

An Asterisk Lichen *Coniocarpon cinnabarinum*



Thallus: pale grey to fawn often with a brown prothallus
Apothecia: asterisk-like or rounded, sometimes branched reddish brown flecks with cinnamon coloured pruina on the margins when fresh
Similar species: easiest to identify when the fresh fruiting bodies have the cinnamon coloured pruina, but even then there are very similar species (e.g. *Arthonia elegans*) and microscopic confirmation is needed
Notes: common

Barnacle Lichen *Thelotrema lepadinum*



Thallus: whitish, pale grey or creamy coloured, often lumpy
Apothecia: abundant, small raised rounded warts growing in the thallus with a thick outer rim and a thin, papery inner rim that gives a barnacle-like appearance
Notes: uncommon (but common on some sites). Found on a wide range of trees usually in old woodlands, also in the *Lobarion* community (Guide 1)

A Comma Lichen *Arthothelium ruanum*



Thallus: creamy white, pale grey, brown-grey or olive grey, sometimes with a dark prothallus
Apothecia: irregular or almost stellate blotches to 2mm, often breaking down in places and sometimes partially covered by bark cells
Similar species: can be confused with *Arthonia radiata* but this species usually has a darker thallus, microscopic examination needed to be sure
Notes: uncommon

4. Is the crust covered in pimples? A pox lichen.



Thallus: whitish, silvery or cream coloured
Perithecia: black conical, volcano-like, perithecia to c0.6mm. Also present are even smaller dots (pycnidia), especially on the margins when in mosaics where they look like stitching
Notes: rare. Forms complex mosaics with it and other similar species, smaller and whiter than other *Pyrenula* species. Strongly associated with temperate rainforest habitat

3. Is the crust covered in warts? A wart lichen.



Thallus: pale grey, sometimes greenish, can be thin or thick, often lumpy and cracked
Apothecia: usually hidden underneath a mound of soredia
Soredia: soredia obscure the apothecia so appear to be in discrete mounds on the thallus, usually starkly white contrasting strongly with the thallus
Similar species: other *Lepra* species; microscopic or chemical examination can be needed for confirmation but the combination of features described here are usually reliable. The very similar *L. amara* has a bitter taste
Notes: common

A Pox Lichen *Pyrenula macrospora*



Thallus: thick and waxy, pale brown to olive with tiny white flecks over the surface and a dark prothallus
Perithecia: black conical, volcano-like, perithecia to 1mm diameter, with a minute pore-like hole in the top sometimes visible
Notes: common. Forms complex mosaics with it and other similar species e.g. *Enterographa crassa* each individual separated with a black line (prothallus)

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Plantlife

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

enquiries@plantlife.org.uk

plantlife.org.uk

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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

Lirellae: linear apothecia found on the script lichens

Perithecia: conical, volcano-like, apothecia found in the pox lichens

Prothallus: border of fungal strands around the edge of a lichen thallus, often dark coloured forming a black border

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

Pycnidia: vegetative reproductive structures that look like tiny perithecia, appearing as tiny dots on the thallus

Soralia: vegetative reproductive structures that contain soredia, they appear like abrasions or ulcers on the thallus

Soredia: powdery granules, a mix of fungal strands and alga, produced in soralia

Stellate: star-shaped

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.

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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Lichens of Wales' Rainforest

Guide 3 - The Lichens of Smooth Bark on Hazel, Rowan, Ash 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 *Graphidion* that grow on the smooth bark of trees like hazel and rowan, and young ash and oak, especially in more sheltered woodlands of the lower slopes and valleys. Some species in this community are found in British temperate rainforest and nowhere else in the world.

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 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 (see Guide 2). Found especially in upland rainforest.

Graphidion: typically occurs as an intricate mosaic of crustose lichens on smooth bark, especially on hazel (this Guide). 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! The *Graphidion* community varies throughout Britain, reflecting different environmental conditions. The species in this guide occur on smooth bark. They are generally quite difficult to identify and need careful examination of their characteristics.

