Lichenicolous fungi occurring on *Xanthoria parietina* in the United Kingdom

British Lichen Society

Edited by Fay Newbery

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Photo Mike Sutcliffe

Forward

This small guide has been produced to stimulate interest in lichenicolous fungi by providing a key, and descriptions, to the fungi that occur on one of the United Kingdom's most common and distinctive lichens: *Xanthoria parietina*.

Limitations and recording

The descriptions of fungi in this guide should allow identifications to be made with a reasonable degree of certainty providing the fungus is displaying the features described. If the species in question can be confused with other species, these are noted in the description. If submitting records, please add a note that this guide was your source of information for identifications.

Lichenicolous fungi are still under-recorded and other fungi could turn up on this host in the UK.

The maps in this guide show records held in the database of the British Lichen Society. Further records may exist in the Fungal Records Database of Britain and Ireland held by the British Mycological Society.

When recording lichenicolous fungi, please record the host. For BMS records, please include the host lichen under 'Associated organism'. If you wish to record lichens which are nearby (but not the host) please use an 'extended record' and use 'Associated organism 2 or 3'. This will enable researchers to check host ranges using BMS data as well as BLS data.

Acknowledgements

This guide would not have been possible except for the generosity of scientists who have made their research and/or their photos publicly available for the benefit of a wider audience.

In particular, thanks are due to Paul Cannon and Mark Powell for the provision of photographs on the Fungi of Great Britain and Ireland website and for their permission to reuse them in this work.

Nigel Chadwick, Jennifer Florentino, Oliver Gonnet, Lukas Large, Heather Paul, Jenny Seawright, Michela Sisti and Norbert Stapper have generously also shared photos.

Paul Cannon, Brian Coppins, Heather Paul, Mark Powell and Becky Yahr have given advice and support.

Xanthoria parietina

This bright yellow lichen occurs widely in the UK wherever the atmosphere, or the surface that it is growing on, contains plenty of nitrogen-rich nutrients. Since nitrogen compounds are released from vehicle exhausts and from animal and bird husbandry, *Xanthoria parietina* has become dominant in many areas. The lichen can grow on a wide variety of surfaces including bark, concrete, rock, paint and other man-made surfaces. Before the present high levels of nitrogen pollution in the UK, *Xanthoria parietina* was most often found on bird perches where it benefitted from the nitrogen in bird droppings.

The bright yellow, 'leafy' thallus is composed of lobes that spread out from the centre. The lobes are often slightly wrinkled and have a tendency to overlap each other. The central area of the lichen usually has jam-tart-shaped fruits consisting of orange discs with yellow margins. *Xanthoria parietina* prefers to grow in brightly lit situations. If it spreads into shaded places – such as the underside of a twig – the thallus becomes grey with hints of yellow mainly around the edges. The discs of the fruits remain orange in shade.

Lichenicolous Fungi

Lichenicolous fungi are fungi that grow on lichens.

The kind of interaction that they have with the lichen varies considerably.

Some lichenicolous fungi are parasites. They are unable to complete their life cycle without taking nutrients, and possibly protection, from the lichens that they grow on. Some of these species cause damage to their host lichen, while others appear to have perfected a method of taking what they need to grow without damaging or killing the lichen that they are feeding on.

Lichenicolous fungi that cause damage to otherwise healthy lichens are described as pathogens – just as organisms that cause human illnesses are referred to as pathogens.

Some fungi occur on damaged lichens but did not cause the first damage. They either attacked an already unhealthy lichen or were only able to begin feeding on the lichen tissue after the lichen was dead. It can be extremely difficult to decide which came first, the damage or the fungus.

Fungi capable of feeding on lichens come from many different groups of fungi. Some are closely related to the ascomycetes that form the majority of lichens. Ascomycetes produce their sexually-formed spores in special sacs called asci. The spores are, therefore, known as ascospores. The asci are usually grouped together into protective structures which can be open 'fruits' like those of *Xanthoria parietina* (known as apothecia) or closed flask-shaped structures that are often black and sunk into the surface of the lichen (known as perithecia).

A few basidiomycetes grow on lichens. These produce sexually-formed basidiospores on tiny stalks at the ends of specialised cells know as basidia. The basidia are often packed into a tight layer over part of the fungus.

The remaining fungi forms that occur on lichens produce spores without the occurrence of a sexual process. These spores are known as conidia. They can be produced in closed flask-shaped structures known as pycnidia (often black and immersed in the surface of the lichen but never containing asci), or the conidia can be produced on the ends of specialised fungal hyphae that protrude from the lichen surface.

Key to lichenicolous fungi known on *Xanthoria parietina* in the UK

Species in bold are most widely recorded and have a description available in this volume.

The non-specialists *Burgoa moriformis, Cearatobasidium bulbillifaciens, Cornutispora ciliata, Marchandiomyces corallinus and Taeniolina scripta* have also been recorded on *Xanthoria parietina* in the UK. The lichenicolous fungus *Laetisaria lichenicola* occasionally spreads onto *Xanthoria parietina* from adjacent *Physcia* species.

1. Large areas of damage associated with cobweb-like fungal growth …… ***Athelia arachnoidea***

1. Pink, coral or orange 'blobs' on, or imbedded in, the surface of the host thallus or fruit …… 2

1. Tiny dark bristles, dark hyphal threads or sooty covering present …… 3

1. Galls present …… 4

1. Black dots present …… 6

2. Shocking pink irregular blobs that swell when wet …… ***Illosporiopsis christensenii***

2. Orange, or coral, slightly irregular blobs (bulbils) …… ***Erythricium aurantiacum***

2. Orange raised warts or pimples on thallus …… **Pycnidia of the *Xanthoria* host**

2. Orangey-pink spherical structures covered in white hairs and with a red spot …… ***Nectriopsis physciicola***

2. Orangey spots embedded in the surface of the thallus or fruit …… ***Pronectria xanthoriae***

3. Black, sooty coating mainly on the top of the host fruit-bodies …… ***Xanthoriicola physciae***

Note: *Monodictys fuliginosa* could key out here. It appears as black flecks on the thallus of its host lichens. If dense, these could be mistaken for *Xanthoriicola physciae* but the conidia have multiple cells.

3. Dark bristles on host fruits (thallus of host often bleached) …… ***Cladosporium licheniphilum***

3. Clusters of dark bristles growing from black dots in or on host thallus or fruit …… ***Pyrenochaeta xanthoriae***

3. Fuzzy brown coating on thallus and fruits of host …… ***Gonatophragmium lichenophilum***

4. Galls yellow and flat, often looking like a three-cornered hat …… ***Telogalla olivieri***

4. Galls mounded with immersed black dots …… 5

5. Black dots are the dark tips of chestnut brown-walled fruit-bodies
…… ***Zwackhiomyces coepulonus*** growing on galls of *Telogalla oliveri*

