- 30 Yellow, orange or very bright green. 31
 Body of lichen not yellow or orange, usually white, grey, dull greenish, brown or black (fruits sometimes orange). 33
- 31 Bright yellow or orange, not greenish. 32
 Bright greenish yellow, or emerald green; not orange. On dry bark of trees; bright emerald green. *Calicium viride*
- [Beware also: free-living green algae, usually called *Chlorococcus viridis*: best distinguished by absence of fungal hyphae (x400), but usually also less well attached to substrate, so leaves a green powder on the finger if gently rubbed.]
- 32 **(3 choices)**
 K+ purple, on calcareous rocks, mortar, rarely bark; usually lots of fruits. *Caloplaca holocarpa*
 K-, on acid rocks, rarely bark; often some fruits. *Candelariella vitellina*
 K-. On dry bark of trees. Never fruits. *Chrysothrix candelaris*
- 33 Sterile. 34
 Fertile: fruits disc-like with a definite margin, or small and black (either black hemispheres or shaped like tiny golf tees, or flat discs immersed in body and hard to see). 41
- 34 Pale, grey, white or light green. 35
 Dark brown, green or black. 40

- 35 Green-grey, with no obvious structure, entirely powdery or fluffy, when magnified looks like green candy-floss or cauliflower, on bark, rock, soil. Never fruits. *Lepraria incana*
Various colours, but with at least parts of the surface smooth surface and often structured. 36
- 36 On straggling mosses, usually where these grow on wood; scurfy or granular, pale grey. Fruits, if present, brown-black, up to 0.75mm. *Bacidia sabuletorum*
Growing directly on bark 37
- 37 White, smooth but matt; bitter-tasting (oxalic acid). Usually forming more or less circular patches several cm across, often on smooth bark. *Pertusaria amara*
Usually grey or green-grey; if white then shiny or warty. Not bitter-tasting. 38
- 38 Green-grey; granular or powdery in part (breaking down into vegetative reproductive structures); extremely common on bark, bare wood, twigs, stone, mortar etc. *Lecanora conizaeoides*
No hint of green coloration, shades of grey or orange. 39
- 39 (3 choices)
Pale blue-grey to orange grey, with orange or mustard patches (fruits tiny and stalked, like black golf-tees). *Chaenotheca ferruginea*
White or pale grey, without orange patches; shining or warty. *Cliostomum griffithi*
Dull, smooth, matt white or pale grey Unidentifiable sterile crusts
[The commonest species keying here are *Lecanora dispersa*, *Rinodina exigua* and *Tephromela atra*. Fruiting plants are usually present alongside the sterile crusts, and are much easier to identify reliably.]
- 40 On bark, bare wood, twigs, stone, mortar etc. Green-grey; granular or powdery in part (breaking down into vegetative reproductive structures); extremely common. *Lecanora conizaeoides*
On bark; bright green to blackish green. *Scoliciosporum chlorococcum*
- 41 Fruits with a raised margin differently coloured (usually paler) from disc, raised from lichen surface and jam-tart-like. 42
Fruits either a simple dome, without a raised margin, or with margin coloured the same as disc of fruit (often all-black), or stalked like a tiny black golf-tee; in all cases sticking up from lichen surface. 45
- 42 Body of lichen green-grey; granular or powdery in part (breaking down into vegetative reproductive structures); fruits often large and irregular, up to 3mm, with a granular powdery margins; disc of fruit green, fawn, brown or pinkish; on old fruits, disc spreading and becoming convex, folding back the margin, often undulating. Extremely common on bark, bare wood, twigs, stone, mortar etc. *Lecanora conizaeoides*
Body of lichen pale grey, sometimes thin or hard to see, never greenish or powdery; discs of fruits black, fawn or brown, never green; disc seldom over-topping margin. 43
- 43 Fruits large (up to 3mm) with black discs and whitish crinkly margins; rest of lichen pale grey or white, often forming patches several cm across; common on sandstone, rarely on wood. *Tephromela atrum*
Fruits small, usually 1mm or less, with pink, brown, fawn or black disks. 44
- 44 Fruits with pink, brown, or fawn disks; lichen in small patches, usually less than 1cm across; body of lichen dark or pale grey, but often hard to see, and fruits appear scattered across mortar or rock; extremely common on mortar, cement, asbestos-concrete and calcareous rocks, fairly frequent on bark and wood. *Lecanora dispersa*
Fruits with black disk, often with pale margin obscured or not visible. Rest of lichen dull grey or green-grey. *Rinodina exigua*
- 45 Fruit stalked, like tiny golf-tees. Body of lichen pale blue-grey to orange grey, with orange or mustard patches. *Chaenotheca ferruginea*
Fruits not stalked, dome-like or disk-like. Some fruits often showing a paler margin. *Rinodina exigua**

* Note: several similar crustose lichens with black fruits may key out here; they are best separated using spore characters (only visible under high magnification of at least x300) and by chemical tests.

