

3 FELT LICHENS

Medium to large lichens comprised of thick greyish scallop-like plates and a thick blackish felt-like underside.

4 SHINGLE LICHENS (continued)

5 OTHER SQUAMULOSE LICHENS

A very tiny lichen with greenish squamules <3mm wide (photo at x5).

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Front cover: Hazel-ash woodland at Coille Thogabhaig SSSI, Skye. The Lobarion lichen community is often best developed on hazel in Scotland's rainforest. Hazel is also important for specialist oceanic lichens of smooth bark (the Graphidion lichen community).



Degelia atlantica Felt lichen



AWI Grey thallus of adpressed scallop-like plates with longitudinal ridges and concentric 'growth rings', felted margins and knobby isidia. Colour dry = pale grey, sometimes tinged brown; wet = darker blue-grey. Isidia numerous knobby isidia on thallus and margins, especially on raised ridges where lobe margins meet. Fruit very rare; reddish; few when present. Lower thick blackish/greyish velvet mat at edges of upturned lobe margins (a thick hypothallus). Similar to *D. plumbea* (usually abundantly fertile, no isidia).

Degelia plumbea (sensu lato) Plum-fruited felt lichen



AWI Grey thallus of adpressed scallop-like plates with longitudinal ridges and concentric 'growth' rings, felted margins and red fruits. Colour dry = pale grey, sometimes tinged brown; wet = darker bluegrey. Soredia/Isidia absent, but sometimes a few knob-like lobules that resemble isidia. Fruit frequent, reddish; blackish when in poor condition. Lower thick blackish/greyish velvet mat at edges of upturned lobe margins (a thick hypothallus). Similar to *see D. atlantica* and *Pannaria rubiginosa*.

Fuscopannaria sampaiana Brown shingle lichen



AWI Nationally Scarce Brownish red squamules with paler soredia. Colour dry = pale creamy red-brown to red-brown with paler margins to squamules; wet = creamy pale greyish red-brown to red-brown. Soredia pale greyish to creamy granular soralia on thallus and margins. Fruit never recorded. Lower blue-black hypothallus often visible at squamule margins. Notes some people detect a distinctive sweet, fruity smell (like 'juicy fruit' chewing gum) when a wet thallus is gently rubbed with a finger.

Normandina pulchella Elf ears



Tiny, bluish green, rounded ear-like squamules with a distinctive paler thickened rim at the margin (x10). May be scattered or clustered, usually growing on mosses, liverworts or other lichens (especially on felt or shingle lichens). Colour dry = pale blue-grey to pale green-grey; wet = blue-green to grey-green. Soredia greyish to greenish, arising at margin, sometimes spreading to cover squamules. Fruit never recorded.

4 SHINGLE LICHENS

small to medium lichens comprised of very small overlapping leaf-like scales (squamules). Greyish to brownish.

6 JELLY LICHENS

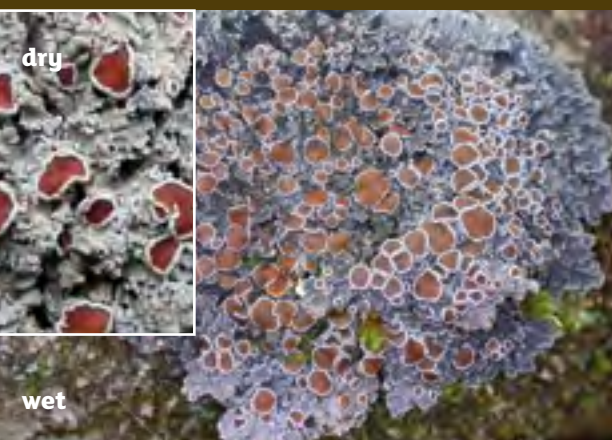
Leafy lichens with a jelly-like thallus when wet, that shrink and become strongly wrinkled when dry.

Pannaria conoplea Mealy-rimmed shingle lichen



AWI Greyish squamules with pale soredia. Colour dry = pale grey to blue-grey, more rarely tinged brownish; wet = darker blue-grey. Squamule margins paler. Sored: coarse grey soralia. Fruit very rare. Lower hypothallus not usually visible. Similar to *P. rubiginosa* (no soredia, usually fertile).

Pannaria rubiginosa Red-eyed shingle lichen



AWI Greyish squamules with red 'jam-tart' fruits. Colour dry = pale grey to blue-grey, more rarely tinged brownish; wet = darker grey to blue-grey. Squamule margins paler. Soredia/Isidia none. Fruit frequent; red to red-brown with thalline margin. Lower: hypothallus often visible as a blue-black zone at margins of squamules/thallus. Similar to poorly developed *Degelia plumbea* (not squamulose; fruit without thalline margin). Also see *P. conoplea*.