5. Black dots are the dark tips of pale-walled fruit-bodies …… ***Telogalla oliveri***

6. Black dots contain asci 7

7. Asci arranged in a layer on the surface of a fruiting body – apothecia 8

8. Apothecia very irregular, often with more than one cavity when seen in cross-section ..... ***Phacothecium varium***

8. Apothecia without a margin. Ascus-bearing tissue on sides as well as top of apothecia 9

9. Apothecia in large clusters ..... ***Arthonia parietinaria***

9. Apothecia in groups of 5 or fewer ..... *Arthonia molendoi*

7. Asci enclosed in a fruiting body – perithecia 10

10. Perithecia pale-walled in cross-section ..... ***Telogalla olivieri***

10. Perithecia dark-walled in cross-section 11

11. Ascospores colourless ..... ***Zwackhiomyces coepulonus***

11. Ascospores brown 12

12. Infected areas stained red. Ascospores with warts ..... ***Didymocyrtis slaptoniensis***

12. Infected areas bleached. Ascospores with smooth walls ..... ***Sphaerellothecium parietinarium***

6. Black dots contain conidia. No asci present 13

13. Black dots with dark bristles ..... ***Pyrenochaeta xanthoriae***

13. Black dots without dark bristles 14

14. Conidia brown ..... ***Lichenoconium xanthoriae***

14. Conidia colourless 15

15. Conidia extremely long and narrow, often curved ..... ***Epithamnolia xanthoriae***

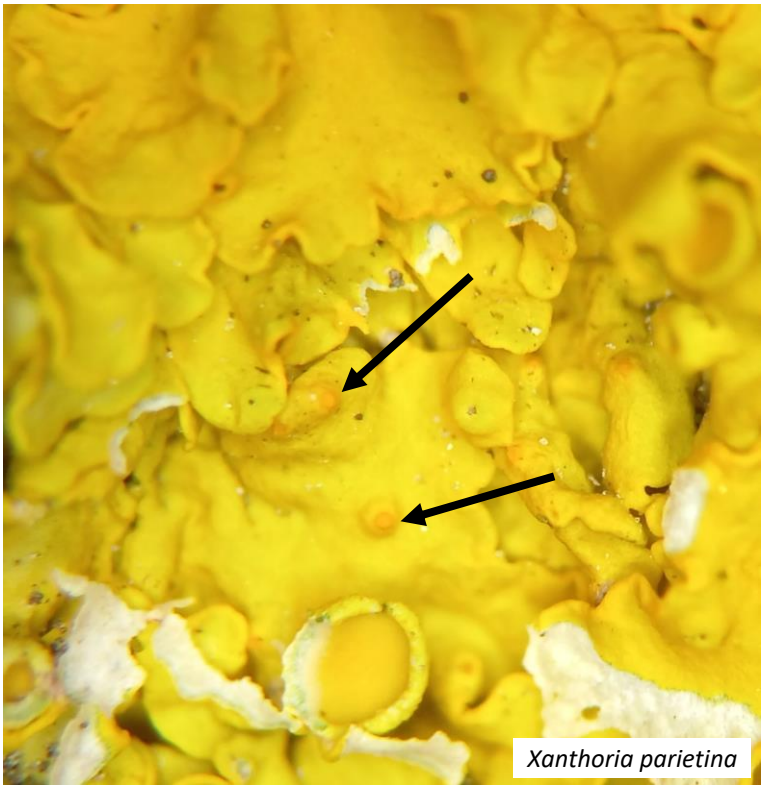
15. Conidia rod-shaped ..... ***Phacothecium varium***

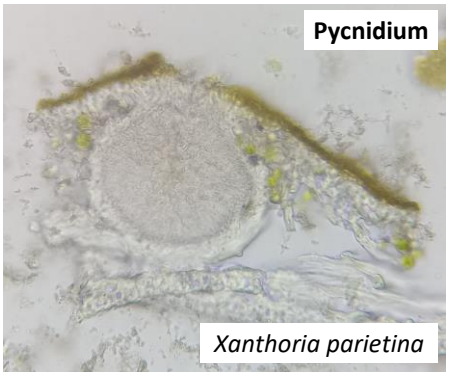
15. Conidia ellipsoid. Mainly 4.6-6.4 x 2.5-3.1 µm ..... ***Didymocyrtis slaptoniensis***

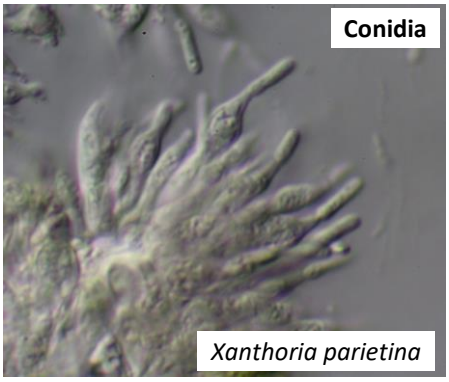
Note: There appears to be a second form of *Didymocyrtis* on *Xanthoria parietina* in the UK. This species is often recorded as *Didymocyrtis epiphyscia* s. lat. It is only known in its conidial form. Conidia are less than 6.5 x 3.0 µm. Spore sizes should be given when making records.

15. Conidia ellipsoid. Mainly 2.5-4 x 1-1.5 µm ..... **Pycnidia of the host: *Xanthoria parietina***

Xanthoria *pycnidia*

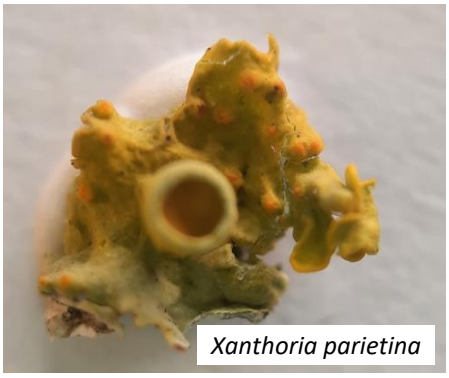

Xanthoria parietina

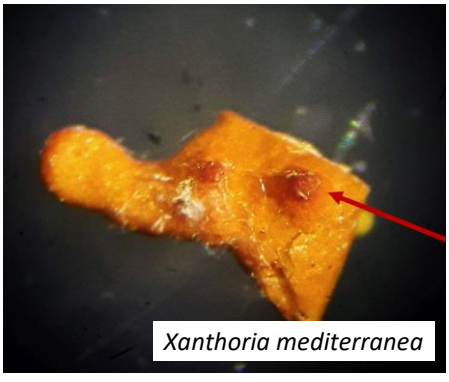

Pycnidium
Xanthoria parietina


Conidia
Xanthoria parietina

Identification: The pycnidia of *Xanthoria* species appear as orange pimples on the surface of the lichen. The orange pimples can be surrounded by a raised ring of thallus tissue. The orange colouration is actually in the lichen cortex. The pycnidia have colourless walls. Conidia are rod-shaped and colourless. They appear to move in water.

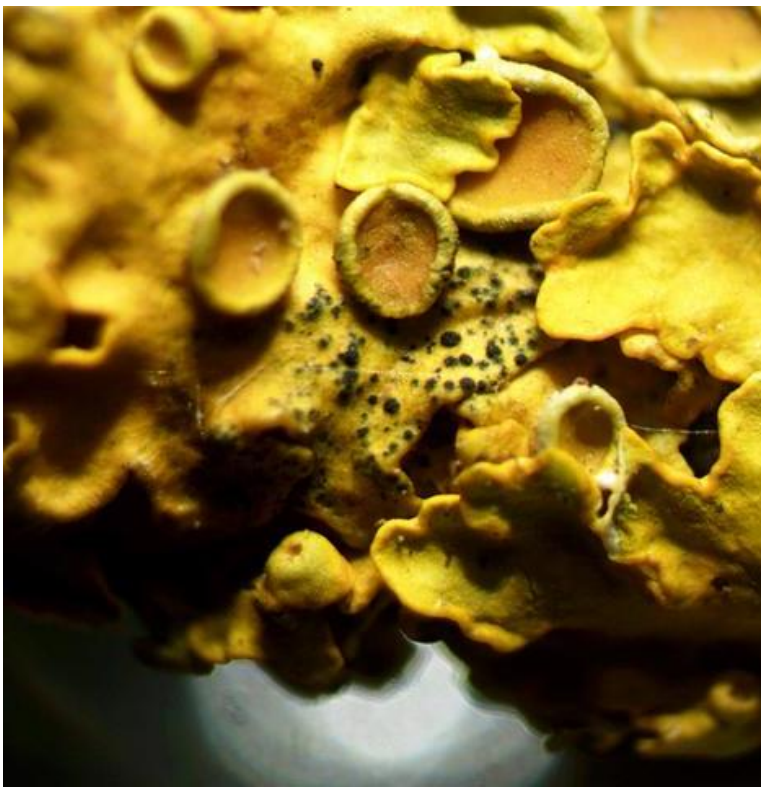
Similar lichenicolous fungi: The immersed perithecia of *Pronectria xanthoriae* are orange but contain asci. Orange bulbils of *Erythricium aurantiacum* occasionally occur embedded in the host thallus but these do not show a distinct wall when sectioned and do not produce spores.

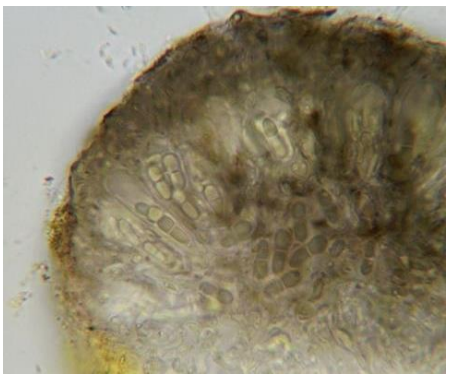

Xanthoria parietina

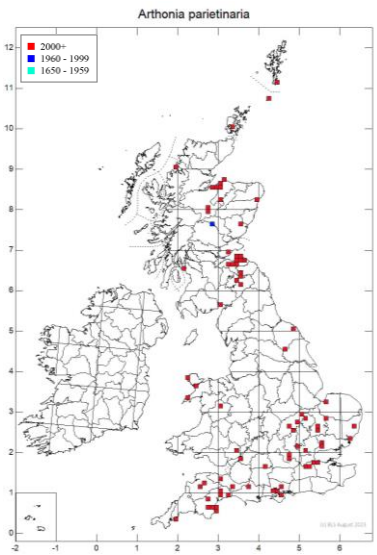

Xanthoria mediterranea

Photos Fay Newbery (left) Fay Newbery (top right) Paul Cannon (top middle right) Michela Sisti (bottom middle right) Jennifer Fiorentino (bottom right) **Text** Fay Newbery

Arthonia parietinaria







Identification: Visible as variably-sized black dots, mainly on the thallus, of *Xanthoria parietina*. The host can show very little damage. Asci relatively broad. Ascospores two-celled with one cell larger than the other. Spores are surrounded by a transparent gelatinous sheath.

