



Lichens of the Lake District's Rainforest

Guide 1 - Lichens on Ash, Hazel, Willow, Rowan, Old Oak and Less Acidic Rocks

This field guide is for anyone interested in identifying some of the more conspicuous lichens associated with temperate rainforest in the Lake District, aiming to provide the tools needed to identify some of the more common species, as well as those that indicate good temperate rainforest habitat.

It looks at a group of lichens called the *Lobarion* that grow on trees with mildly acidic to neutral bark e.g. ash, hazel, willow, rowan and old oak, and on less acidic rocks, especially in more sheltered woodlands of lower slopes and valleys.

What is temperate rainforest?

Temperate rainforest is **globally rare**. It occurs where the climate is mild and wet; suitable climatic conditions are found over **less than 7% of the earth's surface**.

Temperate rainforest is particularly characterised by a **luxuriant growth of lichens, bryophytes¹ and ferns**, many of which are highly specialised and only, or mostly, **found in temperate rainforest**.

In Britain, it is found **in the west where the climate is mild and wet** due to the influence of the Gulf Stream. It occurs throughout the landscape as woodland, wood pasture and scattered trees. Human interaction with the landscape over millennia has shaped what we have today, and **what remains is internationally important** in terms of the habitat itself and the species it supports.

Across Britain rainforest varies according to climate; lowland temperate rainforest occurs in West Scotland and in pockets of Cumbria and North Wales, reflecting wetter climatic conditions, whereas upland rainforest is more widespread. Where conditions are drier and sunnier oceanic woodland becomes more prevalent. Our use of the term '**rainforest**' here encompasses **true rainforest and oceanic woodland** as they often occur alongside each other across the rainforest landscape.

What is a lichen?

A lichen is a **composite organism formed primarily by a fungus and an alga or cyanobacteria** but involving other fungi and bacteria too.

The fungus forms the bulk of the lichen (the thallus), but as with all fungi it cannot produce food for itself. So, the fungus partners with the alga or cyanobacterium (the photobiont), sometimes both, which produce food through photosynthesis. Cyanobacteria also produce food through nitrogen capture.

The fungal species gives the lichen its name; each lichen species is a different fungal species, but they share a relatively small number of algal or cyanobacterial species.

They can reproduce sexually, producing fungal spores dispersed by the fruiting body, and vegetatively with small packages of the alga and fungal material dispersed in small structures e.g. isidia, soredia.

Why are lichens associated with the Lake District's rainforest so important?

British temperate rainforest hosts **internationally important populations of rainforest lichens**, some of which are endemic i.e. found nowhere else in the world.

The richest rainforest sites can support up to 300 or more species of lichen.

They are important **indicators of habitat quality** and can tell us about the **ecological history** of a site e.g. past clear-felling. They are **bioindicators** used in assessing air quality and fulfil important roles in the **nutrient and water cycles**.

Lichen communities

Different lichen species don't just occur randomly throughout the landscape. Whilst some can cope with a wide range of conditions, many are **highly specialised** to particular niches. What species grow where is dependent on many factors but the chemistry of the substrate, light levels, moisture levels and landscape history are particularly important. Different species with similar requirements form ecologically distinct communities, the main ones in British temperate rainforest are:

Lobarion: found on trees with mildly acidic to neutral bark e.g. ash, hazel, rowan, willow and old oak (this Guide). Found in lowland rainforest and oceanic woodland.

Parmelion: found on trees with acidic bark e.g. alder, birch and oak (see Guide 2). Found especially in upland rainforest.

Graphidion: typically occurs as an intricate mosaic of crustose lichens on smooth bark, especially on hazel (see Guide 3). Found especially in lowland rainforest and oceanic woodland.

How to use this guide

Arm yourself with a x10 hand lens and get out into the woods! To see the lichens in this guide it is necessary to explore suitable habitat; the richest temperate rainforest sites have a varied topography, including water courses and rock outcrops, and a diverse woodland structure with glades and a range of tree species including old trees and hazel. The species in this guide occur on bark and on mats of mosses and liverworts growing over bark and on mossy boulders and rocky outcrops.

