



Lichens of the Lake District's Rainforest

Guide 2 - The Lichens of Acid Bark on Birch, Alder and Oak

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 *Parmelion* that grow on trees with acidic bark e.g. Birch, Alder, Oak and on acidic rocks, especially in exposed locations with high rainfall.

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.

¹ A collective term for mosses, liverworts and hornworts

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 (see Guide 1). Found in lowland rainforest and oceanic woodland.

Parmelion: found on trees with acidic bark e.g. alder, birch and oak (this Guide). 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. – 3. Foliose: leafy lobes with different characteristics e.g. rhizines on the underside, and inflated or hollow lobes
4. – 5. Fruticose: shrubby, tufty, straggly or coral-like
6. Crustose: rusty or granular texture

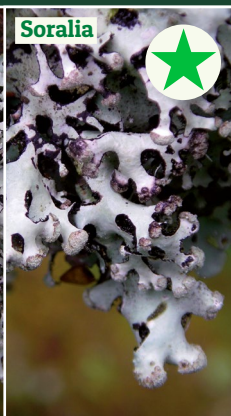
The species accounts detail:

- 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. Is the lichen leafy (foliose), with numerous black rhizines on the underside?

Smooth Loop-lichen *Hypotrachyna laevigata*



Growth habit & size: large (patches up to c.20cm), smooth narrow lobes with square-cut tips

Colour: pale-grey or pale blue-grey

Soredia/isidia: soredia in globular soralia at lobe tips

Apothecia: occasional; to 10 mm, dark brown disc

Underside: black, dark brown near margins, with numerous forked black rhizines

Similar species: *Hypotrachyna taylorensis* (see right) which has no soralia. *H. revoluta* which has less defined soralia and simple rather than branched rhizines. *H. endochlora* which has a yellowish medulla and is rare

Notes: common

Tumbling Kittens *Hypotrachyna taylorensis*



Growth habit & size: large (up to c.20cm or more) with densely overlapping lobes and a scruffy look with older lobes rolled up and hanging down

Colour: pale-grey or pale blue-grey, often greenish, often with brown tips

Soredia/isidia: none

Apothecia: rare

Underside: black, dark brown near margins, with numerous forked black rhizines

Similar species: *Hypotrachyna laevigata* (see left)

Notes: uncommon

Hairy-spined Shield Lichen *Hypotrachyna horrescens*



Growth habit & size: small patches to c.5cm, crowded overlapping lobes, closely attached to the substrate, has a scruffy appearance

Colour: pale grey, often bluish or greenish, shiny

Soredia/isidia: abundant brown-tipped, peg-like isidia with protruding black cilia

Apothecia: rare, reddish brown, isidia with cilia on the margins

Underside: black or dark brown with numerous simple, sometimes forked, black rhizines

Similar species: like a small version of *Parmotrema crinitum* but more tightly pressed to the substrate and shiny

Notes: rare

Grey Crottle *Parmelia saxatilis* & Powdered Crottle *P. sulcata*



Growth habit & size: patches to c.20cm or more, forms rosettes, often loosely attached, lobes with ridges and squared tips

Colour: pale grey, often bluish or greenish, with paler flecks and ridges

Soredia/isidia: *P. saxatilis* has simple, peg-like, or coral-like isidia, often brown-tipped and *P. sulcata* has granular soredia on the surface of the lobes

Apothecia: occasional; to 10mm red-brown/dark brown disc

Underside: black, dark brown near margins, with numerous simple, sometimes forked, black rhizines

Notes: common in a range of lichen communities and habitats, has an appearance of hammered metal

2. Do the lobes have wavy margins and/or an underside that is bare (without rhizines) near the margin?

Desperate Dan *Parmotrema crinitum*



Growth habit & size: patches to c.20cm or more, loosely attached wavy lobes with a torn appearance to the margin and stubby isidia giving an overall scruffy appearance

Colour: pale grey, often bluish or greenish

Soredia/isidia: simple or coral-like isidia, with black hairs (cilia)

Apothecia: very rare

Underside: black with simple rhizines, but with a rhizine-free brown zone around the margins

Similar species: other species in this guide but the isidia are diagnostic. Most similar to *H. horrescens* but that is much smaller and has a hard shiny appearance

Notes: uncommon

Sea Storm Lichen *Parmotrema perlatum*



Growth habit & size: patches to c.20cm or more, loosely attached rounded lobes with a wavy margin that has scattered cilia

Colour: pale grey, often bluish or greenish

Soredia/isidia: fine soredia in marginal soralia that are linear and lip-shaped

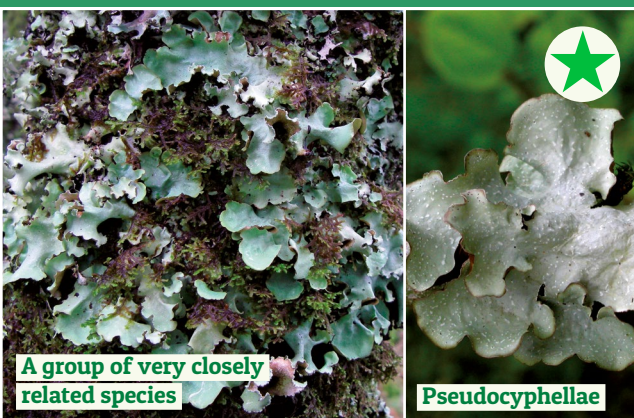
Apothecia: rare

Underside: black with simple rhizines, but with a rhizine-free brown zone around the margins

