

3 OTHER SHRUBBY SPECIES
3.1 Beard lichens (Usnea species)

3.2 Hair lichens (Bryoria species)

4 CRUSTOSE SPECIES

Usnea dasopoga Fishbone beard lichen



AWI Elongated green tufts (to c. 30cm) like fish bones hanging from branches/trunks. **Colour** grey-green to yellow-green. **Soredia/Isidia** isidia develop on soredia or on warts, mostly on the main stem (x10). **Fruit** very rare. Similar to: short forms can be mistaken for other *Usnea* species. **Note** mainly on birch, conifers.

Bryoria fuscescens Horsehair lichen



AWI Elongated green-brown tufts of very narrow, hair-like branches with discrete soralia. **Colour** greenish brown, brown to dark brown. **Soredia** discrete oval soralia along branches. **Fruit** very rare. **Similar to** other *Bryoria* species but *B. fuscescens* is by far the commonest species in Atlantic woods.

Ochrolechia androgyna A cudbear lichen



Ochrolechia tartarea A cudbear lichen



A thick, whitish or pale grey crust with green soralia; usually without fruits. **Colour** whitish, pale grey to grey or greenish white. **Soredia** round to irregular pale green soralia that can join to form a continuous crust. **Fruit** occasional; pale pinkish to orange-brown disc, thick thalline margin with soredia. **Similar to** when fertile often mistaken for *O. tartarea* (no soredia). **Note** a common species in North and West Britain in several lichen communities on acidic trees/rocks. A traditional dye.

AWI 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.

3.3 Species with flattened, strap-shaped branches

Ramalina farinacea Shaggy strap lichen



Evernia prunastri Oak moss



Short pale green tufts of narrow, flattened branches with discrete oval soralia. **Colour** pale grey-green to yellow-green. **Soredia** discrete oval soralia along branch margins. **Fruit** rare. Lower: same colour as upper. **Similar to** short-tufted types of *Usnea* species Beard lichens (have cylindrical branches). Also see *Evernia prunastri*. **Note** *Ramalina* species are generally more abundant on nutrient rich bark, especially on branches/twigs, but *R. farinacea* is the most common species on trees with more acid bark.

Short pale green tufts of flattened branches with forked tips and irregular soralia; often with a network of ridges. **Colour** pale greygreen to pale yellow-green. **Soredia** at first round, on ridges and lobe margins; later irregular, spreading and coalescing. **Fruit** very rare. Lower whitish, occasionally with green patches. **Similar to** *Ramalina farinacea* (narrower lobes; upper and lower surfaces the same colour). Note: a common species on a range of deciduous trees.

A thin to thickish crust with white to pale grey soralia that taste very bitter (rub with a wet finger and taste!). **Colour** pale grey, grey to greenish grey. Sored: soralia white, round, discrete and scattered or coalescing. **Fruit** very rare. **Similar to** another common wart lichen, *P. albens* (not bitter). **Note** both these wart lichens are common British species in a range of lichen communities on trees.

AWI A thin to thickish, whitish or pale grey crust with black convex fruits and often distinctive red 'blood spots' where fruits are damaged. **Colour** white, pale grey to grey. **Soredia** usually none. **Fruit** frequent; black convex fruits; scratch one with a fingernail to reveal a 'blood spot'.

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Front cover: A well-developed Parmelion community in temperate rainforest at Glen Creran SSSI, Argyll Species include shrubby coral lichens (*Bunodophoron melanocarpum* and *Sphaerophorus globosus*), grey leafy loop lichens (*Hypotrachyna laevigata*, *H. taylorensis*) and whitish crustose cudbear lichens (*Ochrolechia androgyna*, *O. tartarea*).

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.

Shrubby (fruticose): thallus is a crust that may be thin, thick, smooth, wrinkled, powdery, granular or cracked like dried mud. Crustose species are **adpressed** (closely pressed) to the substrate. Some species have concentric growth rings at the margin.

Features that may be present on the upper surface

Cilia: wiry black hairs on the upper surface or lobe margins.

Fruits: sexual reproductive structures that produce spores. They can be round discs, pimple-like or globular. They can be brownish, pinkish, orange-brown or black, and may have a margin that is 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, finger-like, or branched like tiny fragments of coral (coralloid). Eroded or granular isidia can be mistaken for granular **soredia**.

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

Rhizines: root-like structures. Stiff wiry black rhizines are typical of many Parmelion species, and these may be simple, forked or branched (x10).

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Lichens of Scotland's Rainforest

Guide 2 Lichens 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 Scotland. It looks at the **Parmelion** group of lichens that grow on trees with very acidic bark (e.g. alder, birch, oak), especially those growing on poorer soils (e.g. in oakwoods and birchwoods). A companion guide (guide 1) looks at the **Lobarion** group of lichens that grow on trees with mildly acidic bark, especially those in the more sheltered, mixed deciduous woodlands of lower slopes and valleys.

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 (see guide 1).

The **Parmelion**: this guide focuses on the typical Parmelion

found on trees with very acidic bark: alder, birch and oak. Another *Parmelion* community typical of less acidic bark has several species in common but is not covered by this guide.

