Revisions of British and Irish Lichens

British Lichen Society

Volume 57 **July 2025**

Miscellaneous families and genera

Cover image: *Loxospora elatina* agg., on rotten wood of *Quercus petraea*, Lower Cabilla Wood, nr Bodmin, Cornwall.

Revisions of British and Irish Lichens is a free-to-access serial publication under the auspices of the British Lichen Society, that charts changes in our understanding of the lichens and lichenicolous fungi of Great Britain and Ireland. Each volume will be devoted to a particular family (or group of families), and will include descriptions, keys, habitat and distribution data for all the species included. The maps are based on information from the BLS Lichen Database, that also includes data from the historical Mapping Scheme and the *Lichen Ireland* database. However, these are not comprehensive and there are many further records that have not yet been digitized. The choice of subject for each volume will depend on the extent of changes in classification for the families concerned, and the number of newly recognized species since previous treatments.

To date, accounts of lichens from our region have been published in book form. However, the time taken to compile new printed editions of the entire lichen biota of Britain and Ireland is extensive, and many parts are out-of-date even as they are published. Issuing updates as a serial electronic publication means that important changes in understanding of our lichens can be made available with a shorter delay. The accounts may also be compiled at intervals into complete printed accounts, as new editions of the *Lichens of Great Britain and Ireland*.

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ISSN 2634-7768

Revisions of British and Irish Lichens **vol. 57**

Miscellaneous lichens and lichenicolous fungi

including *Aphanopsis* and *Steinia* (Aphanopsidaceae), *Arthrorhaphis* (Arthrorhaphidaceae), *Buelliella*, *Hemigrapha*, *Melaspileella*, *Stictographa* and *Taeniolella* (Asterinales, family unassigned), *Phylloblastia* (Chaetothyriales, family unassigned) *Cystocoleus* (Cystocoleaceae), *Sclerococcum* (Dactylosporaceae), *Eiglera* (Eigleraceae), *Epigloea* (Epigloeaceae), *Euopsis* (Harpidiaceae), *Lichenothelia* (Lichenotheliaceae), *Lichinodium* (Lichinodiaceae), *Melaspilea* (Melaspileaceae), *Epithamnolia* and *Mniaecia* (Mniaeciaceae), *Lichenostigma* (Phaeococcomycetaceae), *Pycnora* (Pycnoraceae), *Racodium* (Racodiaceae), *Chicitaea* and *Loxospora* (Sarrameanaceae), *Schaereria* (Schaereriaceae), *Strangospora* (Strangosporaceae), *Botryolepraria* and *Stigmidium* (Verrucariales, family unassigned), and *Biatoridium*, *Mycoglaena*, *Orphniospora*, *Piccolia*, *Psammina* and *Wadeana* (order and family unassigned).

by

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This publication can be cited as:
Cannon, P., Coppins, B., Aptroot, A., Sanderson, N. & Simkin, J. (2025). Miscellaneous lichens and lichenicolous fungi, including *Aphanopsis* and *Steinia* (Aphanopsidaceae), *Arthrorhaphis* (Arthrorhaphidaceae), *Buelliella*, *Hemigrapha*, *Melaspileella*, *Stictographa* and *Taeniolella* (Asterinales, family unassigned), *Phylloblastia* (Chaetothyriales, family unassigned) *Cystocoleus* (Cystocoleaceae), *Sclerococcum* (Dactylosporaceae), *Eiglera* (Eigleraceae), *Epigloea* (Epigloeaceae), *Euopsis* (Harpidiaceae), *Lichenothelia* (Lichenotheliaceae), *Lichinodium* (Lichinodiaceae), *Melaspilea* (Melaspileaceae), *Epithamnolia* and *Mniaecia* (Mniaeciaceae), *Lichenostigma* (Phaeococcomycetaceae), *Pycnora* (Pycnoraceae), *Racodium* (Racodiaceae), *Chicitaea* and *Loxospora* (Sarrameanaceae), *Schaereria* (Schaereriaceae), *Strangospora* (Strangosporaceae), *Botryolepraria* and *Stigmidium* (Verrucariales, family unassigned), and *Biatoridium*, *Mycoglaena*, *Orphniospora*, *Piccolia*, *Psammina* and *Wadeana* (order and family unassigned). *Revisions of British and Irish Lichens* **57**: 1–78.