The species are divided into growth form or character indicated by the headings at the top of the accounts:

1. Leafy lobes
2. Tiny leafy lobes (squamulose)
3. Crusty or granular

The species accounts detail:

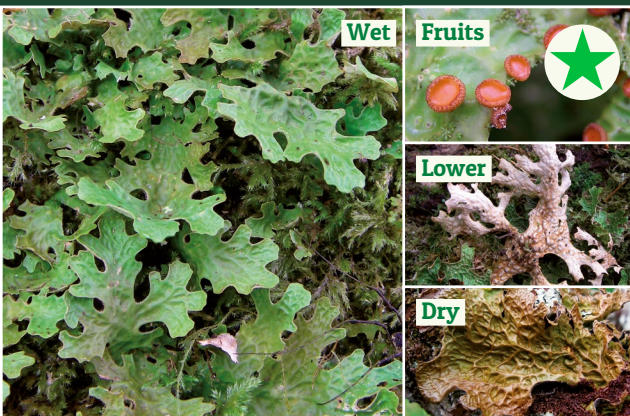
- species that are indicators of good quality temperate rainforest habitat (marked with a ★), look out for these when undertaking a Rapid Rainforest Assessment
- how common each species is in temperate rainforest habitats
- the key ID characters; form & size, colour, reproductive structures, underside
- notes e.g. the main confusion species

Please submit your records to the British Lichen Society.

¹ A collective term for mosses, liverworts and hornworts

1. Does the lichen have well developed leafy lobes; is it foliose?

Tree Lungwort *Lobaria pulmonaria*



Growth habit & size: large (up to c.50cm) loosely attached lobes with a distinctive network of ridges giving a lung-like appearance. Young lobes can have a whitish pruina

Colour: green when wet, brownish-green when dry

Soredia/isidia: soredia and isidia along the margins and ridges

Apothecia: rare; a red-brown disc

Underside: pale with a patchy tomentum and convex naked areas corresponding to depressions between the ridges on the upper surface

Similar species: *Lobaria scrobiculata* (see below)

Notes: uncommon

Parchment Lichen *Ricasolia amplissima*



Growth habit & size: large (up to c.30cm or more) and closely pressed to the substrate, smooth or wrinkled lobes with wavy margins; usually with cephalodia on the surface. Young lobes can have a whitish pruina

Colour: very pale grey when dry to green-grey when wet

Soredia/isidia: none

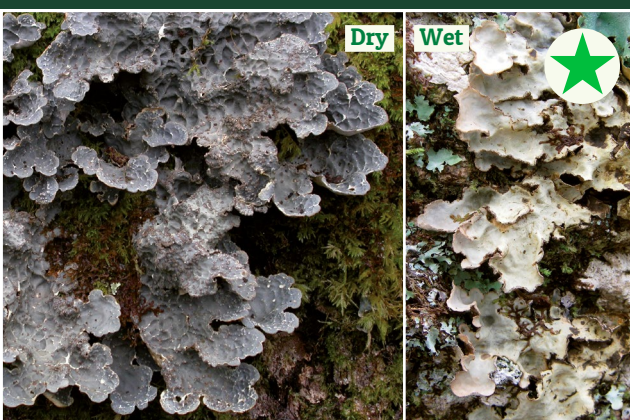
Apothecia: scarce; a red-brown disc with a white margin

Underside: pale with an even tomentum

Similar species: *Ricasolia virens* when wet/green but that species never has cephalodia (see below), *Flavoparmelia caperata* is brighter yellow-green and has soredia

Notes: rare

Lob Scrob *Lobaria scrobiculata*



Growth habit & size: large (to c.20cm), loosely attached, irregular lobes with ridges

Colour: blue or yellowish-grey when dry, blue-grey when wet

Soredia/isidia: grey to blue-grey soredia and occasionally isidia spreading along the ridges and lobe margins