Leptogium brebissonii 'Blobby' jelly-skin lichen



AWI Nationally Scarce When dry: dark grey-black strongly wrinkled/ridged with brown granular isidia on ridges. When wet: dirty green to blackish, swollen jelly-like masses. Colour dry = grey-black; wet = dark green/black. Isidia dry = grey-brown to brown, granular; wet = indistinct. Fruit not recorded in Britain. Similar to when wet could be overlooked for algae, other *Collema* or *Leptogium* species, but when dry the brownish isidia are distinctive.

Collema fasciculare 'Cushion jelly' or 'Octopus suckers'



AWI Nationally Scarce Distinctive when wet: dark swollen cushions of fruits like clusters of tiny octopus suckers. Easily overlooked when dry: blackish crustose to foliose, wrinkled with red fruits. Colour dry = grey-black; wet = dark dirty green to brownish or blackish green. Soredia/Isidia none. Fruit frequent, dominant when wet; dry = redbrown disc with thick thalline margin; wet = dirty green to blackish green with thick swollen margin. Similar to: other *Collema* or *Leptogium* species when dry; unmistakable when wet.

Key features for identification of lichens in this guide

The use of a hand lens (preferably x10 magnification) is recommended to examine and appreciate some of the key features of the lichens in this guide. A (x10) in the text indicates when a hand lens is necessary.

Colour The colour of upper (and if visible the lower) surface can be very variable between wet and dry states.

Growth form of the thallus (the main body of the lichen)

Leafy (foliose): thallus consists of leafy lobes. Lobes may be loosely attached or adpressed (closely pressed) to the substrate. Some leafy Lobarion species swell and become jelly-like when wet.

Squamulose: thallus consists of tiny lobes or leaf-like scales (**squamules**). The squamules may overlap like roof shingles and are not always obvious (e.g. they may be obscured by a crust of isidia).

Features that may be present on the upper surface

Fruits: sexual reproductive structures that produce spores. They are often round and may be flattened, convex or swollen. They may be brown, orange, reddish or blackish. Round fruits may have a margin that can be the same colour as the rest of the fruit, or the same colour as the thallus (a **thalline margin**).

Isidia: tiny thallus projections (x10) that are involved in vegetative reproduction. They may be nodular, granular, very narrow and finger-like, or minutely branched like tiny fragments of coral (**coralloid**). Eroded or granular isidia can be mistaken for granular soredia.

Lobules: tiny flattened lobes (x10) on the surface or on lobe margins.

Pseudocyphellae: pores or cracks that expose the interior of the thallus and so appear as paler spots or lines. Pseudocyphellae on the upper surface may develop soredia.

Soredia: floury powder or coarse granules (like caster sugar, x10) that are involved in vegetative reproduction. They often occur along ridges or cracks on the surface, or on thallus margins, and may be diffuse or arise in discrete structures (**soralia**).

Features that may be present on the lower surface

Cyphellae and pseudocyphellae: pores in the lower surface that appear as pale spots/speckles on the brown felted underside (**tomentum**) of *Sticta* species and *Pseudocyphellaria* (Specklebelly) lichens.

Hypothallus: a dark blue-black or blackish mat on the lower surface, often only visible between lobes/squamules or at the margins of the thallus. It may be thin and visible as a dark stain, but when well developed may be thicker and velvet-like.

Rhizines: root-like structures. Common types include soft, almost fluffy, rhizines e.g. *Peltigera* species (Dog Lichens) or stiff, wiry, black rhizines e.g. many leafy *Parmelia* species, (see guide 2).

Tomentum: an even or patchy carpet of short hairs (usually brownish or pale).

Fruits and isidia on *Lobaria pulmonaria*



Lobules on *Leptogium cyanescens*



Soredia on *Pseudocyphellaria crocata*



Hypothallus on *Degelia* sp.



Rhizines on *Peltigera* sp.



Tomentum with cyphellae on *Sticta* sp.



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Lichens of Scotland's Rainforest

Guide 1 Lichens on ash, hazel, willow, rowan and old oak



This field guide is for anyone interested in identifying some of the more conspicuous lichens associated with temperate rainforest in Scotland. It looks at the **Lobarion** group of lichens that grow on trees with mildly acidic bark (e.g. ash, hazel, willow, rowan and old oak), especially those in more sheltered mixed deciduous woodlands of lower slopes and valleys. A companion guide (guide 2) looks at the **Parmelion** group of lichens that grow on trees with very acidic bark, especially those growing on poorer soils (e.g. oakwoods and birchwoods).