MISCELLANEOUS FAMILIES AND GENERA OF LICHENS

This volume contains a series of mostly unrelated lichen genera not so far treated in the *Revisions of British and Irish Lichens*, thus completing the generic accounts for *Lichens of Britain and Ireland* edition 3. Many of the existing volumes will need further revision in the light of recent research, so the project is not yet complete.

ACAROSPORALES: EIGLERACEAE

Eiglera was included within the Acarosporaceae by Lücking *et al.* (2016) based on molecular evidence from Miadlikowska *et al.* (2014). However, those authors were equivocal about its placement and its morphological differences argue for its previous placement within its own family, the Eigleraceae (Hafellner 1984). Links with *Aspicilia* and *Hymenelia* indicated by Lutzoni & Brodo (1995) and Lumbsch (1997) are not supported by molecular phylogenetic evidence.

There is only one genus (and species), so the description below constitutes that of the family.

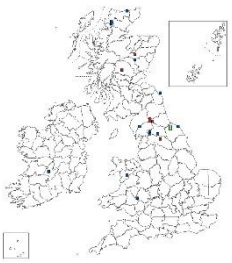
EIGLERA Hafellner (1984)

Thallus crustose. **Photobiont** chlorococcoid. **Ascomata** apothecia, immersed, *Aspicilia*-like. **Exciple** scarcely evident except in the upper part where it is dark blue-green. **Hamathecium** of paraphyses, the apices sometimes broader or clavate, lacking pigmented caps or hoods, slender, septate, sparingly branched. **Asci** 8-spored, broadly clavate or ellipsoidal, with a uniformly K/I+ blue apical dome and K/I+ blue, fuzzy, outer coat forming a thick cap over the apex. **Ascospores** aseptate, colourless, smooth, without a thickened perispore. **Conidiomata** pycnidia, immersed, blackened; wall dark blue-green. **Conidiogenous cells** arising in a single row, bottle-shaped. **Conidia** aseptate, colourless, bacilliform. **Chemistry**: no lichen products reported by TLC. **Ecology**: on calcareous rocks.

Apart from the ascus dome structure it is morphologically very similar to *Hymenelia* (Hymeneliaceae, Hymeneliales); see under that genus (Cannon *et al.* 2025) for a key to the two genera.

Literature:
Cannon *et al.* (2025), Coppins *et al.* (2009), Hafellner (1984), Lücking *et al*. (2017a), Lumbsch (1997), Lutzoni & Brodo (1995), Miądlikowska *et al.* (2014).

Eiglera flavida (Hepp) Hafellner (1984) **Nb**



Thallus crustose, effuse, superficial, grey to ochraceous-brown, matt, rimose, not corticate, to 200 µm thick but sometimes evanescent; photobiont cells 7–12 µm diam. Apothecia 0.15–0.3 mm diam., immersed in the thallus, aspicilioid, disc concave, black (tinged blue-green when wet); hymenium 60–70 µm tall, colourless below, pale to dark blue-green above, K–, N+ crimson, I+ dark blue; hypothecium colourless; paraphyses (1–) 1.5–1.7 µm diam., to 3 µm diam. at the apices. Ascospores 12–18 × 7–9 µm, ellipsoidal, thin-walled, aseptate. Pycnidia 30–50 µm diam.; conidia 3–4 × 0.8–1 µm. **BLS 0110**.

On calcareous rocks by rivers, calcareous pebbles in coastal dunes and shingle ridges; rare. Yorkshire, Northumberland, mid-Wales, Scotland (Angus at 700 m alt., Sutherland), S. central Ireland.