The species are all crustose in their growth form, but have different types of fruiting bodies, the guide is organised according to these:

1. Script lichens: linear fruiting bodies, often branched and divided, sometimes just simple and coffee-bean like
2. Comma lichens: fruiting bodies like small flecks, or fine and star-like, or rounded and more of a blob
3. Barnacle and wart lichens: the fruiting body, if present, is raised with a thick margin and a hole in the centre

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. Does the crust have marks resembling writing or scribbles? A script lichen.

Common Script Lichen group *Graphis scripta* group



Thallus: whitish to greenish grey, usually smooth
Apothecia: lirellae, variable in size and shape, sometimes straight, sometimes curved or branched, that sit more or less level with the surface of the thallus. They have a slightly raised margin which can be closed or open to reveal a black-brown surface inside, sometimes with pruina
Similar species: other *Graphis* and *Phaeographis* species (see below)
Notes: common

Stictographa lentiginosa



Form: A fungus that infects the lichen *Phaeographis dendritica*
Colour: As *P. dendritica*
Soredia/Isidia: None
Fruit: Small flat black flecks that replace the star-shaped fruiting bodies of the *Phaeographis* where it has infected the thallus.
Notes: rare. This species is what is known as a lichenicolous fungus, a fungus that lives on a lichen.

Arthonia atra



Thallus: whitish to olive, orange when scratched (this is the algal photobiont being revealed), sometimes with a distinct black border (prothallus)
Apothecia: lirellae, randomly scattered or in parallel lines or clustered, simple or branched and sometimes forming dense black patches. They have a slightly raised margin and a narrow slit
Similar species: *Opegrapha* and *Graphis* species
Notes: common as neat patches on smooth bark of young trees and branches

Furrowed Script Lichen *Graphis elegans*



Thallus: whitish to greenish grey, often with a brownish or creamy tinge
Apothecia: short lirellae, usually straight, sometimes branched, that sit raised above the surface of the thallus. They have a prominently raised margin which is furrowed or ridged when well developed, and is generally closed and slit-like
Similar species: other *Graphis* and *Phaeographis* species (see below)
Notes: common

Allographa anomala



Thallus: whitish to greenish grey, smooth
Apothecia: short thick black lirellae that sit proud of the surface of the thallus. They have a raised margin which is sometimes furrowed with a narrow slit. They look like coffee beans (see *A. pauciloculata* for detail view of apothecia)
Similar species: *Graphis* species, especially *G. elegans* (see left) as the margins are sometimes furrowed in *Allographa anomala*, but the lirellae are generally smaller and neater
Notes: uncommon

Enterographa crassa



Thallus: pale grey, brown or olive, thick and waxy looking, often cracked and usually with a distinct black border (prothallus)
Apothecia: minute dark dots or flecks in short sinuous lines
Notes: common. Forms tight mosaics with it and other species, individuals separated by thin black lines

Dark-spored Script Lichen *Phaeographis dendritica*



Thallus: silvery to whitish or greenish grey, smooth
Apothecia: abundant lirellae, usually flat, broad and branched with pointed tips, that sit level with the surface of the thallus. They have no obvious margin but they look like they're bursting through the bark, the edges peeling back to reveal the dark surface which is sometimes pruinose
Similar species: other *Phaeographis* and *Graphis* species (see above), often needing microscopic examination to be sure
Notes: common

Allographa pauciloculata



Thallus: usually grows on the thallus of *Allographa anomala* (see above), but when independent the thallus is whitish to greenish grey, smooth
Apothecia: very short clustered lirellae that sit proud of the surface of the thallus, usually curved and tightly clustered into little knots making black patches on the thallus of *Allographa anomala*
Similar species: could be confused with small or poorly developed *A. anomala* but the way the lirellae of *A. pauciloculata* knot together is quite distinctive
Notes: uncommon

2. Is the crust marked with fleck-like patches? A comma lichen.

An Asterisk Lichen *Arthonia radiata*



Thallus: whitish, sometimes greenish and usually with a brown prothallus
Apothecia: asterisk-like or rounded black splotches, sometimes partly covered by bark
Similar species: other *Arthonia* species, needing microscopic examination to be sure
Notes: common

¹ A collective term for mosses, liverworts and hornworts