What is temperate rainforest?

Temperate rainforest includes semi-natural woodlands found in western Britain and Ireland where the climate is mild and wet due to the influence of the Gulf Stream. These conditions are ideal for a range of important lichens. Scotland's rainforest has been compared to tropical rainforests when there is luxuriant growth of lichens, ferns, mosses and liverworts.

What is a lichen?

A lichen is an association between a fungus and a photosynthetic partner. The fungus forms the main body of the lichen (the *thallus*), usually including a protective, opaque upper surface that can be green, yellow, orange, reddish, brown, grey, whitish or bluish. The photosynthetic partner manufactures food using the energy of sunlight (photosynthesis). In most lichens the photosynthetic partner is a green alga, but some lichens have a cyanobacterium (blue-green alga).

Mosses and liverworts often grow with lichens. They have green chlorophyll but no pigmented protective upper surface, and most species are semi-translucent green or yellowish green, though some are reddish purple. Unlike lichens, mosses and most liverworts have a stem with leaves, although some liverworts consist of a thallus that could be mistaken for a lichen.

Why are lichens associated with Scotland's rainforest so important?

Lichens are important for biodiversity and as indicators of habitat quality. There are around 1850 species in Britain compared to around 1400 species of native flowering plants. Temperate rainforest is a particularly important habitat and can support over 150 lichens including good populations of species that are rare in Britain and Europe.

Most lichens prefer clean air, and require habitats that have not been regularly disturbed. The woods with the most diverse lichen flora have a varied topography, including river valleys, and a diverse woodland structure with glades and a range of tree/shrub species including old trees and hazel. In areas with historically low levels of pollution some lichen communities may be good indicators of ancient woodland that has not been clear felled or intensively coppiced.

Lichen communities

Distinctive lichen communities that can support a range of Ancient Woodland Indicator (**AWI**) species include:

The **Lobarion**: found on trees with mildly acidic bark: ash, hazel, rowan, willow and old oak.

The **Parmelion**: the Parmelion community found on trees with very acidic bark (alder, birch and oak) (see guide 2).

The **Graphidion** ('smoothies'): typically occurs as an intricate map-like patchwork of thinly crustose lichens on smooth bark, especially on hazel. The fruits look like small scribbles, warts, barnacles, 'jam-tarts', spots or raised pimples. These are difficult species to identify, often requiring a microscope.

The **Usneion**: green shrubby tufts, especially on branches and twigs in the canopy. Greenish beard lichens (*Usnea* species) are frequent on the twigs/branches of birch, alder and oak. They are difficult to identify, often requiring chemical analysis. Strap-shaped *Ramalina* and *Evernia* species are frequent on the twigs/branches of ash, hawthorn, rowan, hazel and oak.

Lichen hunting!

This is the good bit! Arm yourself with a hand lens and get out into the woods! To see the lichens in this guide it is necessary to explore suitable habitat. The best areas will often be slopes and river valleys with mixed deciduous woods with hazel and old trees of ash, rowan, willow and oak. Lobarion species occur on bark, or on mats of mosses/liverworts growing over bark. Many species can also be found on mossy boulders, rocky outcrops, and in very humid situations they may grow directly on rock. The four *Lobaria* species are good 'lead-in' species that should encourage you to look for other lichens of the *Lobarion* community. An ancient woodland in Scotland's rainforest will often have good populations of a range of the **AWI** species described in this guide, and may include scarce or rare species.

Although common names have been used in this guide, few common names for lichens are universally accepted. Scientific names should always be used when recording lichens to avoid ambiguity.

Further information

Books

Lichens: An Illustrated Guide to the British and Irish Species. Frank Dobson. 7th Edition (2018). Richmond Publishing Co. Ltd. This is the best identification guide to most of the common lichens of a range of habitats.

Lichens. Oliver Gilbert (2000). Collins New Naturalist series. Harper Collins, London. This is a highly readable account of lichen ecology and habitats in Britain including a good chapter on woodland lichens.

Information

www.bls.org.uk The British Lichen Society (BLS) has information on lichens, publications, courses and web links.
www.nwdg.org.uk The Native Woodland Discussion Group (NWDG) runs courses on lichens of temperate rainforest.
www.uklichens.co.uk The UK lichens website has useful photos of many UK species.

