

3. Barnacle lichen *Thelotrema lepadinum*

Barnacle lichen *Thelotrema lepadinum*

Frequent, but only in oceanic areas



A pale thin whitish crust with numerous distinctive whitish barnacle-like fruit.
Colour: Whitish to pale grey.
Fruit: Abundant, like small barnacles.
Surface of fruit: This isn't usually visible as it's hidden inside the 'barnacle', but can sometimes be seen through the opening at the top.

Thelotrema lepadinum can be seen here in a mosaic with an *Arthonia* species



4. Wart lichens

Lichens with a pale green-grey waxy thallus with fruit inside grey-green warts

Bitter wart lichen *Pertusaria amara*

Common



Colour: Pale grey to greenish grey.
Fruit: Very rare, but the surface is covered in discrete, or sometimes coalescing, rounded clumps of white coarse granules. Known as soredia, these taste very bitter (rub with a wet finger and taste).
Note: Similar to another common wart lichen, *P. albescens* (but this does not taste bitter). Both of these wart lichens are common in a range of lichen communities on trees.

The rounded clusters of coarse granules – soredia – can be seen here



Pepper pot lichen *Pertusaria pertusa*

Common



Colour: Pale green-grey.
Fruit: Abundant, often crowded, swollen warts with a constricted base and with a number of dark dots (like a pepper pot) visible on the surface.
Surface of fruit: This is just visible as several dark pores (like blackheads) in the top of each wart.

The pepper pot-like fruit can be seen here



5. Pox lichens

Lichens with scattered fruit like black pimples, with a microscopic pore at the top of the pimple through which the spores are released. There are a number of species but the most common in Wales is *Pyrenula macrospora*

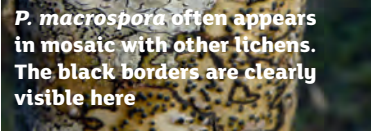
Pyrenula macrospora

Common



Colour: Fawn to greenish brown with minute white flecks across the surface.
Fruit: Black pimples or small 'volcanoes'; approx 0.5–0.9mm in diameter.
Note: Sometimes forms mosaics with *Pyrenula chlorospila*, which is similar but has much smaller pimples of approximately 0.2–0.4mm diameter.

P. macrospora often appears in mosaic with other lichens. The black borders are clearly visible here



Comparison of the fruit characteristics of the more common script lichens

Species	Flat	Raised	Branched	Simple	Pruina	Widely open	Narrowly open or a narrow slit
<i>Graphis scripta</i>	✓	Sometimes slightly raised	✓	✓	✓	✓	✓
<i>Graphina anguina</i>	✓		✓		✓		✓
<i>Phaeographis dendritica</i>	✓		✓		✓	✓	
<i>Graphis elegans</i>		✓	Sometimes slightly branched	✓			✓
<i>Opegrapha atra</i>		✓	✓				✓

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Further information

Books

Lichens: An Illustrated Guide to the British and Irish Species by Frank Dobson, 5th Edition (2005), Richmond Publishing Co Ltd. The best field guide to most of the common lichens of a range of habitats.

Lichens by Oliver Gilbert (2000), Collins New Naturalist series, Harper Collins, London. A highly readable account of lichen ecology and habitats in Britain, including a good chapter on woodland lichens.

Atlantic hazel: Scotland's Special Woodlands by Sandy and Brian Coppins (2012), Atlantic Hazel Action Group. An excellent account of our hazel woods relevant in all regions of the UK with temperate rainforest, and it includes a lot of information on the *Graphidion*.

Websites

www.britishlichensociety.org.uk The British Lichen Society (BLS) has information on lichens, publications, courses and web links.
www.uklichens.co.uk The UK lichens website has useful photographs of many UK species.
www.wales-lichens.org.uk This website is dedicated to the conservation of lichens in Wales and is a great resource.

Advice and support

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Lichens of Welsh temperate rainforest

Guide 3 The *Graphidion* lichens of smooth-barked trees



This guide is for anyone interested in identifying some of the more characteristic lichens of temperate rainforest. Different species often grow together to form distinct communities, such as the *Graphidion* lichens. They grow on trees with smooth bark – for example, hazel, holly, rowan, ash, willow, oak and sycamore. Two companion guides (Guides 1 and 2) look at two other distinctive communities – the *Lobarion* and the *Parmelion* that grow on base-rich bark and acidic bark respectively. All three guides will help you identify good and potentially important lichen habitats.