ASTERINALES M.E. Barr ex D. Hawksw. & O.E. Erikss. (1986)

The Asterinales is a diverse and speciose order of fungi, centred on *Asterina* which is a large, primarily tropical genus of leaf-inhabiting plant parasites. There remains controversy over the phylogenetic position of the type of *Asterina*, and some authors (e.g. Guatimosim *et al.* 2015) consider that the clade containing the species treated in this volume should properly be referred to as the Asterotexales. Ertz & Diederich (2015), Ertz *et al.* (2016), Diederich *et al.* (2018) and Heuchert *et al.* (2024) placed various lichenicolous taxa in the order, several of which occur in Britain and Ireland. Those treated here include *Buelliella*, *Hemigrapha*, *Melaspileella* and *Stictographa*. The disparate, mostly lichenicolous hyphomycete genus *Taeniolella* also belongs in this assemblage (Ertz *et al.* 2016), but has been comprehensively monographed by Heuchert *et al.* (2018, 2024) and descriptions are not repeated here. Dai *et al*. (2018) described the families *Hemigraphaceae, Melaspileellaceae* and *Stictographaceae* for the lichenicolous species of Asterinales based on a LSU/SSU phylogenetic tree, but these are not accepted here pending further investigations into the relationships of *Asterina* s. str.

It has been suggested that the hyphomycete genus *Actinocladium* Ehrenb. (1819) belongs with the genera above (Yang *et al.* 2023), and the type *A. rhodosporum* Ehrenb. has occasionally been reported as growing on lichens. However, that placement should be considered as preliminary. *Karschia talcophila* (Ach. ex Flot.) Körb. also belongs to the order, but has not been correctly reported from Britain and Ireland.

BUELLIELLA Fink (1935)

Thallus absent (lichenicolous). **Ascomata** initially ± globose and closed, with the upper ascomatal wall opening irregularly in the centre and breaking gradually away to expose the hymenium when mature, then ± discoid and superficial. **Exciple** medium to dark brown, mostly K–. **Hymenium** K/I– or K+ pale blue. **Hamathecium** of paraphysoids, sometimes branched or anastomosed and apically slightly enlarged and brownish, short, few-celled periphyses arising from the inner excipular layer. **Asci** fissitunicate, broadly clavate to subcylindrical, the wall apically thickened with a distinct ocular chamber, I– and K/I–, mostly 8-spored. **Ascospores** ellipsoidal, 1-septate, smooth, pale to medium brown, slightly constricted near the septum. **Anamorphs** not known.

Only three species of *Buelliella* have been sequenced (Ertz & Diederich 2015, Hongsanan *et al.* 2020). The single species treated here, *B. physciicola* Poelt & Hafellner (1979), occupies a clade sister to that containing *Labrocarpon* according to these authors, and to one containing *Stictographa* in the analysis of Dai *et al*. (2018). The type of *Buelliella* also appears to be included in this clade. The other species sequenced, *B. poetschii* Hafellner (2008), not known from our region, appears to be close to *Hemigrapha* and has been assigned to a new genus *Neobuelliella* (with its own family) by Hongsanan *et al.* (2020).

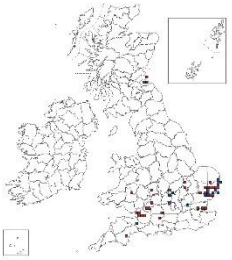
Only one species has been reported to date from Britain and Ireland.

Literature:
Hafellner (1979), Pérez-Ortega & Etayo (2010), Suija & Alstrup (2004).

Buelliella physciicola Poelt & Hafellner (1979) **NE**
Ascomata scattered or in small groups, black, 0.2–0.4 mm diam., initially closed, then breaking open above, the hymenium becoming widely exposed; exciple dark brown, pseudoparenchymatous, (15–) 20–40 µm thick; hypothecium colourless; hymenium 70–80 µm high; epithecium pale brown. Asci narrowly to broadly clavate, usually 8-spored, but sometimes containing only 4 or 6 spores, 50–60 × 12–17 µm. Paraphysoids branched and

anastomosing, 2–3 µm diam., the apices slightly thickened and lightly pigmented, embedded in a light brown gel. Ascospores 1-septate, eventually becoming pale brown, thin-walled, the upper cell broader than the lower cell, broadly rounded at both ends, without germ pores, (12–) 13–17 × 6–8.5 µm. All parts I–. **BLS 2022**.

On thalli of *Phaeophyscia orbicularis* and *P. sciastra*, apparently not causing significant damage to the host; widespread and common in S. England with a scattering of records from S. Scotland and one from Wales.