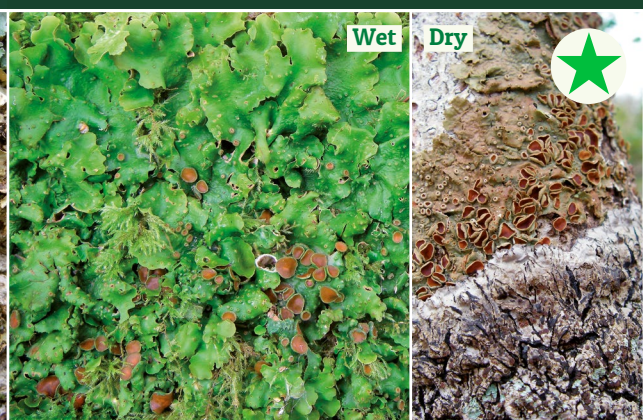
Apothecia: rare; a red-brown disc with a thick green margin

Underside: pale with a patchy tomentum and convex naked areas corresponding to depressions between the ridges on the upper surface

Similar species: *Lobaria pulmonaria* (see above)

Notes: rare

Green Satin Lichen or Dragonskin *Ricasolia virens*



Growth habit & size: large (to c.30cm or more) smooth or wrinkled wavy lobes closely pressed to the substrate with volcano-like pimples scattered over the surface

Colour: bright green when wet, brownish-green when dry

Soredia/isidia: none

Apothecia: frequent; an orange disc with a thick green margin

Underside: pale brown with a tomentum

Similar species: *Ricasolia amplissima* (see above) and *Flavoparmelia caperata*

Notes: uncommon

A Kidney Lichen *Nephroma laevigatum*



Growth habit & size: to c.10cm with thin papery lobes and distinctive fruits on the underside of upturned lobe tips. Often has tiny flattened lobules on lobe margins

Colour: brown-grey to red-brown

Soredia/isidia: none

Apothecia: frequent; an orange-brown disc on the underside of upturned lobe tips

Underside: smooth or wrinkled, looks like smooth tan leather

Similar species: *Nephroma parile*, but that has soredia on the margins (see right)

Notes: uncommon

A Kidney Lichen *Nephroma parile*



Growth habit & size: to c.10cm, lobes with raised wavy or frilly margins and soredia

Colour: brown-grey to red-brown

Soredia/isidia: pale-grey to blue-grey soredia on the wavy lobe margins

Apothecia: very rare

Underside: smooth or wrinkled, looks like smooth tan leather

Similar species: *Sticta limbata* (see below) and *Peltigera collina*, but the underside differs on each species

Notes: uncommon

A Dog Lichen *Peltigera horizontalis*



Growth habit & size: large, to c.40cm, smooth lobes, often forming large patches

Colour: brown to brown-grey when wet, greyish when dry

Soredia/isidia: none

Apothecia: usually frequent, chestnut brown, rounded and held parallel to the substrate

Underside: white with a network of dark veins and tufted brown rhizines that look like the frayed tips of old rope

Similar species: confusable with other *Peltigera* species

Notes: uncommon. Often found on tree bases and moist stumps and rocks

Floury *Sticta limbata*



Growth habit & size: rounded, sometime notched, lobes to c.15cm with sorediate ('floury') margins

Colour: grey to grey-brown, but darker when wet

Soredia/isidia: diffuse, 'floury', pale grey soredia along the margins and spreading on to the surface of the lobes

Apothecia: very rare

Underside: pale brown tomentum with white spots (cyphellae)

Similar species: *Nephroma parile* (see above) and *Peltigera collina*, but the underside differs on each species

Notes: uncommon

Stinky Sticta group *Sticta fuliginosa* group



Growth habit & size: rounded lobes to c.15cm that aren't distinctly divided into lobes (like *Sticta sylvatica*) but can be notched, split or irregular in outline

Colour: dark brown when wet, grey-brown when dry

Soredia/isidia: tiny coral-like isidia on the surface of the lobes, often on ridges and margins

Apothecia: rare, chestnut brown, often with pale hairs (cilia) on the margins

Underside: pale or brown tomentum

Similar species: *Sticta sylvatica* (see right), especially with larger, divided thalli of *S. fuliginosa*. *S. sylvatica* often looks shinier and with a bronzy tone, and with a darker underside

