

5. Is the lichen shrubby, tufty or straggly?

Witches Whiskers *Usnea florida*

A Horsehair Lichen *Bryoria fuscescens*



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: none
Apothecia: can be abundant, very distinctive; a green-grey disc (to 1cm) with long projections (the 'whiskers') around the rim
Underside: n/a
Similar species: other *Usnea* species, but *Usnea florida* tends to be more abundantly fertile and completely lacks any isidia or soredia which most other species have
Notes: common

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 *Byoria subcana* which is typically paler. Chemical tests are often needed for certain identification
Notes: uncommon

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

A Cudbear Lichen *Ochrolechia androgyna*

A Cudbear Lichen *Ochrolechia tartarea*



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

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

Shaggy Strap Lichen *Ramalina farinacea*

Oak Moss *Evernia prunastri*

Bitter Wart Lichen *Lepra amara*

Bloody-heart Lichen *Mycoblastus sanguinarius*



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 upper side
Similar species: *Evernia prunastri* (see right, whitish underside), tufted *Usnea* species (cylindrical stems) and other, less common *Ramalina* species on acid bark
Notes: a common species in a range of habitats

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

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

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

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Cilia on *Parmotrema perlatum*



Fruits on *Ochrolechia tartarea*



Isidia on *Parmelia saxatilis*



Soredia on *Parmelia sulcata*



Pseudocyphellae on *Cetrelia olivetorum*



Rhizines on *Hypotrachyna laevigata*



Lichens of Wales' 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 Wales, 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 Wales' 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:

- 3. Foliose: leafy lobes with different characteristics e.g. rhizines on the underside, and inflated or hollow lobes
- 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

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

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

Heather Rags *Hypogymnia physodes*



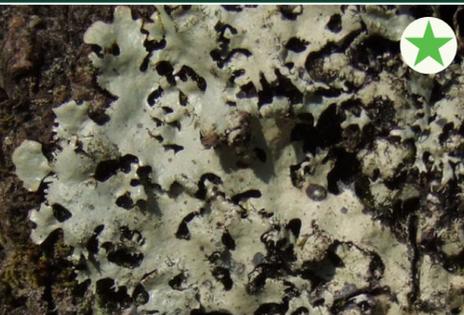
Growth habit & size: patches to c.10cm of inflated hollow lobes. The lobe tips are often raised to show a brown underside or split open to reveal soredia on the underside
Colour: pale grey often bluish or greenish, sometimes tinged brown
Soredia/isidia: soredia on the undersides of split lobe tips
Apothecia: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

Tree Flute *Menegazzia terebrata*



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

Hairy-spined Shield Lichen *Hypotrachyna horrescens*



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



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

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

Speckled Sea Storm Lichen group *Cetrelia olivetorum* group



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

A Coral Lichen *Sphaerophorus globosus*



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

A Coral Lichen *Bunodophoron melanocarpum*



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