HEMIGRAPHA (Müll. Arg.) D. Hawksw. (1975)

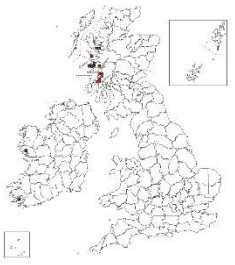
Thallus absent (lichenicolous). **Ascomata** thyriothecia, black, superficial, flat, round to stellate or elongate, sometimes branched, sometimes confluent. **Exciple** composed of a single layer of radiating rows of dark brown, shortly rectangular cells, continuous above the hymenium; ostiole often inconspicuous, opening by irregular cracks, leaving the hymenium partly exposed. **Hymenium** not blueing in iodine. **Hamathecium** of sparingly branched and anastomosed paraphysoids, in mature ascomata becoming free at the top, short periphysoid-like hyphae arising from the ascomatal wall. **Asci** clavate to subglobose, fissitunicate, the wall apically thickened, normally with a distinct ocular chamber, not blueing in iodine, (2-) 4- to 8-spored. **Ascospores** 1- to 3-septate, distinctly constricted at the septa, colourless when young and pale brown when mature, smooth at first, but with a granular to distinctly verrucose ornamentation when over-mature; perispore absent. **Conidiomata** pycnothyria, intermixed with and macroscopically indistinguishable from ascomata. **Conidiophores** absent. **Conidiogenous cells** arising directly from the wall, ellipsoidal to shortly ampulliform, not proliferating. **Conidia** colourless, aseptate, smooth, base truncate or not, ellipsoidal; with narrowly ellipsoidal to rod-shaped microconidia and larger, ellipsoidal macroconidia.

There are currently nine species of *Hemigrapha*, four of which occur as associates of foliicolous lichens, four on Peltigerales and one on *Graphis*. Only one occurs in our region.

Literature:
Diederich & Wedin (2000), Ertz & Diederich (2015).

Hemigrapha atlantica Diederich & Wedin (2000) **NT**

Ascomata round to slightly and irregularly stellate, 0.15–0.6 mm diam. Hymenium to 45 µm tall. Paraphysoids in mature ascomata thin and indistinct, 1–1.5 µm diam.; periphysoid-like cells developing abundantly from the exciple, mostly aseptate, 3–11 × 2.5–4 µm. Asci 8-spored, broadly clavate to subglobose, 21–23 × 10–14 µm. Ascospores colourless when young, brownish and distinctly verruculose at maturity, 1-septate, constricted at the septum, 13–15 (–17) × 4–6 µm. Conidiomata intermixed with ascomata. Microconidia rod-shaped to slightly bent, basally somewhat truncate, 5–7 × *ca* 2 µm. **BLS 2307**.



On the cyanobacterial morph of *Sticta canariensis*, oceanic W. Scotland from Kintyre to Skye, also W. Ireland.

Appears very much like an *Arthonia* species in the field, but the exciple structure and hamathecium are quite different. Old records of this species were assigned to *H. asteriscus* (Müll. Arg.) D. Hawksw. (1975) which has slightly smaller ascospores and a primarily Southern Hemisphere distribution.

Descriptions of genus and species have primarily been adapted from the literature sources listed above.

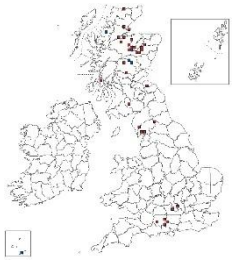
MELASPILEELLA (P. Karst.) Vainio (1921)

Ascomata at first closed and immersed, later erumpent and ± superficial, rupturing to expose a dark brown disc, then appearing apothecial, obconical or discoid, sessile, the margin lobed, crenulate or reduced. **Exciple** black and smooth, discontinuous beneath the hymenium, composed of pseudoparenchymatous tissue, two-layered, the outermost layer of dark brown thick-walled cells. **Hymenium** I± pale blue. **Hypothecium** thin, pseudoparenchymatous. **Hamathecium** of mainly unbranched paraphysoids, the tips of which form an brownish epithecium, periphyses not present. **Asci** broadly clavate or ellipsoidal, fissitunicate, 4- to 8-spored. **Ascospores** obovoid, 1-septate, constricted at the septum, colourless but becoming yellowish brown and verrucose, with a cluster of setae at each end that disintegrate when the spore is old. **Anamorph**: not known.