Notes: uncommon. Smells strongly of fish when wet

Stinky Sticta *Sticta sylvatica*



Growth habit & size: rounded lobes to c.15cm that are distinctly divided into lobes or 'branches'

Colour: dark brown when wet, grey-brown when dry, often with a reddish or bronze tinge

Soredia/isidia: tiny coral-like isidia on the surface of the lobes, often on ridges and margins

Apothecia: not known

Underside: dark brown tomentum with cyphellae which can contrast strikingly with a dark background

Similar species: *Sticta fuliginosa* (see left) especially when young or poorly developed, young specimens of *Sticta* can be almost impossible to tell apart

Notes: uncommon. Smells strongly of fish when wet

Tattered Jelly Skin *Scytinium lichenoides*



Growth habit & size: forms cushions up to c.10cm of very thin lobes with minutely frilly margins

Colour: dark, often reddish, brown when wet, grey to grey-brown when dry

Soredia/isidia: abundant elongated cylindrical or coral-like isidia on the lobe margins giving the lobes a frilly edge

Apothecia: Occasional, a small red-brown disc (see photo)

Underside: the underside is minutely ridged

Similar species: *Scytinium* species but the cylindrical or coral-like frilly margins are distinctive

Notes: common. Often grows amongst mosses on the bases of trees and on mossy rocks

Blue Jelly Skin *Leptogium cyanescens*



Growth habit & size: intricate rosettes of thin overlapping lobes to c.10cm

Colour: pale blue-grey when dry, dark grey to blackish when wet

Soredia/isidia: cylindrical or flattened isidia or lobules are abundant on lobe margins or surface of thallus

Apothecia: very rare

Underside: smooth or slightly wrinkled

Similar species: some other *Leptogium* species but the combination of flattened isidia or lobules and the blue-grey colour when dry are distinctive

Notes: uncommon

A Jelly Lichen *Collema subflaccidum*



Growth habit & size: patches to c.10cm of thin papery lobes when dry, gelatinous when wet

Colour: brown-black when dry, green-black when wet

Soredia/Isidia: abundant globular or cylindrical isidia covering the thallus

Apothecia: very rare

Underside: difficult to see, but similar to the upper surface

Similar species: can be confused with *C. flaccidum*, which has flattened isidia and lobules

Notes: uncommon

Bat Wings *Collema furfuraceum*



Growth habit & size: can form large colonies to c.10cm of thin membrane-like lobes closely pressed to the substrate. The lobes have ridges and wrinkles radiating outwards. Said to look like bat wings.

Colour: dark green-black, more translucent when wet

Soredia/Isidia: usually abundant peg-like to branched isidia on the ridges of mature lobes

Apothecia: very rare

Similar species: easily confused with *C. subflaccidum* but *C. furfuraceum* is usually pressed more tightly to the substrate with radiating ridges lobes and does not swell when wet

Notes: uncommon

2. Does the lichen have tiny leafy lobes; is it squamulose?

Mealy-rimmed Shingle Lichen *Pannaria conoplea*



Growth habit: to c10cm, small squamules with frilly margins

Colour: pale grey to blue-grey with paler margins, sometimes tinged brown and darker when wet

Soredia/isidia: coarse grey soredia

Fruit: very rare

Underside: has a blackish or greyish velvety hypothallus but this isn't usually visible

Similar species: *P. rubiginosa*, but this is usually abundantly fertile, has no soredia

Notes: uncommon

Black-bordered Shingle Lichen *Parmeliella thriptophylla*



Growth habit & size: can form large patches and streaks of up to 30cm+ made up of tiny squamules sitting on a black hypothallus

Colour: appears blackish from a distance but up close is brown or grey-brown when dry, darker when wet

Soredia/isidia: minute, thin and finger-like isidia, sometimes branched, which can form a dense crust in the centre of the thallus

Apothecia: rare; small (to 1mm) and red-brown

Underside: a black hypothallus extends beyond the margins of the squamules, forming a black border