What is a lichen?

A lichen is a special association between a fungus and an alga. The fungus forms the main body of the lichen, providing a protective upper surface that protects the alga, while the alga manufactures food using the energy of sunlight (photosynthesis). Each lichen has its own distinct species of fungus, but all share a small number of algae species – either a green alga or a blue-green alga (cyanobacteria).

What is temperate rainforest?

They are natural or 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. Temperate rainforest has been compared to tropical rainforest where there is also a luxuriant growth of lichens, ferns, mosses and liverworts.

Why is temperate rainforest important for lichens?

The temperate rainforests of western Britain are an important habitat for many lichens, mosses and liverworts. Many of these are largely confined to ancient or long-established woodlands in areas with low air pollution and are not found in other parts of Britain and Europe. Some species are globally rare and some have their world headquarters here. Lichens play a fundamental role in woodland ecosystems – for example, in nutrient cycling – and are indicators of habitats that are of a high quality. They are characteristic of ancient woodland that has never been clear-felled or intensively coppiced.

What is the *Graphidion* community?

This community is made up of lichens that grow as a very thin crust on the smooth bark of trees such as hazel and holly, usually in moderate shade. They appear frequently as a mosaic of brown, white and grey patches on the stems, branches and trunks, often completely obscuring the bark. If you look closely, you will see differently shaped fruiting bodies appearing as dots, flecks, squiggles, warts or pimples on the surface of the lichens. While most of the species described here are common and widespread in unpolluted areas, some

are ‘oceanic’ and found only in temperate rainforest – for example, *Graphina ruiziana*. Some are indicators of ancient woodlands – for example, the barnacle lichen *Thelotrema lepadinum*.

Finding and identifying lichens

The *Graphidion* lichens can be tricky to identify with confidence, and microscopic examination of spores and chemical tests are often required to identify them with certainty. This guide gives an introduction to the community and the species featured here can all be relatively confidently identified using the features described. A hand lens (10x is a good magnification) will help accurate identification.

Important features to note are:

- The colour of the lichen thallus (this is the main body of the lichen).
- The type of fruiting body (termed fruit in this guide):
 - Is it a squiggle? These are the script lichens, see Section 1.
 - Is it an irregular splodge or fleck? These are the comma lichens, see Section 2.
 - Is it like a small barnacle? This is the barnacle lichen, see Section 3.
 - Is it like a small wart? These are the wart lichens, see Section 4.
 - Is it like a small pimple or volcano? These are the pox lichens, see Section 5.
- Look at the detail of the fruit:
 - Does it sit flat on the surface, or is it raised?
 - Is it open, or narrowly closed?
 - Is it branched, or not (known as ‘simple’)? Note the degree of branching.
 - Does the fruit have a white, grey or red frosting on the surface? This is known as pruina.
 - Are there furrows on the edge, or a raised bit of the lichen thallus?
 - Are there holes, or small dots visible (like blackheads)?
- The fruiting bodies of some of these lichens can look like species of bark fungi, although the lichen fruiting bodies will always be associated with a lichen thallus.

Although internationally important for their rich lichen and bryophyte communities, temperate rainforests face a number of threats. So Plantlife is securing their future by working with landowners and managers, helping to develop their skills in identifying important sites and species; raising awareness of the key conservation issues; identifying priority areas for management; and planning effective habitat management that will build more secure and resilient populations.

Please submit any records you make to the **British Lichen Society** (see back page). Although some common names have been used in this guide, scientific names should always be used when recording.