Similar species: *Arthonia parietinaria* is the only fungus that produces apothecia with two-celled ascospores on *Xanthoria parietina*. It is possible that groups of 5 or fewer apothecia represent a different species known as *Arthonia molendoi*.

Habitat: Parasitic on thalli and apothecia of *Xanthoria parietina*.

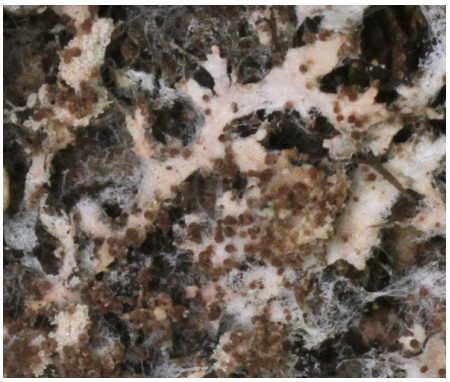
Distribution: This fungus is probably under-recorded.

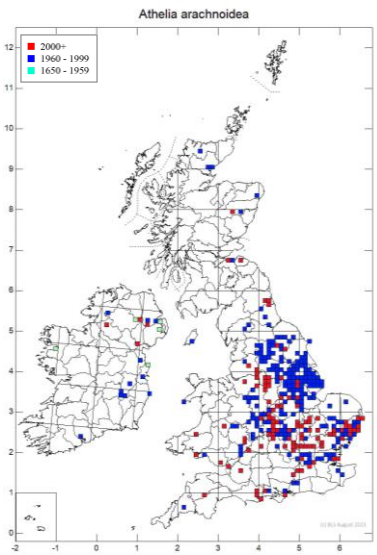
References: http://fungi.myspecies.info/all-fungi/arthonia-parietinaria

Fleischhacker *et al* (2016) Fungal Biology **120**: 1341-1353

Photos Mark Powell (left) Mark Powell (top right) Paul Cannon (bottom right) **Text** Fay Newbery

Athelia arachnoidea





Identification: This aggressive pathogen of lichens and algae causes large areas of damage which can be spotted from a distance. The white edges of the damaged areas are covered in a cobweb-like growth of fungal hyphae. Tiny, pale-brown, spheres (sclerotia) can be formed on the surface. These darken with age.

Similar species: *Paranectria oropensis* can produce cobweb-like fungal growth but does not kill large patches of lichens. It is usually found with pale orange, spherical fruiting bodies that have a tiny red-orange spot on them. *Lichenotubeufia heterodermiae* produces hairy, pale creamy-brown, spherical perithecia on damaged off-white thalli of *Physcia* species but no cobweb-like growth.

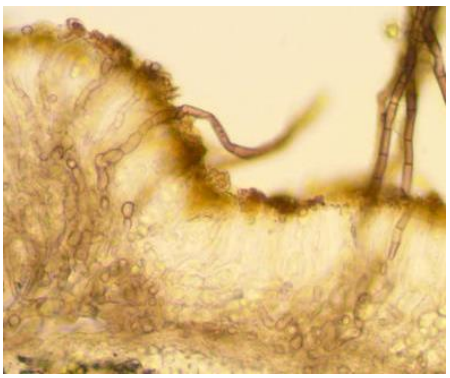
Habitat: Growing over lichens and algae on bark.

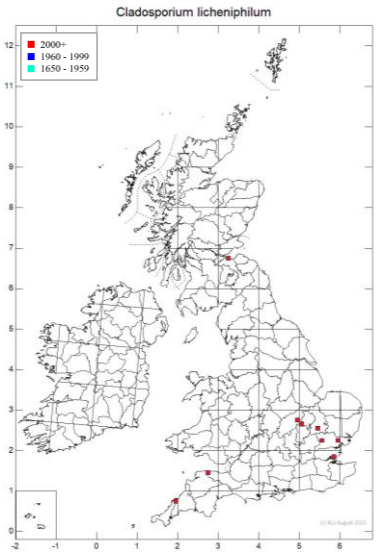
Distribution: Most common in urban areas and in lichen communities dominated by *Physcia adscendens* and *Xanthoria parietina*. Always over bark.

References: http://fungi.myspecies.info/all-fungi/athelia-arachnoidea

Photos Jenny Seawright (left) Alan Silverside (top right) Mark Powell (bottom right) **Text** Fay Newbery

Cladosporium licheniphilum





Identification: This fungus causes a brown, spiky layer on the apothecia of *Xanthoria parietina in* bleached areas of the thallus. Dark-walled hyphae grow up through the host tissue. These have frequent cross walls and produce lemon-shaped spores at their tips. The spores can form chains.

Similar species: On the same host: *Gonatophragmium lichenophilum* causes a brown, fuzzy-appearing coating on both the thallus and on apothecia. Its spores are formed on hyphae that have few cross walls. *Xanthoriicola physciae* causes a black sooty surface only on the apothecia.

Habitat: On apothecia of *Xanthoria parietina*.

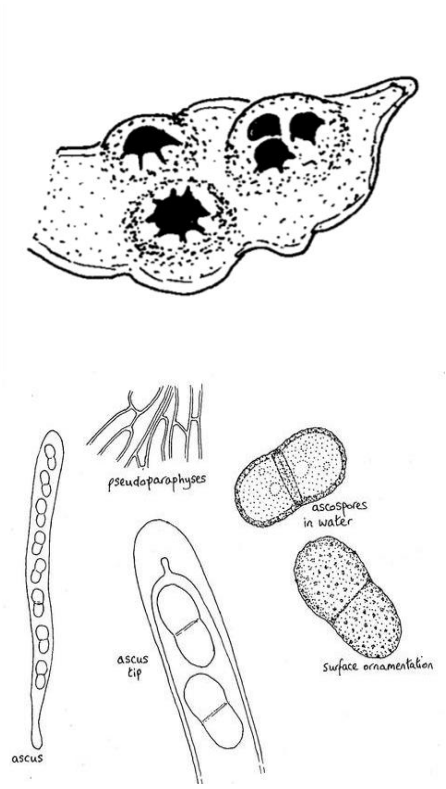
Distribution: Few records but probably overlooked.

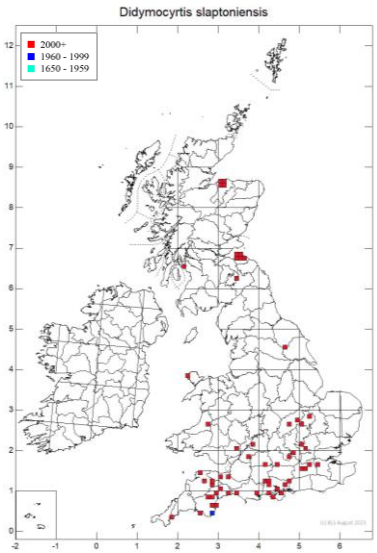
References: http://fungi.myspecies.info/all-fungi/cladosporium-licheniphilum

Heuchert & Braun (2006) Herzogia **19**: 11-21

Photos Mark Powell **Text** Fay Newbery

Didymocyrtis slaptoniensis





Identification: Areas of *Xanthoria parietina* infected with this fungus are usually tinged a distinctive reddish colour. Perithecia occurring on host thallus have a raised ring of host tissue around them. Perithecia also occur in the host apothecia. Within the perithecia, brown, two-celled ascospores are arranged in a single line in narrow asci. The ascospores have small warts on their outer walls. Pycnidia with colourless, single-celled spores also occur.

Similar species: *Sphaerellothecium parietinarium* also produces perithecia with brown, two-celled ascospores on *X. parietina* but is generally found on bleached areas of host thallus. The ascospores have no warts and tend to overlap within each ascus.

Habitat: On thallus and apothecia of *Xanthoria parietina*.