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. Only one distinctive **AWI** *Usnea* species is described in this guide. Strap-shaped *Ramalina* and *Evernia* species are frequent on the twigs/branches of ash, hawthorn, rowan, hazel and oak.

Lichen hunting!

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 e.g. upland birchwoods, wet woodlands, oakwoods. *Parmelion* species occur on bark, or on mats of mosses/liverworts growing over bark. Some can also be found on mossy boulders, rocky outcrops, and in some situations they may grow directly on rock. The occurrence of pale grey, pale blue-grey to pale green-grey leafy lichens and extensive areas of whitish crusts on tree trunks is a good indication of the presence of the *Parmelion* community. However, care has to be taken to ensure that the cover of leafy lichens is not just composed of common and widespread species such as *Hypogymnia physodes*, *Parmelia saxatilis*, *P. sulcata* and *Platismatia glauca*. The upper canopy often has a welldeveloped *Usneion* community of shrubby green beard lichens. An ancient oak or birch 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.

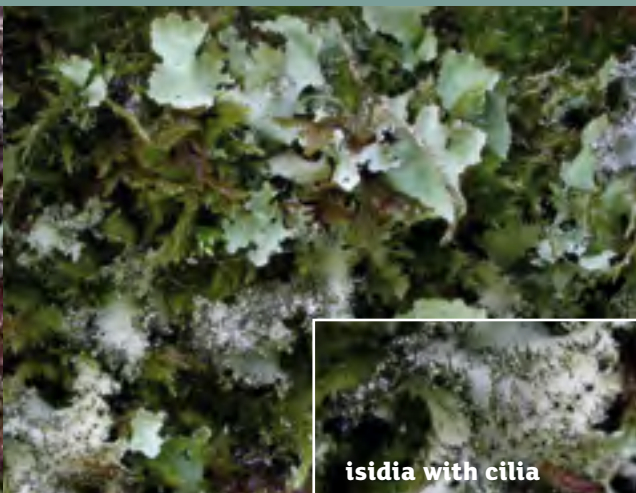
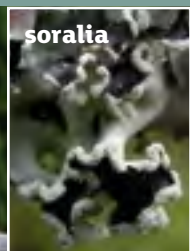
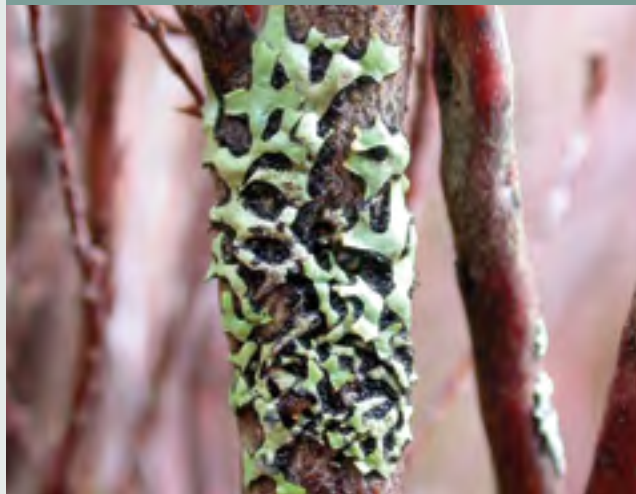
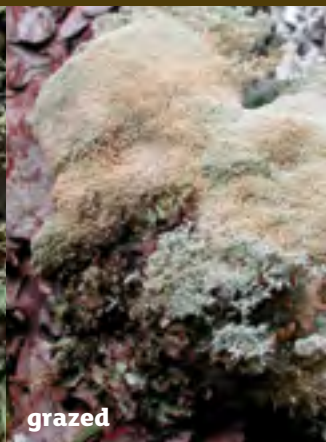
Further information

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 LEAFY SPECIES				1.2 Lobes with wavy margins and/or lower surface with naked zone near margin				1.3 Lobes inflated and hollow; lower surface smooth, without black rhizines			
<i>Hypotrachyna laevigata</i> Smooth loop lichen		<i>Hypotrachyna taylorensis</i> Tailed loop lichen		<i>Parmotrema crinitum</i> ‘Desperate Dan’		<i>Parmotrema perlatum</i> Sea-storm lichen		<i>Hypogymnia physodes</i> Heather rags		<i>Menegazzia terebrata</i> Tree flute	
 				 		   					