Similar species: superficially similar to the other grey foliose species in this guide and to other *Parmotrema* species

Notes: common in a range of habitats in Western Britain

Speckled Sea Storm Lichen group *Cetrelia olivetorum* group



A group of very closely related species

Growth habit & size: patches to c.20cm or more, loosely attached rounded lobes that are speckled white and have a wavy margin

Colour: pale grey, often bluish or greenish, sometimes tinged brown

Soredia/isidia: older lobes can have soredia on the margins, not dissimilar to *Parmotrema perlatum* (see above)

Apothecia: not known in Britain

Underside: black with simple rhizines, but with a rhizine-free brown zone around the margins

Similar species: *Parmotrema perlatum* (see above)

Notes: uncommon

Frilly Lettuce *Platismatia glauca*



Growth habit & size: patches to c.10cm, lobes with wavy divided margins giving a frilly appearance

Colour: pale green-grey to whitish green, sometimes tinged brown, and often with reddish or pinkish patches on older lobes

Soredia/isidia: simple or coral-like isidia or granular soredia on the margins

Apothecia: very rare

Underside: brown, white or black, with occasional rhizines that are simple or branched

Notes: a common species on trees in a range of habitats

3. Are the lobes inflated and hollow, with a smooth underside without rhizines?

Heather Rags *Hypogymnia physodes*



Soralia



Tree Flute *Menegazzia terebrata*

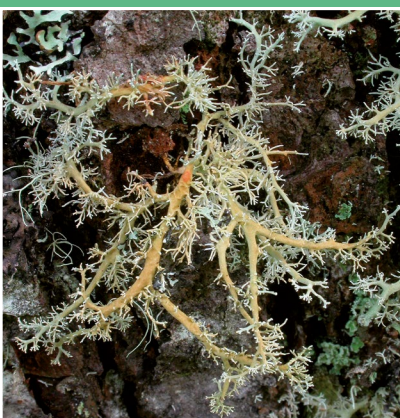


Growth habit & size: patches to c.10cm of inflated hollow lobes. The lobe tips are often raised to show a brown underside or split open to reveal soredia on the underside
Colour: pale grey often bluish or greenish, sometimes tinged brown
Soredia/isidia: soredia on the undersides of split lobe tips
Apothecia: scarce; red-brown disc with a rim
Underside: black but brown towards the margins, without rhizines
Similar species: *Hypogymnia tubulosa* which soredia on solid (not split) lobe tips and *Menegazzia terebrata* (see right)
Notes: a common species on trees in a range of habitats

Growth habit & size: patches to c.10cm of inflated hollow lobes, with distinctive holes. Often forms neat rosettes closely pressed to the substrate
Colour: pale grey, bluish, greenish, sometimes tinged brown
Soredia/isidia: soredia in discrete rounded lumps on the surface and lobe-tips
Apothecia: very rare
Underside: black, without rhizines
Similar species: *Hypogymnia physodes* (see left) which has soredia under split lobe tips and lacks the distinctive holes of *M. terebrata*. *M. subsimilis* is very similar and difficult to distinguish, but is very rare in England and Wales
Notes: rare

4. Is the lichen coral-like?

A Coral Lichen *Sphaerophorus globosus*



Grazed



A Coral Lichen *Bunodophoron melanocarpum*



Growth habit & size: up to c.10cm clumps of irregularly branched cylindrical stems growing out away from the substrate
Colour: pale grey often bluish or greenish, sometimes tinged orange-brown
Soredia/isidia: none
Apothecia: occasional; globular swellings on branch tips, which burst to reveal a dark powder of spores
Underside: n/a
Similar species: *Bunodophoron melanocarpum* (see right) which has flattened rather than cylindrical stems
Notes: uncommon

Growth habit & size: up to c.10cm clumps of irregularly branched flattened stems growing out away from the substrate, often with a tiered appearance. The branch tips divide into 'fingers' and can look a little like hands
Colour: pale grey often bluish
Soredia/isidia: none
Apothecia: occasional; branch tips swell to form a hood which has a black spore mass on the underside
Underside: n/a
Similar species: *Sphaerophorus globosus* (see left) which has cylindrical rather than flattened stems
Notes: rare

5. Is the lichen shrubby, tufty or straggly?

A Beard Lichen *Usnea subfloridana*



Growth habit & size: shrubby tufts up to c.10cm on twigs and branches

Colour: pale green-grey with a blackened base to the main stem

Soredia/isidia: granular soredia and isidia in rounded soralia

Apothecia: rare, resemble those of *Usnea florida*

Underside: n/a

Similar species: very similar to and difficult to distinguish from other *Usnea* species