1. Script lichens

These all have fruiting bodies that appear as small dark squiggles. *Graphis scripta*, *Graphina anguina* and *Phaeographis dendritica* can usually be distinguished in the field when well developed, but can often look very similar. In cases where there is doubt, microscopic examination is necessary

Common script lichen <i>Graphis scripta</i>	Very common	Dark-spored script lichen <i>Phaeographis dendritica</i>	Local	<i>Enterographa crassa</i>	Common
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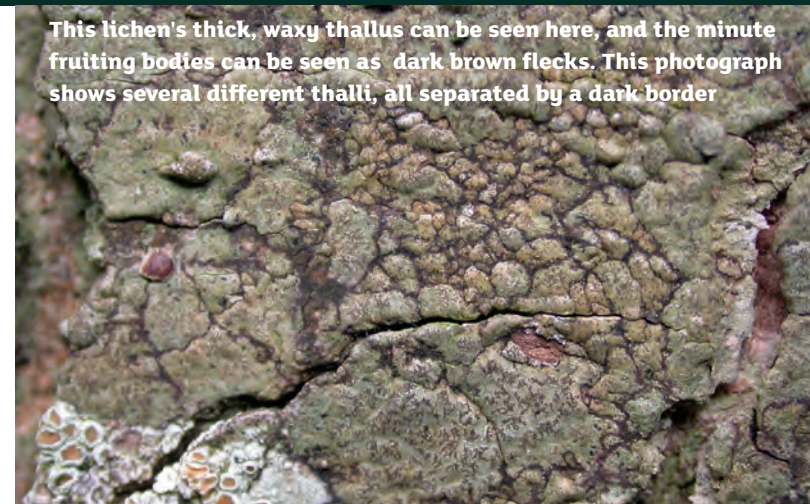


When wet, as in this photograph, the fruit becomes more open

Colour: Whitish to greenish grey and usually smooth.
Fruit: Variable; sometimes branched and sometimes straight, level with the surface or sometimes slightly raised and 1–7mm long x 0.2mm–0.3mm wide.
Surface of fruit: Variable; sometimes narrow or sometimes expanded and open (especially when wet). The surface often has pruina.
Margin of the fruit: Raised and prominent, but not furrowed.
Note: Looks very similar to *Graphina anguina* and *Phaeographis dendritica*, but can usually be distinguished in the field when well developed.



Colour: Pale and silvery to greenish white.
Fruit: Abundant, flat, usually much branched and star-like, with long tapering points looking like the bow of a boat pushing through the sea; 0.5–3mm long x 0.3–0.5mm wide.
Surface of fruit: Usually very open and often with pruina.
Margin of the fruit: No clear margin but the fruit erupts through the bark, so there is often a raised rim of pale lichen visible at the margin.
Note: Looks very similar to *Graphis scripta* and *Graphina anguina*, but can usually be distinguished in the field when well developed.



This lichen's thick, waxy thallus can be seen here, and the minute fruiting bodies can be seen as dark brown flecks. This photograph shows several different thalli, all separated by a dark border

Colour: Grey, brown or olive-green, usually with a black border.
Fruit: Minute dark brown thread-like lines or dots/flecks; 0.1–0.3mm long.
Notes: The surface of the lichen is often cracked like crazy paving. This isn't really a script lichen but can look similar and is common in Wales. It has a thick, waxy, often lumpy thallus and often forms mosaics with individual lichens separated by a black border.

Furrowed script lichen <i>Graphis elegans</i>	Common	<i>Graphina ruiziana</i>	Rare
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The furrowed fruit margins can be clearly seen here

Colour: Whitish to dark grey, often with a brownish tinge.
Fruit: Elevated above the surface of the lichen; 1–4mm long x 0.3–0.5mm.
Surface of fruit: Slit-like and generally not visible.
Margin of the fruit: Very prominent, well developed and furrowed or ridged when well developed. When young, the fruit looks like pursed lips.



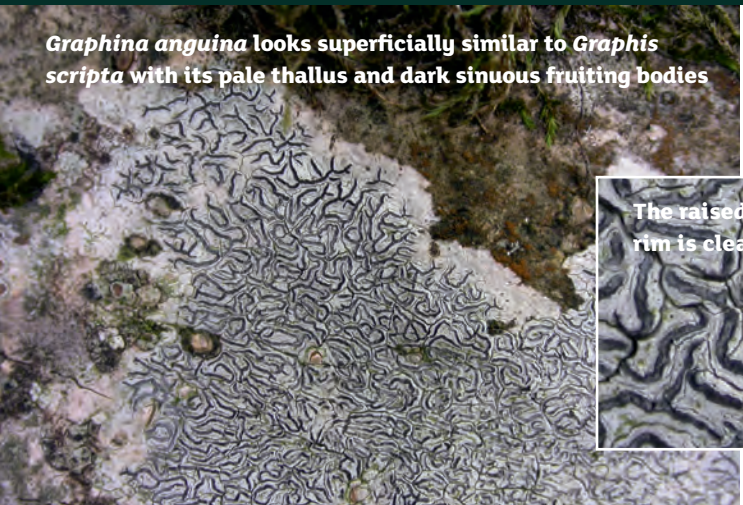
The pale whitish thallus with short, straight black fruit