There is only one species definitely assignable to *Melaspileella* at present (see Ertz & Diederich 2015), but *Melaspilea bagliettoana* Zahlbr. (1904) also has immature ascospores with polar setae, a feature perhaps diagnostic for *Melaspileella*. It is retained in *Melaspilea* (see below) pending further examination.

Literature:
Ertz & Diederich (2015), Kutorga & Hawksworth (1997, as *Banhegyia*), Sanderson *et al.* (2009).

Melaspileella proximella (Nyl.) Nyl. (1873) **Nb**



Thallus absent. Apothecia 0.1–0.2 (–0.3) mm diam., rounded to angular, solitary or in groups, superficial; disc sometimes obscured by the inflexed, raised exciple; epithecium granular; hymenium colourless to pale brown, I+ pale blue; hypothecium colourless to dark brown; paraphyses sparsely branched and anastomosed, apices swollen to *ca* 4 µm diam., with external brownish pigmentation. Asci 36–55 × 14–21 µm, (4-)8-spored, clavate, with an internal apical beak. Ascospores 14–19 (–22) × 7–9 µm, obovoid to sole-shaped, smooth, colourless but pale brown and verrucose only at over-maturity, when young with polar flagella. **BLS 1950**.

On *Juniperus* bark, presumably saprotrophic; rare. Scotland (Highlands), N. and central S. England.

Some older British records refer to *Melaspilea ochrothalamia*, the separation from which is discussed under that species. *Melaspilea amota* has a darker I+ blue hymenium and ascus tips. See also comments under *Melaspilea bagliettoana*.

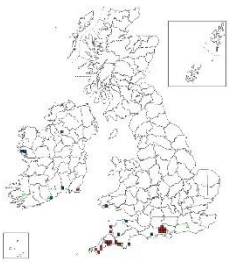
STICTOGRAPHA Mudd (1861)

Thallus absent (lichenicolous). **Ascomata** lirelliform, black, simple or occasionally shortly branched. **Disc** slit-like. **Exciple** well-developed, brownish black, K– (brownish pigment disappears), continuous below the hymenium. **Hymenium** colourless, I+ and K/I+ blue turning orange. **Hamathecium** of mainly unbranched paraphysoids, periphyses developing from the inner excipular layer. **Asci** clavate, thick-walled in the upper part, fissitunicate with a distinct ocular chamber, I–, K/I–. **Ascospores** 1-septate, colourless and becoming brown. **Anamorph**: not known.

Two species are known, the type *S. lentiginosa* on *Phaeographis* and *S. dirinariicola* on *Dirinaria* from the Seychelles. The genus appears to be closely related to *Buelliella*.

Literature:
Cannon & Minter (2018), Diederich *et al.* (2017), Ertz & Diederich (2015), Sanderson *et al*. (2009).

Stictographa lentiginosa (Lyell ex Leight.) Mudd (1861) **NT IR**



Ascomata lirellate apothecia, solitary or irregularly aggregated, oblong to elliptical in outline, occasionally branched, ± superficial, 0.11–0.26 (–0.5) × 0.08–0.12 (–0.2) µm, 65–80 µm tall; disc slit-like, not expanding greatly when wet; exciple thick, incurved, continuous below the hymenium, heavily melanized; subhymenial layer colourless; hymenium 50–70 µm thick, colourless to pale brown, KI+ blue; epithecium reddish brown, rather variably developed. Hamathecium composed of mainly unbranched paraphysis-like hyphae *ca* 2 µm diam., tending to deliquesce at maturity, with periphysoid-like hyphae at the margin of the exciple. Asci clavate, ± sessile with a shortly tapered base, 29–43 × 11.5–15 µm, the apex rounded, thick-walled and fissitunicate with a well-developed ocular chamber, not staining in iodine, (2)4–8-spored. Ascospores clavate to soleiform, 13–15 (–16) × (5–) 5.5–7 (–7.5) µm, for a long time colourless but eventually becoming olivaceous, 1-septate, somewhat narrower at the septum, fairly thick-walled, smooth, without a perispore. **BLS 1554**.

On thalli of *Phaeographis dendritica*, mostly found in old growth woodlands and parklands with large populations of the host. S. and S.W. England, S. Wales and Ireland.