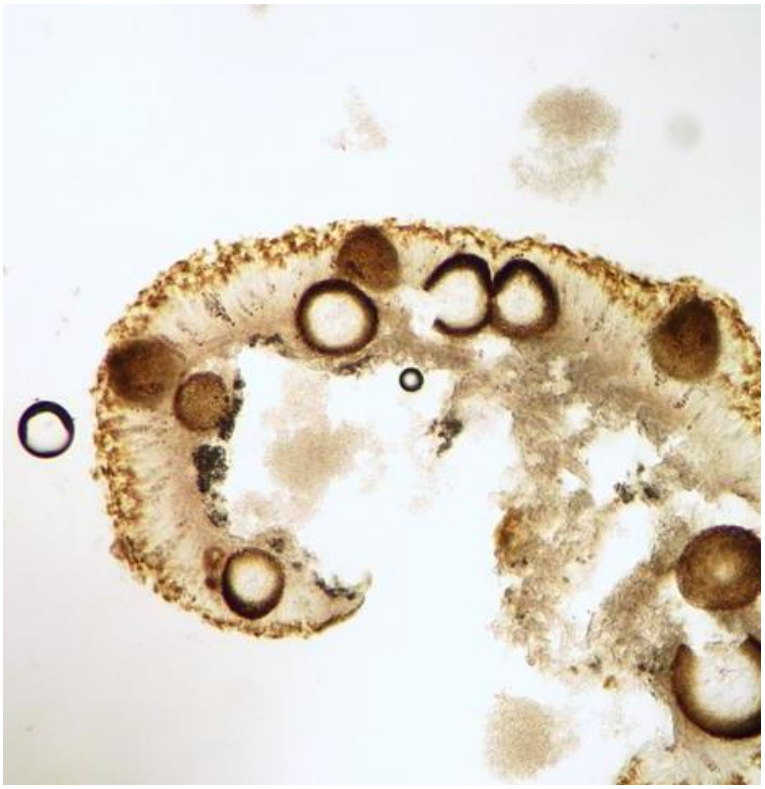
Distribution: Southern England with scattered records elsewhere.

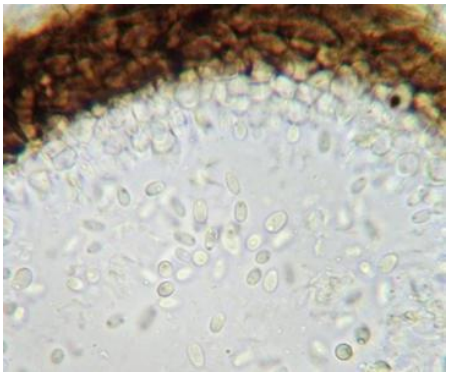
References: http://fungi.myspecies.info/all-fungi/didymocyrtis-slaptoniensis

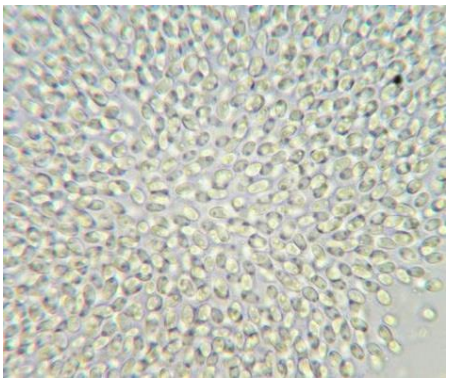
Ertz *et al* (2015) Fungal Diversity **74**: 53-89

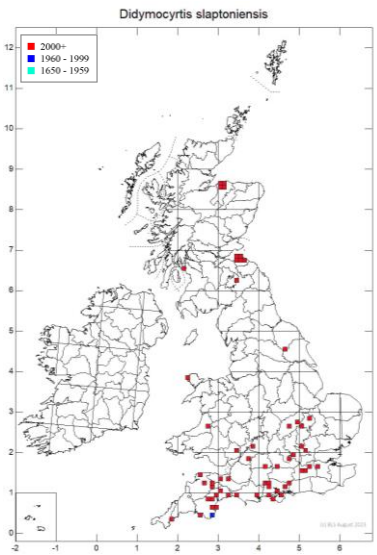
Photo Mark Powell **Drawings** David Hawksworth (top) Mark Powell (bottom) **Text** Fay Newbery

Didymocyrtis slaptoniensis *pycnidial form*









Identification: Areas of *Xanthoria parietina* infected with this fungus are usually tinged a distinctive reddish colour. The pycnidia of *Didymocyrtis slaptoniensis* can be found on the thallus or, more rarely, on the apothecia. The spores are colourless and single-celled. Perithecia with brown, two-celled spores also occur.

Similar species: *Pyrenochaeta xanthoriae* also forms pycnidia on *X. parietina* and has colourless, single-celled spores but this species has dark hair-like structures (setae) on the top of its pycnidia. Another species of *Didymocyrtis* produces pycnidia on *X. parietina* but has narrower spores. This is very difficult to separate so spore sizes should always be recorded for this fungus.

Habitat: On thallus and apothecia of *Xanthoria parietina*.

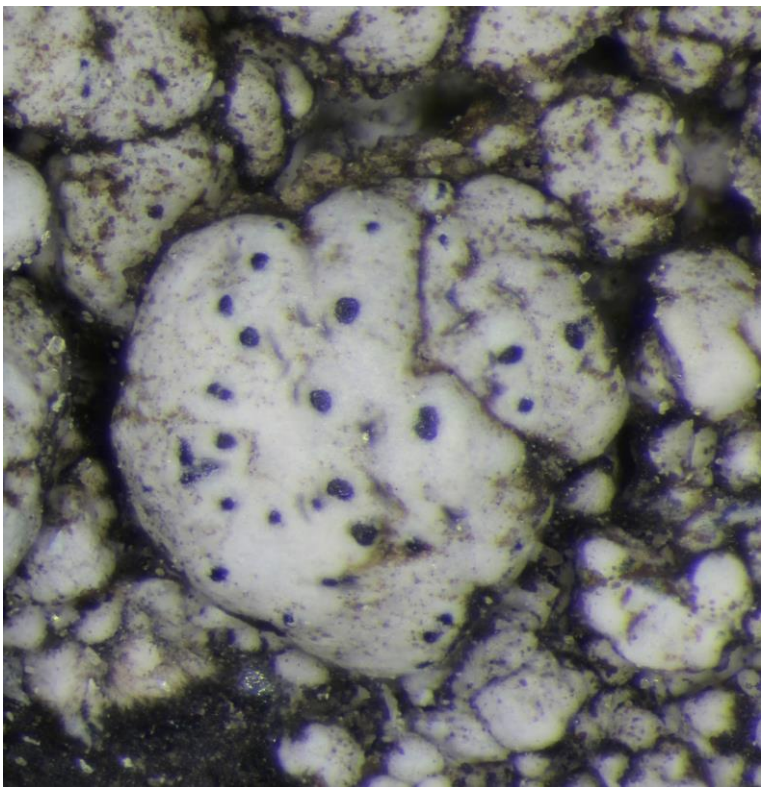
Distribution: Southern England with scattered records elsewhere.

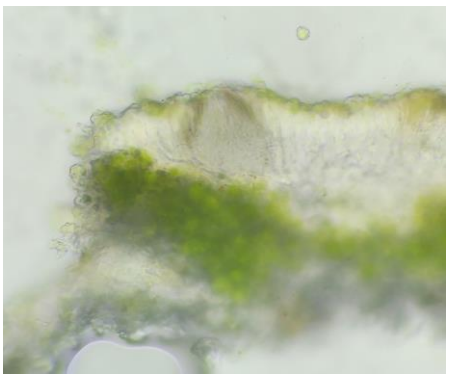
References: http://fungi.myspecies.info/all-fungi/didymocyrtis-slaptoniensis

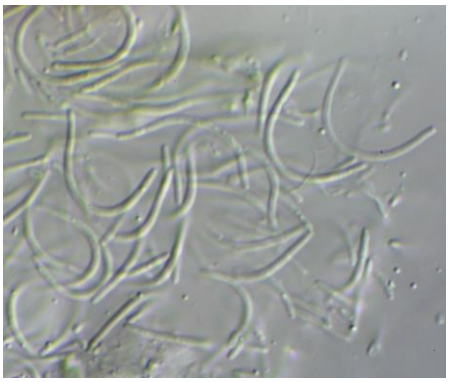
Ertz *et al* (2015) Fungal Diversity **74**: 53-89

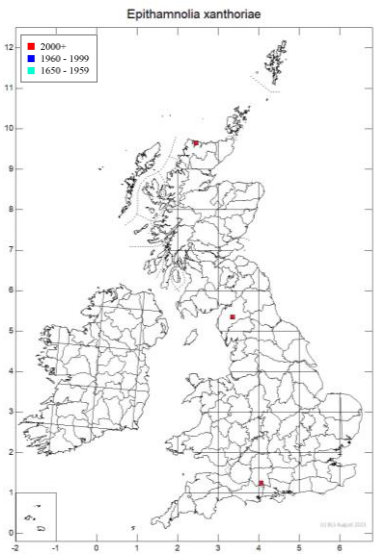
Photos Mark Powell **Text** Fay Newbery

Epithamnolia lecanorae









Identification: Pycnidia appear as black dots on the thallus, or in the apothecia, of host lichens. Galling is not normally present. The pycnidial wall is pale below a darkened portion around the ostiole. Conidia are colourless, more than 35 µm long, narrow and either straight or curved. They narrow gradually towards the tips.