Notes: common

A Horsehair Lichen *Bryoria fuscescens*



Growth habit & size: narrow, cylindrical, hair-like branches in elongated or long and straggling tufts typically to c.15cm but sometimes much longer

Colour: greenish brown, brown or dark brown

Soredia/isidia: whitish soredia erupting in discrete oval patches on the stems

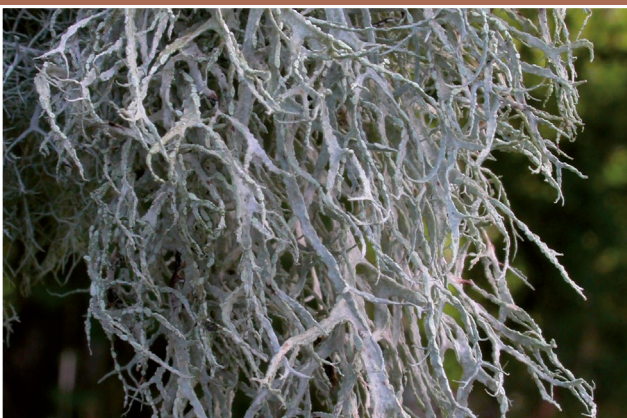
Apothecia: very rare

Underside: n/a

Similar species: very similar to and easily confused with other *Bryoria* species, especially *B. subcana* which is typically paler. Chemical tests are often needed for certain identification

Notes: uncommon

Shaggy Strap Lichen *Ramalina farinacea*



Growth habit & size: compact tufts to c.7cm of narrow flattened branches, mostly on twigs and branches

Colour: pale grey-green to yellow-green

Soredia/isidia: soredia in discrete oval patches along branches

Apothecia: rare

Underside: same colour as upperside

Similar species: *Evernia prunastri* (see right), which has a whitish underside, tufted *Usnea* species (cylindrical stems) and other *Ramalina* species (but this is the commonest on acid bark)

Notes: a common species in a range of habitats

Oak Moss *Evernia prunastri*



Growth habit & size: compact tufts to c.12cm of flattened ridged branches with divided tips, mostly on twigs and branches

Colour: pale grey-green to yellow-green

Soredia/isidia: soredia on ridges and margins, in discrete round patches at first but spreading and coalescing

Apothecia: very rare

Underside: whitish, distinctly paler than the upper surface

Similar species: *Ramalina farinacea* which has narrower lobes that are similar colours on both the upper and lower surfaces

Notes: a common species in a range of habitats

6. Is the lichen a crust on the substrate (crustose)?

A Cudbear Lichen *Ochrolechia androgyna*



Soredia
and Fruits



Growth habit & size: forms thick lumpy crusty patches to c.20cm or more

Colour: whitish to pale grey, often greenish

Soredia/isidia: usually rounded pale yellow-green soredia that look a little cauliflower-like, sometimes becoming confluent

Apothecia: occasional; pale pinkish to orange-brown disc with a thick sorediate rim

Underside: n/a

Similar species: *Ochrolechia tartarea* (see right) when that species is fertile but that has no soredia

Notes: a common species in north and western Britain that occurs in different lichen communities

A Cudbear Lichen *Ochrolechia tartarea*



Growth habit & size: forms thick lumpy crusty patches to c.20cm or more

Colour: whitish to pale grey

Soredia/isidia: none

Apothecia: frequent; dull pinkish to orange-brown disc with a thick rim (but no soredia)

Underside: n/a

Similar species: *Ochrolechia androgyna* (see left) when that species is fertile but that has soredia

Notes: uncommon

Bitter Wart Lichen *Lepra amara*



Growth habit & size: forms thick lumpy crusty patches to c.20cm or more

Colour: whitish to pale grey

Soredia/isidia: white soredia in discrete rounded patches. These taste very bitter (touch with wet finger and taste)

Apothecia: very rare

Underside: n/a

Similar species: other *Lepra* species but others don't taste bitter. Common in a range of lichen communities

Notes: common

Bloody-heart Lichen *Mycoblastus sanguinarius*



Growth habit & size: forms thick lumpy crusty patches to c.20cm or more

Colour: whitish to pale grey

Soredia/isidia: none

Apothecia: frequent; black and convex which when scratched reveal red inside (the 'bloody heart'), these can sometimes be seen without the need to scratch e.g. where damaged

Underside: n/a

Similar species: very similar to *M. sanguinarioides*, which can only be distinguished microscopically

Notes: uncommon

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Brewery House
36 Milford Street, Salisbury
Wiltshire, SP1 2AP

enquiries@plantlife.org.uk

plantlife.org.uk

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



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

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

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

Medulla: the inside of a lichen, can be seen when the outer layer (the cortex) is scratched off

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

Pseudocyphellae: small gaps in the cortex where the (usually white) inside shows through. Appears as small flecks on the surface

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

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

Thallus: the body of the lichen

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.

Cilia on
Parmotrema perlatum



Fruits on
Ochrolechia tartarea



Isidia on
Parmelia saxatilis



Soredia on
Parmelia sulcata



Pseudocyphellae on
Cetrelia olivetorum



Rhizines on
Hypotrachyna laevigata