A weakly parasitic species; the minute apothecia can be intermixed with those of the host, but usually the apothecia of *Phaeographis dendritica* are suppressed where those of *S. lentiginosa* are densest but the thallus appears unaffected. British collections of *Melaspilea diplasiospora* (Nyl.) Müll. Arg. (syn. *Melaspileopsis diplasiospora* (Nyl.) Ertz & Diederich 2015) are likely to be misidentified and could represent a further species of *Stictographa*. They are parasites of *Graphis elegans* with ascospores 19.5–27 (–32) × 9.5–13.5 (–16) µm in size.

TAENIOLELLA S. Hughes (1958)

Taeniolella is a large genus of hyphomycetous fungi, many species of which are considered to be lichen parasites. They are morphologically simple in form and difficult to identify, and the extent to which they are host-specific is uncertain. Few have been sequenced, but existing molecular data suggest that species are interspersed with the other genera of Asterinales treated here, and that the genus is not monophyletic (Ertz *et al*. 2016). As there are recent comprehensive monographs of *Taeniolella* (Heuchert *et al*. 2018, 2024), the treatment here is presented as a summary table.

Species	BLS no.	Host	GBI distribution
arthoniae (M.S. Christ. & D. Hawksw.) Heuchert & U. Braun 2018	2757	*Dendrographa decolorans*, *Lecanactis abietina*	Hampshire, Somerset, Sussex
cladinicola Alstrup 1993	2525	*Cladonia arbuscula*, *C. portentosa*, *C. strepsilis*, *C. uncialis*, *C. zopfii*	N., E. and C. Scotland, Wales (Merioneth), England (Cornwall, Dorset, Hampshire)
delicata M.S. Christ. & D. Hawksw. 1979	2241	Plurivorous	Scotland (Inverness, Dumbarton), S., C. & E. England
lecanoricola Heuchert & Diederich 2018	2907	*Glaucomaria rupicola*	Scotland (Speyside)
pertusariicola D. Hawksw. & H. Mayrhofer 1990	2730	*Lepra pulvinata*, *Ophioparma ventosa*, *Pertusaria pseudocorallina*	S. & S.W. England, Wales, Cumbria, S. Scotland, Outer Hebrides
phaeophysciae D. Hawksw. 1979	2242	*Phaeophyscia orbicularis*, *Physconia distorta*	Throughout Britain
punctata M.S. Christ. & D. Hawksw. 1979	2243	*Graphis scripta* s.l., *Pertusaria leioplaca*	Throughout Britain
rolfii Diederich & Zhurb. 1997	2327	*Cetraria aculeata*	Wales (Radnorshire), N. England
toruloides Heuchert & Diederich 2016	2690	*Crutarndina petractoides*, *Thelotrema lepadinum*, *T. lueckingii*	S. England, Wales, Cumbria, Scotland (Mull)

CANDELARIALES: PYCNORACEAE

The Pycnoraceae contains a single genus *Pycnora*, which was found to occupy a clade sister to that of the Candelariaceae by Bendiskby & Timdal (2013). The order was considered to belong to a newly described class Candelariomycetes by Voglmayr *et al*. (2018), and to the Lichinomycetes by Díaz-Escandon *et al.* (2022). The description of *Pycnora* below constitutes that of the family Pycnoraceae.

PYCNORA Hafellner (2001)

Thallus crustose, occasionally subsquamulose, usually indeterminate, thick, somewhat rimose, often sorediate; prothallus generally indistinct but more rarely distinctly brown, blue or blackish. **Ascomata** apothecia, marginal or laminal, flat. **Disc** black, not pruinose. **Exciple** remaining prominent, entire or flexuose, of closely conglutinated hyphae, brown in the inner part, brownish black in the rim, not containing crystals, K+ violet, N–. **Hypothecium** dark brown. **Epithecium** dull green to dark brown, not containing crystals, K+ violet, N–. **Paraphyses** mostly unbranched, rarely anastomosing, without swelling or with a pigmented cap in the apical cell. **Asci** K/I+ blue, with a broad central corpus, often poorly differentiated, *Lecanora*-type, 8-spored; ascal gelatin I+ blue but hymenial gel I–. Ascospores aseptate, ovoid to ellipsoidal, colourless. **Pycnidia** conspicuous. **Conidia** developing acrogenously, cylindrical to subglobose, frequently in a coherent jelly. **Chemistry**: alectorialic acid, plus occasional other unknown substances. **Ecology**: on lignum, occasionally bark.