Similar species: This is the only lichenicolous genus in the UK with long, narrow, colourless spores and with pycnidia that have dark walls in the upper area and pale, or colourless walls, lower down.

Habitat: On thallus and apothecia of a variety of lichens.

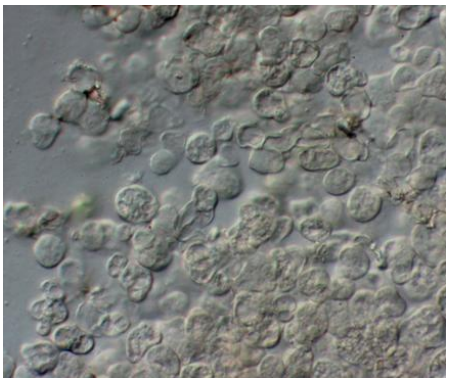
Distribution: Scattered records throughout the UK.

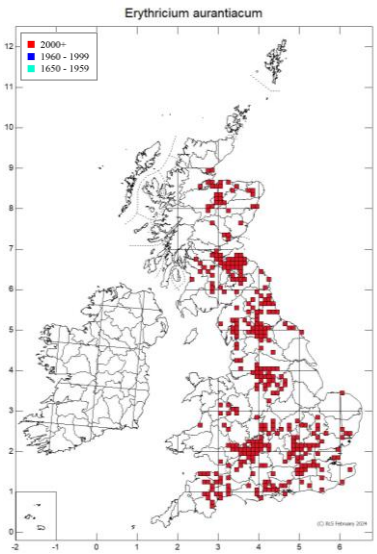
References: https://fungi.myspecies.info/all-fungi/epithamnolia-xanthoriae

Suija *et al* (2017) Mycologia **109**: 882-899

Photos Paul Cannon (left) Fay Newbery (top right) Paul Cannon (bottom right) **Text** Fay Newbery

Erythricium aurantiacum





Identification: Pale orange bulbils on bleached areas of lichen thalli. Bulbils can be spherical or merged into distorted shapes. Bottom right picture shows cells within a bulbil. Spores rarely found.

Similar species: *Paranectria oropensis* forms pale orange, fluffy, spherical perithecia on the surface of damaged lichens. Each perithecium has one tiny red dot. *Marchandiomyces corallinus* has pink bulbils. *Illosporiopsis christensenii* forms bright, shocking pink blobs composed of coiled spores. These blobs swell when wet.

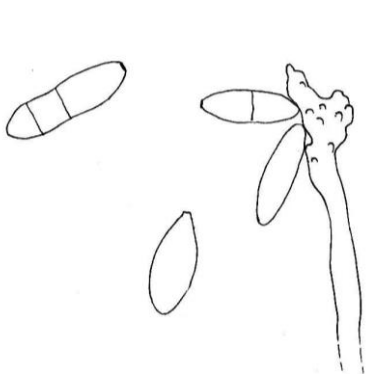
Habitat: Parasitic on species of *Physcia*. Sometimes spreading to nearby lichens such as *Xanthoria parietina*.

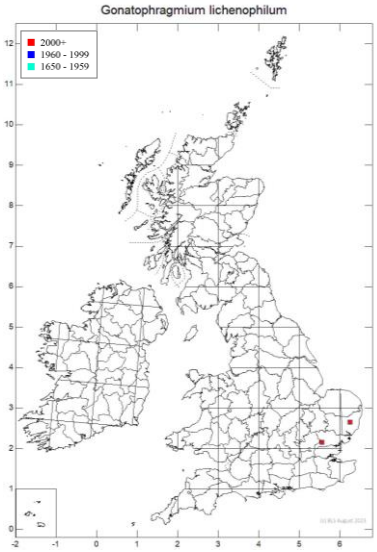
Distribution: Scattered throughout the UK.

References: http://fungi.myspecies.info/all-fungi/erythricium-aurantiacum

Photos Mark Powell (left) Fay Newbery (top right) Paul Cannon (bottom right) **Text** Fay Newbery

Gonatophragmium lichenophilum





Identification: This fungus causes a fuzzy, brown coating on slightly, or very, bleached areas of the thallus and apothecia of *Xanthoria parietina*. Spores are formed around the tips of specialised hyphae. The spores break away to leave distinct scars that give the tips of these hyphae a knobbly appearance. Spores are variable but generally ellipsoid with 1-4 cells.

Similar species: Two other fungi produce coloured layers on *Xanthoria parietina* but only on the apothecia. *Cladosporium licheniphilum* produces a brown, spiky layer. Its spores are produced on hyphae that are thick-walled and have lots of cross walls. *Xanthoriicola physciae* causes a black sooty surface.

Habitat: On the thallus and apothecia of *Xanthoria parietina* in nitrogen-rich lichen communities.

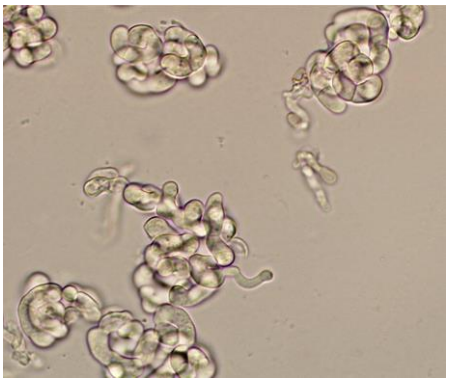
Distribution: Very few records in the UK but probably overlooked.

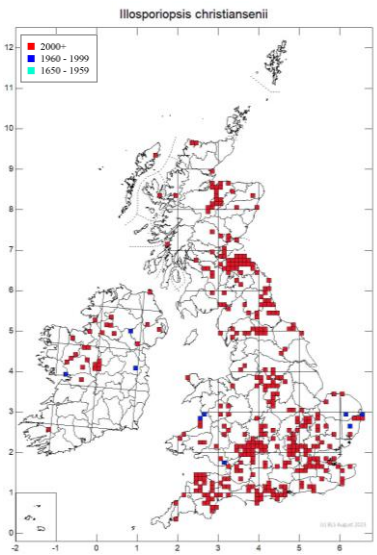
References: Berger *et al* (2015) Mycobiota **5**: 7-13

http://fungi.myspecies.info/all-fungi/gonatophragmium-lichenophilum

Photos Mark Powell **Drawing** Mark Powell **Text** Fay Newbery

Illosporiopsis christiansenii





Identification: Bright, shocking pink blobs on decaying lichens and nearby bark. The blobs are made up of thousands of coiled spores. The blobs swell in water and some of the spores wash away.

Similar species: *Marchandiomyces corallinus* forms less intense, and more regularly shaped, pink bulbils that do not contain coiled spores and do not swell in water. *Laetisaria lichenicola* causes a bright pink stain on the thallus of infected lichens but no blobs or bulbils.

Habitat: Common on species of *Physcia* and occasionally on other lichens in nutrient-rich communities on bark. Rare on *Xanthoria parietina*.

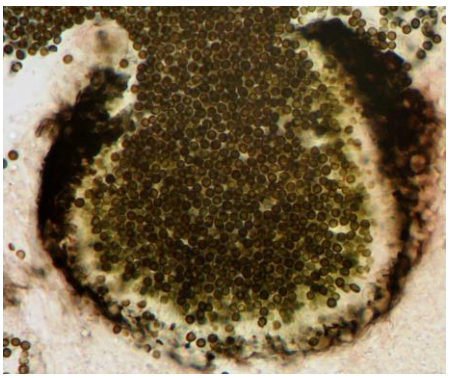
Distribution: Throughout the UK.