AWI Pale grey smooth, narrow lobes with square-cut tips and discrete soralia. Colour pale grey to pale blue-grey. Soredia in discrete globose soralia at lobe tips. Fruit scarce; dark brown disc, thalline margin. Lower black with numerous branched black rhizines (x10). Similar to <i>H. taylorensis</i> (no soredia). <i>H. revoluta</i> Powdered loop lichen (has diffuse soralia and distinctly down-turned lobes with rounded tips; more typical of less acidic <i>Parmelion</i> communities).		AWI Pale grey densely overlapping lobes; thallus looks scruffy and old lobes often hang down and roll up to form distinctive tubes (‘tails’). Colour pale grey to pale green-grey, often with brown tips. Soredia absent. Fruit rare. Lower black, dark brown near margin; numerous branched black rhizines (x10). Similar to <i>H. laevigata</i> (has soralia).		AWI Pale grey scruffy thallus of wavy lobes with divided margins, isidia and stubble-like black hairs (cilia). Colour pale grey to pale green-grey. Isidia simple to coralloid, tips often with cilia. Fruit very rare. Lower black, simple rhizines, brown naked zone at margin. Similar to forms with very sparse isidia/cilia are similar to <i>P. perlatum</i> - search carefully for isidia/cilia (x10) to confirm <i>P. crinitum</i>.		Pale grey lobes with raised wavy margins and lip-shaped soralia. Often with a few black hairs (cilia) along lobe margins. Colour pale grey to pale green-grey. Soredia in discrete soralia on lobe margins, globose or lip-shaped. Fruit rare. Lower black, a few simple rhizines, brown-black naked zone at margin. Similar to see <i>P. crinitum</i> and <i>Cetrelia olivetorum</i>. Note: common in western Britain, most abundant in less acidic <i>Parmelion</i> communities.		Grey inflated hollow lobes, with lobe tips often raised to show brown underside or split to reveal distinctive soralia. Colour pale grey to greengrey. Soredia lobe tips split, turn up and develop soredia on underside. Fruit scarce; red-brown disc, thalline margin. Lower black, brown near margin; no rhizines. Similar to <i>H. tubulosa</i> Tube lichen (typically on twigs; narrow, tubular lobes and discrete globose soralia on lobe tips that do not split). See <i>Menegazzia terebrata</i>. Note a very common British species in a range of lichen communities. Also found on heather that is not regularly burned hence ‘heather rags’.		AWI Pale grey or pale green-grey inflated hollow lobes with distinctive holes, often forming neat adpressed rosettes. Colour pale grey to pale green-grey, often brownish at lobe tips. Soredia discrete convex soralia. Fruit very rare. Lower: black, no rhizines. Similar to <i>Hypogymnia physodes</i> (distinctive soralia, no holes in lobes).	
<i>Hypotrachyna sinuosa</i> Green loop lichen		<i>Parmelia saxatilis</i> Grey crottle and <i>P. sulcata</i> Powdered crottle		<i>Cetrelia olivetorum</i> Speckled sea-storm lichen		<i>Platismatia glauca</i> ‘Frilly lettuce’		2 CORAL LICHENS (a type of shrubby lichen)			
		 		 				 		 	
AWI Very narrow yellow-green lobes with rhizines usually visible as a black ‘fuzz’ at lobe edges. Colour yellow-green to yellowgreen. Soredia discrete globose soralia at lobe tips. Fruit not known. Lower black, with numerous densely branched black rhizines (x10).		Pale grey lobes with isidia (<i>P. saxatilis</i>) or soralia (<i>P. sulcata</i>) and oval to elongated pseudocyphellae that may form a network on raised ridges (so surface can have a hammered appearance). Colour pale grey to pale green-grey, often with brownish lobe tips. Isidia <i>P. saxatilis</i> with simple to coralloid isidia, often brown-tipped (x10). Soredia develop along pseudocyphellae in <i>P. sulcata</i>. Fruit occasional; red to brown disc, thalline margin with isidia (<i>P. saxatilis</i>) or soredia (<i>P. sulcata</i>). Lower black, brown at margin; numerous simple (occasionally forked) black rhizines. Note very common in a range of lichen communities. Traditional dyes.		AWI Pale grey to greenish lobes with raised wavy margins and distinctive white spots (pseudocyphellae); often with some soralia. Colour pale grey to pale grey-green sometimes tinged brownish. Soredia soralia on margins of older lobes. Fruit rare. Lower black, simple scattered rhizines, paler naked zone at margin. Similar to <i>Parmotrema perlatum</i> (no spots).		Pale greenish-whitish frilly lobes with wavy divided margins. Colour pale grey-green to whitish green, sometimes brownish. Old bits of thallus may have reddish/pinkish patches. Soredia/Isidia often with simple to coralloid isidia or granular soredia on margins. Fruit very rare. Lower brown, white or black; rhizines simple or branched, few or absent. Note a common species in several lichen communities		AWI Irregularly branched, pale greyish/brownish cylindrical stems, though these can be grazed (e.g. by slugs) to form neat dense cushions. Colour pale grey to pale green-grey, main branches often orange-brown. Soredia/Isidia none. Fruit occasional; globular swellings at branch tips burst to reveal a dark powder of spores. Similar to see <i>Bunodophoron melanocarpum</i>.		AWI Branched, pale grey, flattened stems, sometimes forming distinct tiers; branch tips divide to look like hands; fruits distinctive when present. Colour whitish, pale grey to pale green-grey. Lower paler below. Soredia/Isidia none. Fruit occasional; branch tips swell to form a hood that has distinctive ‘black eyes’ (a mass of spores) on lower surface. Similar to the much more common <i>Sphaerophorus globosus</i> (cylindrical branches, main branches often orange-brown).	