Colour: Whitish to greenish grey.
Fruit: 0.5–2.2mm long x 0.3–0.5mm, usually scattered and unbranched and looking like small black sausages elevated above the pale surface.
Surface of fruit: Not expanded, a narrow slit.
Margin of fruit: Prominent, raised, well developed, usually unfurrowed.
Note: Quite a rare lichen in Wales, with an oceanic distribution. It can look similar to *G. elegans* but usually has unfurrowed fruit. Recorded on bark of holly, oak, rowan, hazel.



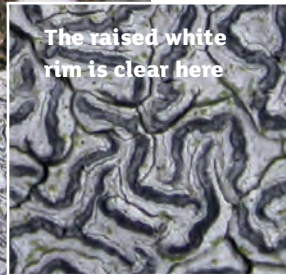
The fruit is reminiscent of little black sausages

<i>Graphina anguina</i>	Frequent	Common scribble lichen <i>Opegrapha atra</i>	Very common
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Graphina anguina looks superficially similar to Graphis scripta with its pale thallus and dark sinuous fruiting bodies

Colour: Whitish to greenish grey, and often with some surface cracking.
Fruit: Usually flat and well branched; 2–5mm long x 0.3–1mm wide.
Surface of fruit: Slit-like or narrow, often pruinose.
Margin of fruit: Has a thin black margin but this is inconspicuous; a raised whitish rim (the surface of the lichen) is usually clearly visible around the margin.
Note: Like *G. scripta* but with a clearer white rim pushed up around the black fruit margin. Microscopic examination of spores is recommended for confirmation in cases of doubt.



The raised white rim is clear here



The whole thallus often appears dark because of the abundant and tightly packed fruit



Colour: Pale, usually whitish to olive, but orange when scratched – for example, with a fingernail.
Fruit: Abundant, usually branched, tightly packed, small fruit; up to 2mm long x 0.3mm wide. The whole lichen often looks dark because of the densely packed fruit.
Surface of fruit: A narrow slit, not very obvious.
Margin of the fruit: Prominent, standing proud of the surface.
Note: Common as small neat patches on smooth bark of young trees with abundant, tightly packed and usually branched small squiggly fruit. It is similar to a number of other *Opegrapha* species (microscopic examination is needed to be sure) and *G. scripta*; *O. atra*'s fruit is smaller, closed and usually more densely packed.

2. Comma lichens
Lichens with small fleck-like fruit, usually with an irregular shape and no margin. There are a large number of comma lichens and many require microscopic examination to identify confidently. *Arthonia radiata* and *A. cinnabarina* are two of the most common species that when well developed are relatively easy to identify in the field

Asterisk lichen <i>Arthonia radiata</i>	Common
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The asterisk-like fruit can be clearly seen here

Colour: Pale whitish and immersed in the bark.
Fruit: Irregularly rounded, linear or asterisk-like; to 1.5mm long x 0.2mm wide.
Surface of fruit: Black, with no pruina.
Note: A whitish lichen with a brown line around its outer edge, and black variable-shaped fruit that can be irregularly rounded, linear or star-like; most easily identified when the fruit forms small black asterisks.

Bloody comma lichen <i>Arthonia cinnabarina</i>	Common
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The red frosting can sometimes be really bright

Colour: Forms a pale grey to fawn patch on bark, often with a brown line around the margin.
Fruit: Irregularly rounded, occasionally with some branching; 0.3–1mm long x 0.2–0.5mm wide.
Surface of fruit: Usually with a red frosting (pruina) when fresh, looking like a dusting of cinnamon. Older fruit is usually reddish brown and without any pruina, and these examples are less easily identified.
Note: Easiest to identify when the fruit is fresh with the red frosting. When only old fruit is present, microscopic examination is recommended to distinguish from several similar comma lichens.