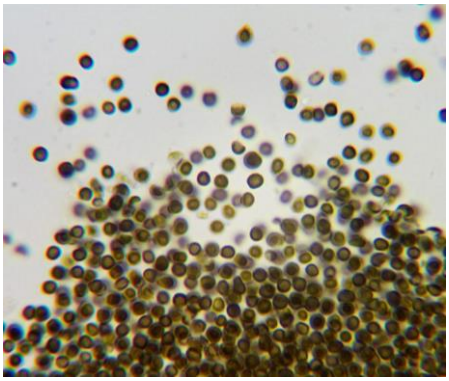
References: http://fungi.myspecies.info/all-fungi/illosporiopsis-christiansenii

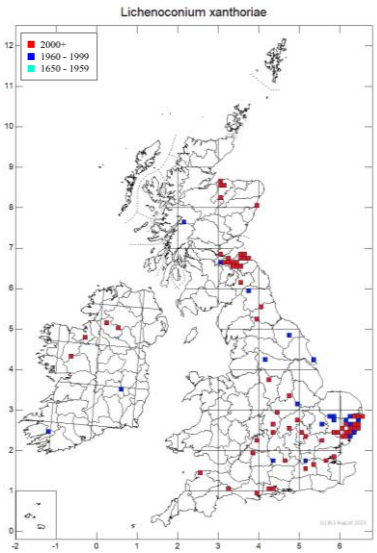
Lowen *et al* (1986) Mycologia **78**: *nii.* 842-846 describes this fungus under the previous name *Hobsonia christiansenii.*

Photos Mark Powell (left) Mark Powell (top right) Lukas Large (bottom right) **Text** Fay Newbery

Lichenoconium xanthoriae







Identification: The pycnidia of this lichenicolous fungus can be scattered, or grouped, in the apothecia of the host lichen. They develop immersed in the host but protrude at maturity. The pycnidia open by rupturing and become cup-shaped. They release brown, spherical spores which often have one flattened side. Few, if any, of the host's asci develop in infected apothecia.

Similar species: No other species with near spherical, brown, single-celled, smooth-walled spores are known on the same hosts.

Habitat: Most common on *Xanthoria polycarpa*. Also known in the UK on *X. parietina*, *Teloschistes chrysophthalmus* and *Cetrelia olivetorum.*

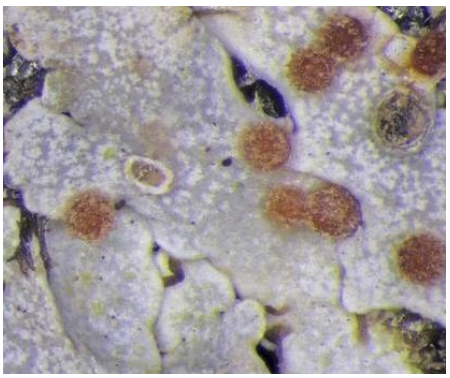
Distribution: Widespread but rarely recorded.

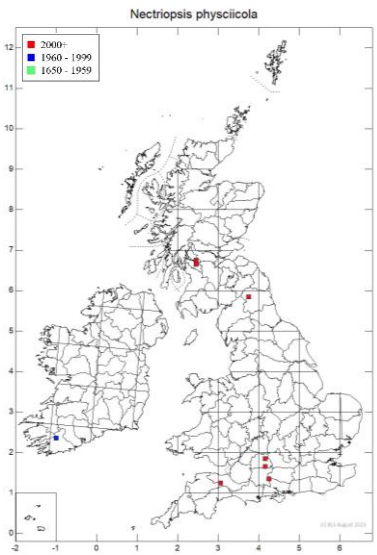
References: Christiansen (1956) Friesia **5**: 212-217

Hawksworth (1977) Persoonia **9**: 159-198

Photos Mark Powell **Text** Fay Newbery

Nectriopsis physciicola





Identification: Tiny, spherical, pale orangey-pink perithecia are formed on the thallus or apothecia of the host, sometimes appearing white due to a coating of white hairs. The perithecia each have one tiny red dot which is the hole that allows the spores to be released. Spores are formed in asci within the perithecia. Spores are colourless and two-celled.

Similar species: *Erythricium aurantiacum* produces bulbils of a similar colour but these lack the red dot and do not contain asci or spores. No other orangey fungus on *Physcia* or *Xanthoria* has similar spores.

Habitat: Parasitic on *Physcia* species. Rarely recorded on *Xanthoria parietina*.

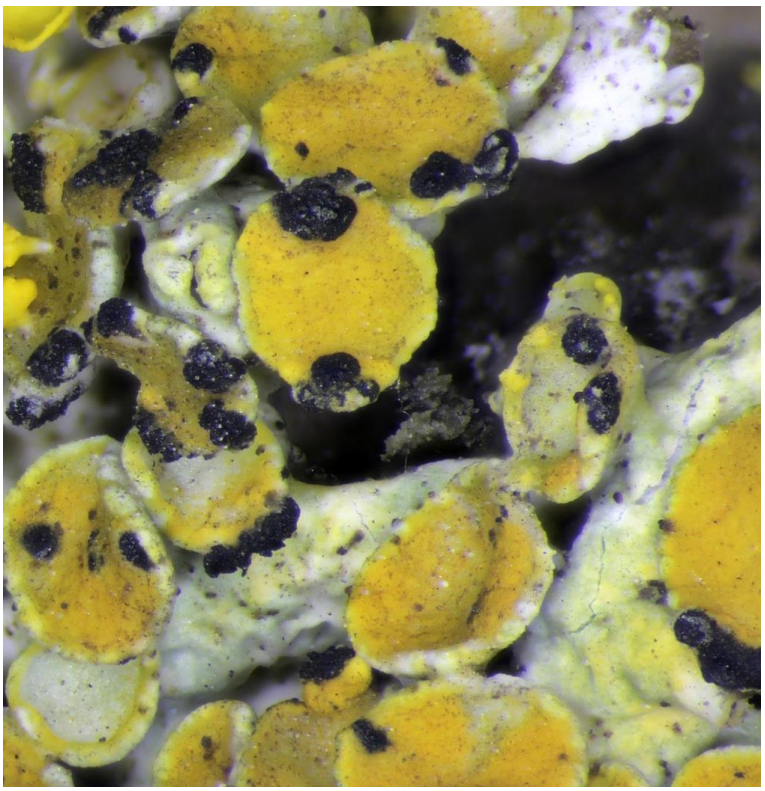
Distribution: Rare but spread across the UK and Ireland.

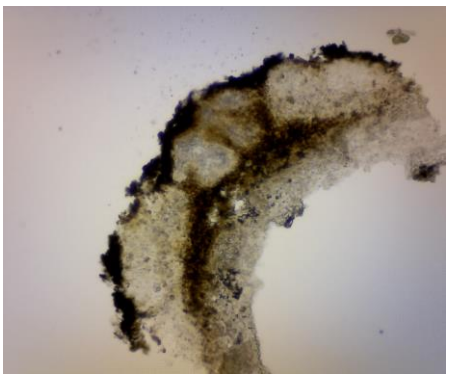
References: https://fungi.myspecies.info/all-fungi/nectriopsis-physciicola

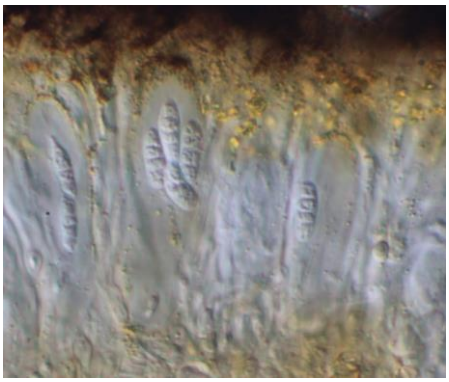
Earland-Bennett (2006) Boletín de la Sociedad Mycológica de Madrid **30**: 243-248

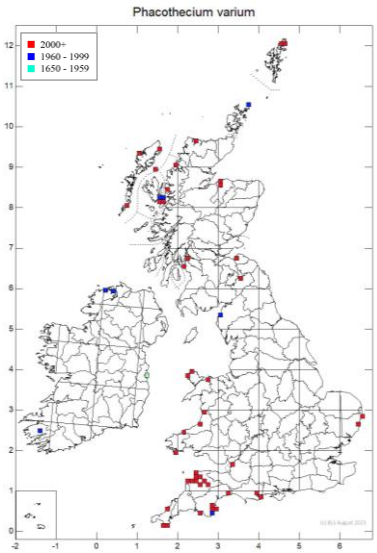
Photos Paul Cannon **Text** Fay Newbery

Phacothecium varium









Identification: Previously known as *Opegrapha physicaria*. Irregular, black gall-like growths on bleached areas of *Xanthoria parietina*. Early growths are immersed. Each black structure contains one or more apothecia and, sometimes, also pycnidia. Asci are broadly club-shaped and contain eight 4-celled ascospores.

Similar species: No other lichenicolous fungi on this host have 4-celled spores or have multiple fruiting bodies within one structure.

Habitat: Parasitic on thallus and apothecia of *Xanthoria parietina*.

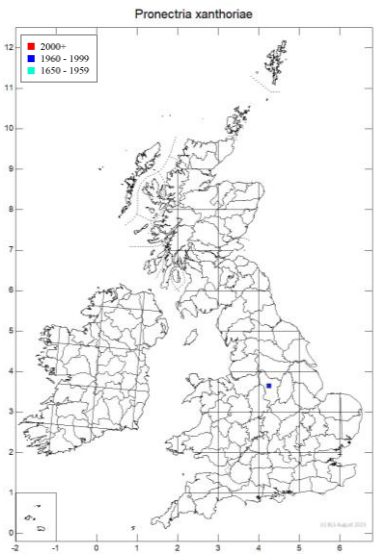
Distribution: Nationally rare. Mainly coastal.