Notes: uncommon. Appears as a dark stain on tree bark

3. Does the lichen form a smooth, lumpy or granular crust on the substrate; is it crustose?

Elf's Ears *Normandina pulchella*



Growth habit & size: tiny (to 3mm) rounded squamules with a distinctive paler rim which look ear-like

Colour: pale blue-grey to pale green-grey, greener when wet

Soredia/isidia: greenish soredia

Apothecia: rare, tiny black pimples embedded in the thallus

Underside: n/a

Notes: common. Can grow as either scattered or clustered squamules, often grows over mosses and liverworts, or other lichens

Barnacle Lichen *Thelotrema lepadinum*



Growth habit & size: a pale crust with numerous small, distinctive barnacle-like apothecia

Colour: whitish to pale grey

Soredia/isidia: none

Apothecia: abundant, raised rounded pimples growing in the thallus with a thick outer rim and a thin, papery inner rim that gives a barnacle-like appearance

Underside: n/a

Notes: uncommon but common on some sites. Found on a wide range of trees usually in old woodlands, also in the *Graphidion* community (Guide 3)

Mycobilimbia sphaeroides & *M. epixanthoides*



Growth habit & size: a scurfy granular crust with distinctive apothecia (*M. sphaeroides*) and/or soredia (*M. epixanthoides*) which can form large patches to 20cm or more but is usually smaller

Colour: green to grey-green, greener when wet

Soredia/isidia: none (*M. sphaeroides*) or fine yellow soredia (*M. epixanthoides*)

Apothecia: abundant (*M. sphaeroides*) or rare (*M. epixanthoides*), to 1mm, buff to pinkish-orange and globular

Notes: uncommon. Frequently found on or near the base of mature trees, often in more shaded conditions

Orange Dimple Lichen *Coenogonium luteum*



Growth habit & size: a thin crust, sometimes barely visible, or finely granular, forming patches up to 10cm

Colour: pale grey-green, to grey

Soredia/isidia: none

Apothecia: small (to 2mm), orange with a pale margin, looking like minute apricot halves (especially when wet). Produced seasonally

Notes: common. Mainly grows on mosses or bark in damp shaded situations. The other common *Coenogonium* species usually has smaller white to pinkish fruits and is more common on bark

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Scan the QR code or visit joinplantlife.org/temperate-rainforest-ld-lob



Further Information

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.

britishlichensociety.org.uk

The British Lichen Society (BLS) has information on lichens, publications, courses and web links.

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Glossary

Apothecia: sexual reproductive structures on the surface of the thallus that disperse the fungal spores, like the fruiting body of a mushroom. Often disc-shaped but they take many forms

Cephalodia: dark brown or blackish shrubby growths of cyanobacteria that fix nitrogen from the atmosphere

Cyphellae: small breaks or holes in the surface of the underside of a lobe, a characteristic of the *Sticta* family

Form: the growth form of the lichen i.e. leafy (foliose), minutely leafy (squamulose), crusty (crustose)

Hypothallus: a dark mat of fungal strands on which lobes and squamules of certain species sit e.g. *Pectenaria*, *Parmeliella*

Isidia: vegetative reproductive structures that look like hard little pegs on the thallus, they can be simple or coral-like

Lobe: the 'leaf' of a leafy (foliose) lichen

Lobule: a tiny lobe growing on the upper surface or the lobe margin

Pruina: an icing sugar like dusting over the surface of a thallus or apothecium

Rhizines: root-like structures on the underside that are simply a means of attaching the lichen to the substrate

Soralia: vegetative reproductive structures that contain powdery granules (soredia), they appear like abrasions or ulcers on the thallus, often oval or circular in shape

Squamule: a tiny lobe

Substrate: the surface on which the lichen is growing e.g. tree bark, rock

Thallus: the body of the lichen

Tomentum: a fuzzy texture on the underside of a thallus that attaches it to the substrate

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

Fruits and isidia on
Lobaria pulmonaria



Lobules on
Leptogium cyanescens



Soredia on
Pseudocyphellaria citrina



Hypothallus on
Pectenaria sp.



Rhizines on
Peltigera sp.



Tomentum with
cyphellae on *Sticta* sp.