Hypocenomyce (Umbilicariaceae: Ophioparmaceae; see Bendiksby & Timdal 2013) differs in its distinctly squamulose thallus, ascal structure and substantially different chemistry. *Cliostomum* (Lecanorales: Ramalinaceae) is a genus with similarly conspicuous pycnidia as *Pycnora* but differs in the biatorine apothecia and the *Bacidia*-type ascus. *Ramboldia* (Lecanorales: Ramboldiaceae) differs in its immersed pycnidia producing filiform conidia and in the absence of alectorialic acid, and *Pyrrhospora* (Lecanorales: Lecanoraceae) has K+ crimson to purple apothecia and filiform conidia.

Pycnora leucococca (R. Sant.) R. Sant. (2004) was transferred to the new genus *Toensbergia* (Rhizocarpales: Sporastatiaceae) by Bendiksby & Timdal (2013); it was included in Fryday *et al.* (2024).

Literature:
Coppins (2009a), Hafellner & Türk (2001), Spribille & Björk (2008), Timdal (1984).

1 Thallus sorediate 2
Thallus not sorediate 3

2(1) Areoles subsquamulose, with orbicular to capitate soralia ..... ***Toensbergia leucococca***
Areoles weakly convex, with diffuse soredia .....***sorophora***

3(1) Conidia ellipsoidal (average length/width ratio 1.8–2.8).....***praestabilis***
Conidia subglobose (average length/width ratio 1.2–1.7) .....***xanthococca***

Pycnora praestabilis (Nyl.) Hafellner (2001) **NE**
Thallus crustose; areoles to 1.0 (–1.5) mm diam., not sorediate, pale grey to yellowish brown, not glossy. Apothecia rare, to 0.8 (–1.1) mm diam., attached to the areoles or apparently directly on the substratum, persistently flat and marginate, black, not pruinose; disc rarely becoming ± gyrose, margin becoming slightly flexuose; exciple of conglutinated ± thin-walled hyphae with ellipsoidal to shortly cylindrical lumina, inner part and rim blackish brown; hypothecium brown; epithecium green, containing a blackish brown amorphous

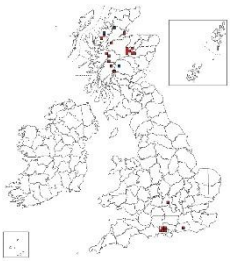
substance which dissolves in K with a violet effusion, N+ violet; hymenium 55-70 µm tall. Paraphyses with apical cells hardly swollen, not pigmented. Ascus clavate, without an apical cap; tholus well-developed, I+ blue and KI+ deep blue, with a parietal I+ blue and KI+ deep blue area. Ascospores ellipsoidal, aseptate, 7–11.5 × 3–4.5 µm. Pycnidia normally abundant, to 0.3 mm diam., the wall dirty green, K–, N+ violet. Conidia ellipsoidal, 3–5.5 × 1.5–2.5 µm. Chemistry: alectorialic acid and xanthococca unknown. Cortex and medulla PD+ yellow, K+ yellow, C+ red, KC+ red, UV–. **BLS 2570**.

On lignum, Scotland (E. Lothian) and chestnut palings, England (Kent). Likely to have been overlooked elsewhere.

Similar to *P. xanthococca* but with ellipsoidal rather than subglobose conidia and slightly thicker areoles, and it tends to occur on worked timber rather than standing stumps. The description has been largely abstracted from Timdal (1984).

Pycnora sorophora (Vain.) Hafellner (2001) **Nb**

Thallus crustose, areoles to 0.5 (–1) mm diam., weakly convex; upper surface dull, light grey or yellowish brown; soralia bursting from apices or more rarely, from margins of the areoles, yellowish brown; soredia farinose, 20–30 (–50) µm diam. Ascomata apothecia (not found in British material), to 0.6 (–0.8) mm diam., marginal or laminal, flat; disc black, not pruinose; margin remaining prominent, entire or flexuose; exciple of closely conglutinated hyphae, brown in the inner part, brownish black in the rim, not containing crystals, K+ violet, N–; hypothecium dark brown; epithecium dark brown, not containing crystals, K+ violet, N–; paraphyses without swelling or a pigment cap in the apical cell. Asci with a well-developed tholus containing an amyloid flank. Ascospores broadly to narrowly ellipsoidal, aseptate, 6–9 × 2.5–4.5 µm. Pycnidia sessile, black, attached to the areole or apparently directly to the substratum; conidia ellipsoidal to shortly bacilliform, 3.5–5 × 1.5–2.5 µm. Soralia C+ red, K+ yellow, KC+ red, P+ yellow, UV+ yellow (alectorialic acid). **BLS 1757**.