References: http://fungi.myspecies.info/all-fungi/phacothecium-varium

Atienza (1992) Anales Jardín Botánico de Madrid **50**: 159-162 describes this fungus under the previous name *Opegrapha physicaria*.

Photos Paul Cannon (left) Fay Newbery (top right) Paul Cannon (bottom right) **Text** Fay Newbery

Pronectria xanthoriae



Identification: The orange perithecia of this fungus form within the thallus or apothecia of *Xanthoria parietina* but break through the surface when mature. The surrounding host material is often raised. The ascospores have a number of large oil droplets. They have a single cell until they reach maturity when one dividing wall grows across the middle of each spore. Infected thalli are a deeper orange colour.

Similar species: *Pronectria xanthoriae* is the only fungus on *Xanthoria parietina* that has sunken orange perithecia. Pycnidia of the host can appear similar but are not bright orange when cut through.

Habitat: On the thallus and apothecia of *Xanthoria parietina*.

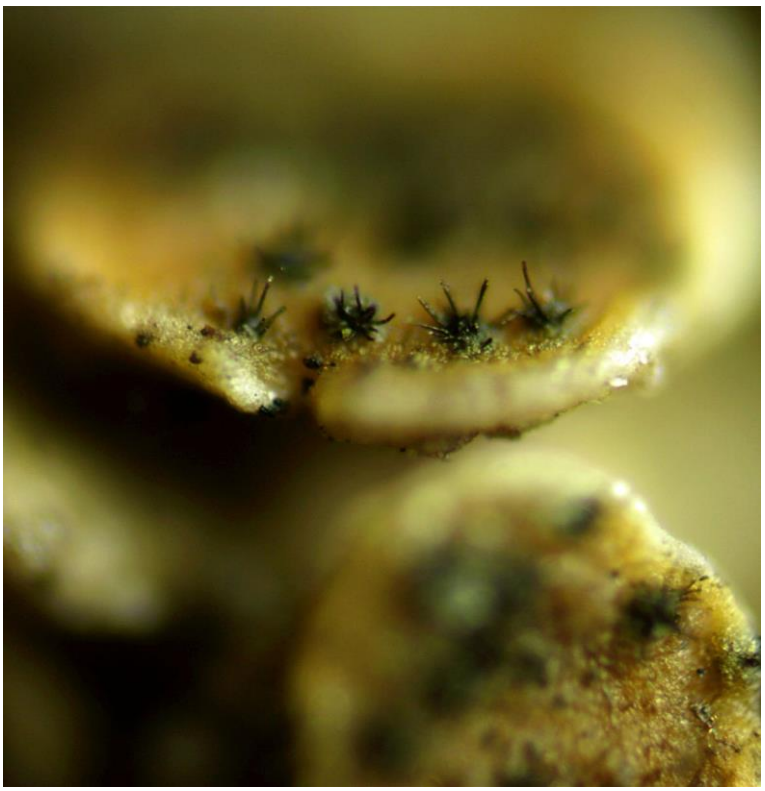
Distribution: Only found once in the UK.

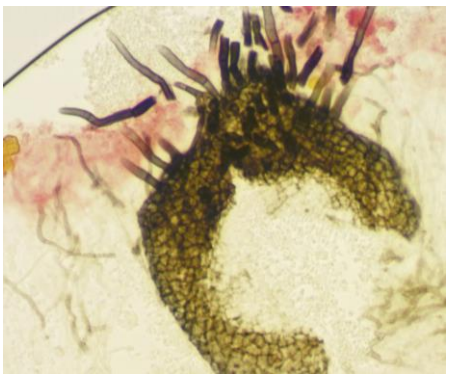
References: http://fungi.myspecies.info/all-fungi/pronectria-xanthoriae

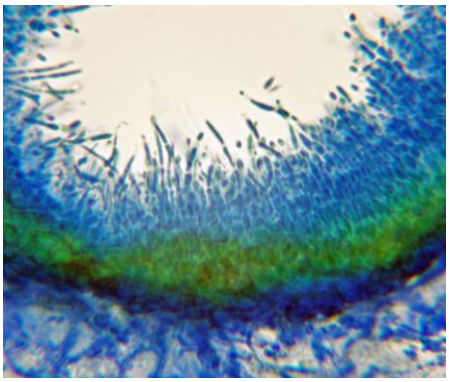
Lowen & Deiderich (1990) Mycologia **82**: 788-791

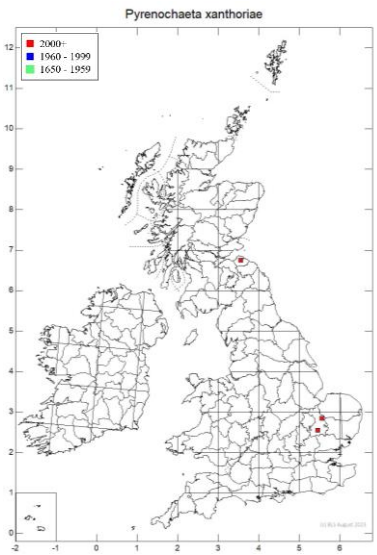
Photos Norbert Stapper **Text** Fay Newbery

Pyrenochaeta xanthoriae









Identification: This fungus forms black pycnidia with dark bristles around the top. The pycnidia are initially formed within the thallus or apothecia of the host but later break through the surface.

Similar species: No other lichenicolous fungus on *Xanthoria parietina* forms pycnidia or perithecia with bristles.

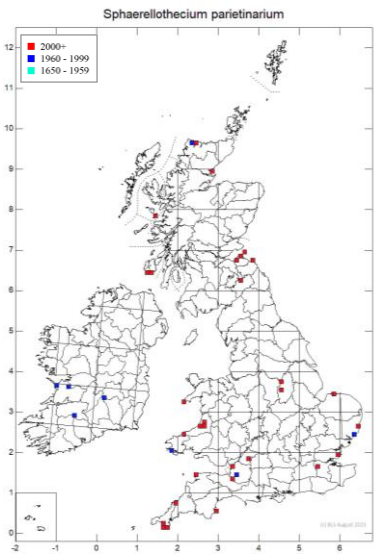
Habitat: Found on the thallus and apothecia of *Xanthoria parietina.*

Distribution: Rarely recorded.

References: https://fungi.myspecies.info/all-fungi/pyrenochaeta-xanthoriae

Photos Mark Powell **Text** Fay Newbery

Sphaerellothecium parietinarium



Identification: This fungus occurs as crowded black perithecia on the apothecia, and sometimes on the thalli, of *Xanthoria* species. The perithecia are partially immersed in the host tissue. The asci are club- or pear-shaped with eight brown, 2-celled, smooth-walled ascospores.

Similar species: *Didymocyrtis slaptoniensis* also produces black perithecia with 2-celled, brown ascospores on *X. parietina,* but these ascospores have tiny warts on the outside and are arranged in a single line in narrow asci.

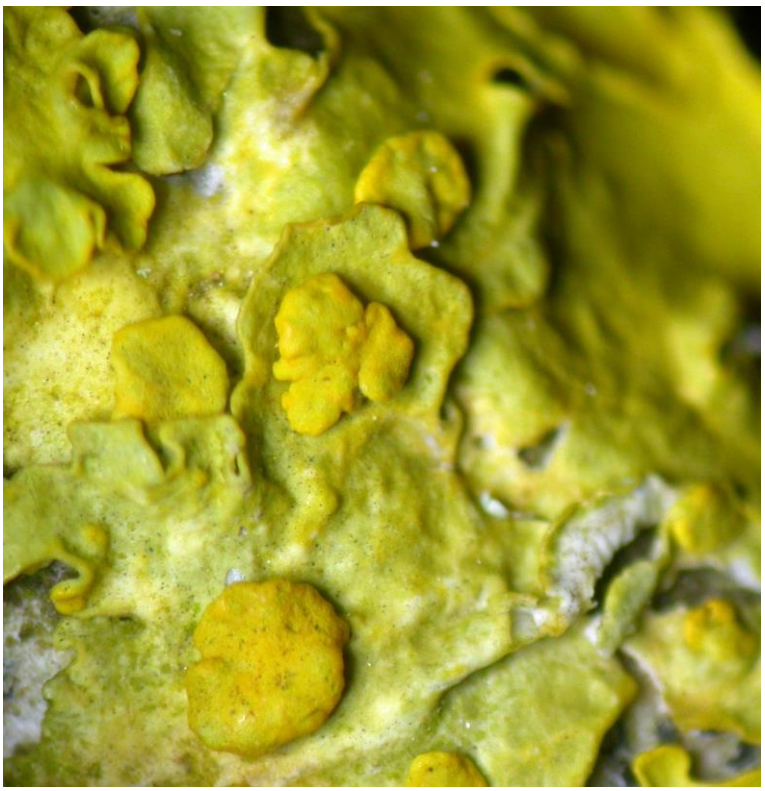
Habitat: On apothecia and, occasionally the thalli of *Xanthoria parietina* and other *Xanthoria* species.