Advice and support

Plantlife Scotland can help you in your quest for information and support. Plantlife Scotland is a leading partner of the Alliance for Scotland's Rainforest – you'll find information and resources at **www.savingscotlandsrainforest.org.uk**

1 THE FOUR LOBARIA SPECIES

Large, conspicuous leafy lichens in a range of colours: yellow-green, whitish, blue-grey, green or green-brown

Lobaria pulmonaria Tree lungwort



fruits



lower



dry



Lobaria amplissima Parchment lichen



AWI Green or brownish loosely attached lobes with distinctive network of ridges (lung-like). **Colour** dry = green or brownish green; wet = green. **Soredia/Isidia** often with soredia or isidia along ridges. **Fruit** occasional; orange to red-brown. **Lower** tomentum patchy with convex naked areas corresponding to depressions between the ridges on the upper surface.

AWI Whitish or green adpressed, smooth or wrinkled lobes with wavy margins; usually with dark brown shrubby growths (cephalodia). Margins of young lobes have a fine crystalline frosting when dry (x10). **Colour** dry = whitish; wet = green. **Soredia/Isidia** none. **Fruit** scarce; red-brown disc, white margin. **Lower** even tomentum. **Similar to** when wet to *L. virens* (never has *cephalodia*) and *Flavoparmelia caperata* (Common green shield lichen) – brighter yellow-green, no tomentum, has soralia, never has cephalodia.

2 OTHER LEAFY SPECIES

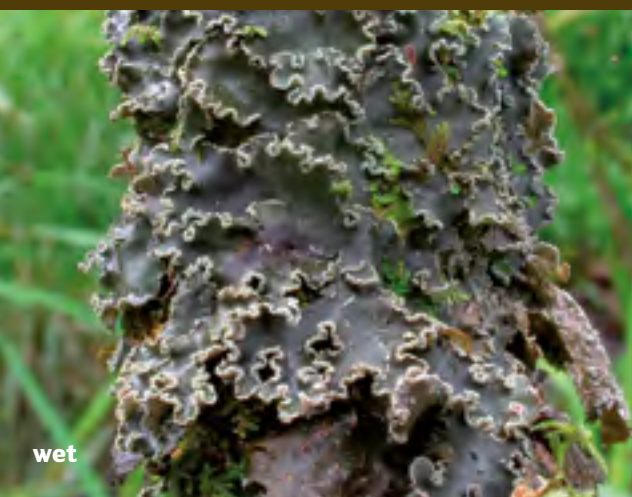
Medium to large leafy lichens in a range of greyish to brownish colours.

Nephroma laevigatum A kidney lichen



AWI Grey or brownish lobes with distinctive fruits on underside of upturned lobe tips. **Colour** dry = brown-grey to red-brown; wet = brown-grey to brown. **Soredia/Isidia** none, but often with tiny flattened lobules. **Fruit** frequent; orange-brown to red-brown disc, thin brown margin. **Lower** smooth to wrinkled.

Peltigera collina Floury dog-lichen



AWI Grey lobes with raised, wavy/frilly margins with soredia. **Colour** dry = grey, blue-grey to grey-brown; wet = grey. **Soredia** coarse pale grey to blue-grey soralia on wavy lobe margins. **Fruit** rare; dark brown to blackish. **Lower** soft rhizines. **Similar to** *Nephroma parile* Powdery kidney lichen (smooth or wrinkled lower surface, no rhizines), *Pseudocyphellaria norvegica* (speckled tomentum, no rhizines), **Notes** the only *Peltigera* species with marginal soralia.

2 OTHER LEAFY SPECIES

(continued)

Pseudocyphellaria norvegica Norwegian specklebelly



P. crocata **AWI** *P. norvegica* **AWI** **Nationally Scarce** Loosely attached greyish to brownish irregular lobes with soralia, that are yellow (*P. crocata*) or grey (*P. norvegica*); lobes sometimes irregularly branched in *P. norvegica*. **Colour** dry = grey-brown to red-brown; wet = grey to brown-grey. **Soredia** soralia at first round, then elongated, irregular and spreading along ridges and lobe margins. In *P. crocata* they are yellow; in *P. norvegica* they are greyish, often with a lilac tinge. **Fruit** very rare. **Lower** brown tomentum with pale speckles (pseudocyphellae). **Similar to** *P. norvegica* is similar to *Peltigera collina* or *Nephroma parile* Powdery kidney lichen (neither has a speckled tomentum).