Brief Glossary of technical terms about lichens

'Introductory' books about lichens probably use more obscure and technical language than any other branch of natural history. This is partly because the structures of lichens do not have analogues in everyday life, and partly because lichens are a diverse group, with very varied life strategies. The simple key provided today tries to avoid most obscure terms. This list is intended to soften the blow of trying to read one of the standard works for the first time. Fortunately, all the recommended texts include their own comprehensive glossary, too.

Apical	At or toward the tip
Apothecia	Fruits, especially disc-shaped ones
Calcareous	Made of, or rich in, chalk or limestone, so with an alkaline pH and fizzing in acids
Cilia	Hairs or bristles sticking out from the lichen body; usually, at random angles (if mainly on the underside and downward-pointing, probably referred to as rhizines or rhizinae)
Cortex	The smooth outer surface of the body of most lichens (cf. the inner part, the medulla)
Crustose	Body of a lichen forming a thin crust over its substrate, which may be powdery or solid, thin (like a coat of water-colour paint) or thicker, with a smooth or a rough surface
Eutrophic	Enriched with nutrients, especially nitrates
Foliose	Leafy, the body of the lichen comprising a number of flat or curved leafy structures which either stand up from, or are appressed to, the substrate (q.v.)
Fruits	The structures associated with production of fungal spores by the lichen. They are often flat or convex discs, sometimes with a distinct margin or rim. In some species they are immersed in the surface of the lichen, and open as small pores
Fruticose	Shrubby, the body of the lichen made up of simple or branching structures which either stick up from, or dangle down from, the substrate (q.v.)
Granular	Texture of caster sugar or slightly finer
Isidia	Tiny warty or finger-like outgrowths of the smooth surface of a lichen; under high magnification, the surface of isidia is smooth, formed of the same material, the cortex, as the rest of the lichen surface. This smooth cortex distinguished them from soredia, which are powdery
Lecanorine	A fruit which looks like a jam tart: a flat disc (usually coloured) in the middle, and a rim or margin, usually the colour of the body of the lichen, around the edge
Lecideine	A fruit in which the margin, if present, is the same colour and texture as the disc of the fruit, usually black all over
Leprose	Powdery, and tending to break up
Lirellae	Fruits (apothecia) which are linear or crack-like, usually black and charcoal-like on a pale background
Medulla	The inner part of a lichen, which you see if you scratch the surface. In most species, the medulla is white, and made mainly or entirely of fungal fibres, whereas the outer layer, the cortex, is coloured and has algal cells arranged within it
Perithecia	Fruits, especially those immersed in the body of the lichen and opening as tiny pores in the surface
Placodioid	A lichen which is crustose in the middle but has small lobes around the edges
Podetia	Structures sticking up from the basal part of the lichen, usually hollow and often bearing fruits at their tip when mature, e.g. the cups or antlers of <i>Cladonia</i> , arising from a bed of basal squamules (q.v.)
Pruina	A bloom or frosting of white powder on the surface of a lichen
Rhizines	Root-like hairs on the underside of a lichen lobe; also called rhizinae
Simple	Unbranched
Soralium	A well-defined patch of fine or coarse powder on the surface of a lichen (plural soralia), a form of vegetative reproduction, cf. isidia
Soredia	The powder or granules which make up soralia
Spores	The microscopic spherical or oval reproductive cells which are released by the fruits of lichens; they are actually the propagules of the fungal partner, and contain no algal component
Squamules	Small leaf-like or scale-like structures, either at the base of structures which stick up, or attached to such structures
Substrate	The material on which a lichen is growing, usually bark, rock or soil, occasionally mosses or other lichens
Thallus	The body of the lichen, usually excluding the fruits