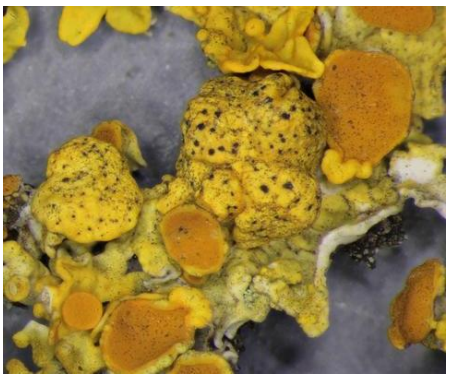
Distribution: Mainly coastal but this species may be under-recorded.

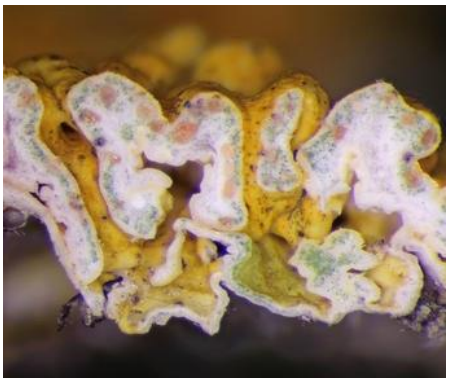
References: http://fungi.myspecies.info/all-fungi/sphaerellothecium-parietinarium

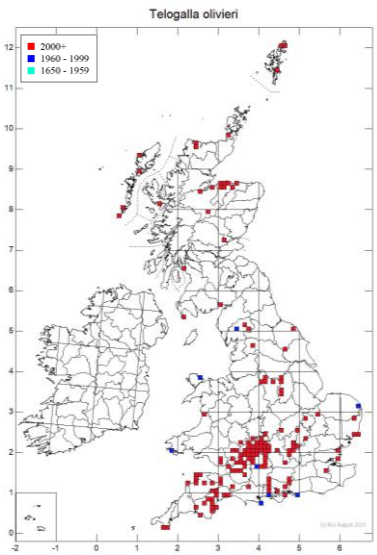
Photos Mark Powell (left) Paul Cannon (top right) Mark Powell (bottom right) **Text** Fay Newbery

Telogalla olivieri









Identification: Yellow galls formed on the thallus of *Xanthoria parietina* and *X. calcicola.* The galls are often shaped like a three-cornered hat. These develop black spots and a more domed appearance as the fungus matures. A cross-section of the thallus shows pale brown perithecia with black tips that open through the lichen surface.

Similar species: There are a lot of lichenicolous fungi that produce black spots on *Xanthoria parietina*. Only *Telogalla olivieri* shows pale walls when the lichen thallus is sectioned.

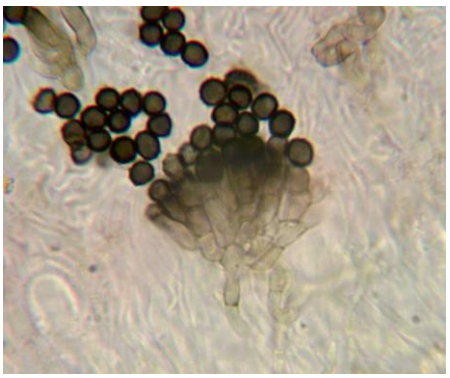
Habitat: A parasite on *Xanthoria parietina* and *X. calcicola.*

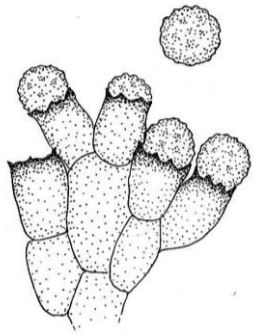
Distribution: Scattered in England, Scotland and Wales.

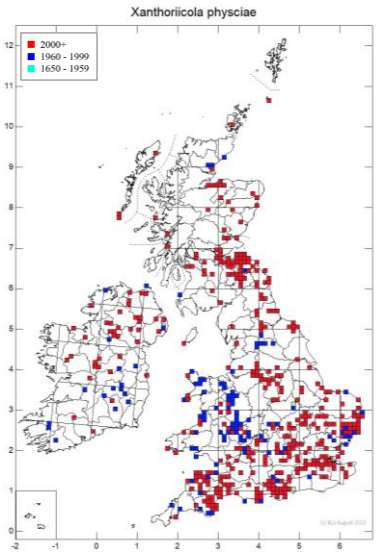
References: http://fungi.myspecies.info/all-fungi/telogalla-olivieri

Photos Mark Powell (left) Paul Cannon (top right) Paul Cannon (bottom right) **Text** Fay Newbery

Xanthoriicola physciae







Identification: Known as 'Xanthoria smut'. This fungus infects *Xanthoria parietina* and produces a sooty, black coating over the surface of the apothecia. The fungus grows in the upper layer of the apothecia producing chunky-appearing hyphae which release globose spores from their tips. The spores are dark brown and are covered in tiny warts.

Similar species: *Gonatophragmium lichenophilum* causes a brown, fuzzy-appearing coating on both the thallus and apothecia of *Xanthoria parietina. Cladosporium licheniphilum* causes a brown, spiky coating only on the apothecia of *X. parietina*.

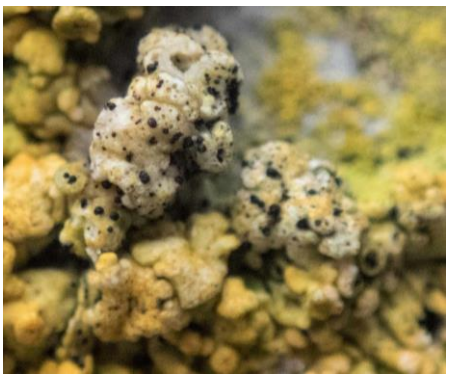
Habitat: On the apothecia of *Xanthoria parietina*. It may, in the future, turn up on other species of *Xanthoria*.

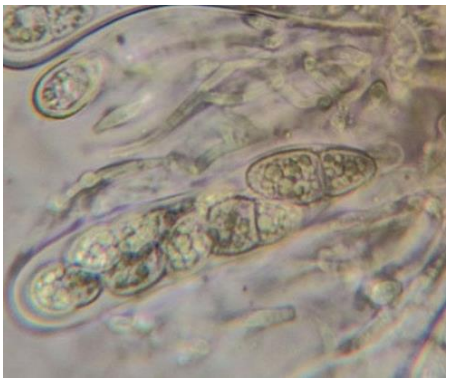
Distribution: Common.

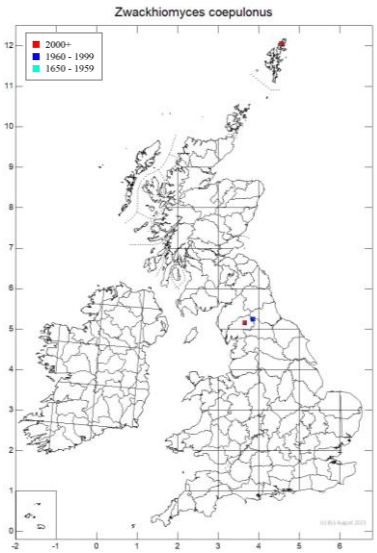
References: http://fungi.myspecies.info/all-fungi/xanthoriicola-physciae

Photos Paul Cannon (left) Mark Powell (top right) **Drawing** Mark Powell **Text** Fay Newbery

Zwackhiomyces coepulonus







Identification: The black perithecia of *Zwackhiomyces coepulonus* grow immersed in the thallus or apothecia of the host. The fungus can occur in galls caused by *Telogalla olivieri*. The perithecia protrude at maturity and contain colourless 2-celled ascospores.

Similar species: This is the only fungus on *Xanthoria* that produces perithecia with colourless, 2-celled ascospores.

Habitat: On thallus and apothecia of *Xanthoria parietina.* Also known on *X. elegans* and on *Caloplaca* outside the UK.

Distribution: Only known from Northern England and Scotland.

References: http://fungi.myspecies.info/all-fungi/zwackhiomyces-coepulonus

Grube (1990) Nova Hedwigia 51: 283-360

Photos Olivier Gonnet (left) Nigel Chadwick (top right) Nigel Chadwick (bottom right) **Text** Fay Newbery