Sticta limbata Floury Sticta

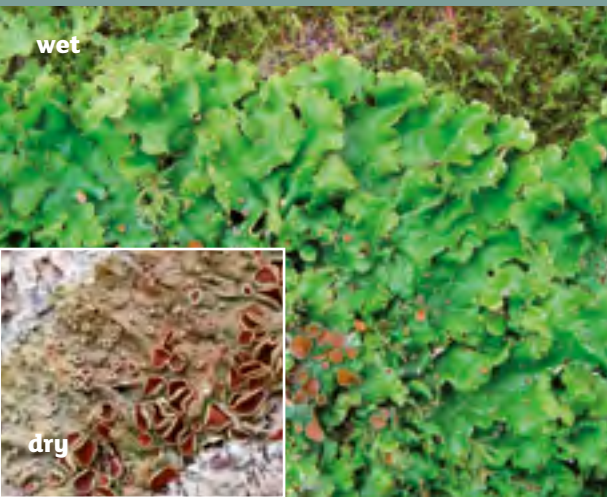


Grey rounded floury lobes with downturned margins; lobes unbranched but may be notched or irregular. **Colour** dry = pale grey to pale grey-brown; wet = darker grey to grey-brown. **Soredia** diffuse, floury pale grey; along margins and spreading onto surface. **Fruit** very rare. Lower: pale or brown tomentum with paler spots (*cyphellae*). **Similar to** when poorly developed could be confused with *Nephroma parile* Powdery kidney lichen (smooth lower surface, no speckled tomentum).

Lobaria scrobiculata Lob scrob



Lobaria virens Green satin lichen



AWI Yellowish or blue-grey loosely attached irregular lobes with irregular ridges and grey soredia. **Colour** dry = matt creamy yellowish green to yellowish grey; wet = blue-grey. **Soredia** grey to blue-grey; round, then elongated, irregular and spreading along ridges and lobe margins. **Fruit** rare; red-brown disc, thick thalline margin. **Lower** tomentum patchy with convex naked areas corresponding to depressions between the ridges on the upper surface.

AWI Green or brownish adpressed, smooth or wrinkled wavy lobes with orange fruits arising from volcano-like warts. **Colour** dry = green or brownish-green (often with a satin sheen); wet = green. **Soredia/Isidia** none. **Fruit** common; orange disc, thick green margin. **Lower** even tomentum. **Similar to** *L. amplissima* or *Flavoparmelia caperata* Common Green Shield Lichen (see *L. amplissima*).

Leptogium burgessii 'Frilly fruited' jelly-skin lichen



AWI Brownish or blackish intricate frilly rosettes of thin wavy lobes with frilly fruits. **Colour** dry = brown, grey-brown to blackish; wet = blackish green to blackish brown. **Soredia/Isidia** none. **Fruit** common; red-brown to blackish brown disc, thalline margin with lobules (frilly fruits). **Lower** thin pale grey tomentum when dry contrasts with darker upper surface (tomentum dark if wet but visible x10). **Similar to** see *L. cyanescens*.

Leptogium cyanescens Blue jelly-skin lichen



AWI Pale blue-grey or dark grey to blackish intricate rosettes of thin overlapping lobes with isidia and/or lobules. **Colour** dry = pale blue-grey, wet = dark grey to blackish. **Isidia/lobules** cylindrical or flattened isidia and/or lobules abundant on lobe margins/surface. **Fruit** very rare. **Lower** smooth to slightly wrinkled. **Similar to** when wet to *L. burgessii* (has tomentum but x10 may be required to see it when wet; usually fertile with frilly fruits). If in doubt dry a specimen to see the distinctive colour of dry *L. cyanescens*.

Sticta sylvatica A stinky Sticta



AWI Brown, irregularly branched lobes that smell fishy when wet and abraded. **Colour** dry = dark grey to grey-brown; wet = brown to blackish brown. **Isidia** tiny, coralloid isidia visible as darker granular patches on thallus. **Fruit** never recorded. **Lower** pale or brown tomentum with paler spots (*cyphellae*). **Similar to** when poorly developed it is difficult to distinguish from some irregularly notched forms of *S. fuliginosa*

Sticta fuliginosa A stinky Sticta



AWI Brown to blackish rounded lobes with downturned margins; lobes unbranched but may be notched or irregular; smells fishy when wet and abraded. **Colour** dry = dark grey-brown; wet = blackish brown. **Isidia** tiny, coralloid isidia visible as darker granular patches on thallus. **Fruit** scarce; red-brown, often with pale hairs on margins (x10). **Lower** pale or brown tomentum with paler spots (*cyphellae*). **Similar to** see *S. sylvatica*.