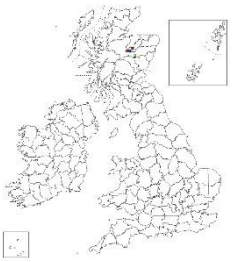


On bark and lignum of old pines, *Quercus* lignum on standing or part fallen trees and *Castanea* lignum on post and rail fencing; rare. England (New Forest, Sussex, Oxfordshire) and Scotland (Highlands).

Similar to *Toensbergia leucococca*, which has larger, prominent areoles and discrete soralia. When areoles are poorly formed, it resembles *Myochroidea porphyrospoda* (Lecanorales; see Cannon *et al.* 2024), which contains lobaric acid (C–, Pd–, UV–).

Pycnora xanthococca (Sommerf.) Hafellner (2001) **VU**

Thallus crustose, areolate, areoles to 0.7 (–1.2) mm diam., not sorediate; surface pale grey to yellowish brown, dull. Apothecia to 0.8 (–1.2) mm diam., often present, attached to areoles, flat with a raised persistent margin, black, not pruinose. Epithecium greenish, sometimes brownish, K+ violet, N+ red. Ascospores 7–13 × 3–7 µm, aseptate, ellipsoidal. Pycnidia usually numerous, the wall greenish, N+ reddish; conidia 2.5–4 × 1.5–3 µm, subglobose. Thallus C+ red, K+ yellow, KC+ red, Pd+ yellow, UV– (alectorialic acid and unidentified substance). **BLS 0579**.



On lignum of old pines in native pinewoods; rare. Scotland (E. Highlands).

Characterized by the crustose, areolate thallus which is C+ red and the flat, black apothecia with a persistent raised exciple. Distinguished from *P. praestabilis* most easily by conidial shape.

CAPNODIALES Woron. (1925)

A large order of Ascomycota with a very broad ecological and nutritional range, primarily of saprotrophs and plant parasites. The circumscription of the order has undergone substantial change

(Abdollahzadeh *et al.* 2020) but for our purposes a broad approach is used, equivalent to Capnodiales s. lat. as defined by these authors. Two families of lichenized fungi are currently assigned to the order, the Cystocoleaceae and Racodiaceae.

Of lichenicolous taxa, there are occasional reports of *Cladosporium* (Cladosporiaceae) on lichens (Diederich *et al.* 2024a), including *C. licheniphilum* Heuchert & U. Braun that has been reported from Britain on *Cladonia pyxidata* and *Xanthoria parietina.* These could well be facultative associations, and more research is needed into the relationships of this species. *Verrucocladosporium dirinae* K. Schub., Aptroot & Crous (also Cladosporiaceae; Diederich *et al.* 2024b) is known from Britain, reported from *Dirina massiliensis* in Somerset. The common species *Xanthoriicola physciae* (Kalchbr.) D. Hawksw., parasitic on *Xanthoria parietina*, is assigned to the Teratosphaeriaceae (Diederich *et al*. 2024c). Other genera could belong here, including the gall-forming *Peltigera* parasite *Hawksworthiana peltigerae*, and the teleomorph genera *Stigmidium* and *Sphaerellothecium* have been assigned to the Mycosphaerellaceae. None of these have molecular sequence data to aid in their disposition.

CYSTOCOLEACEAE Locq. ex Lücking, B.P. Hodk. & S.D. Leav. (2016)

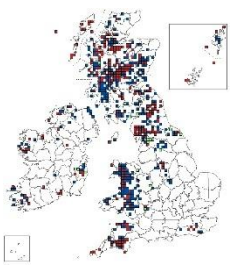
The family contains the single genus *Cystocoleus* Thwaites (1849), so its description below constitutes that of the family. It is placed in the Mycosphaerellales in the system of Abdollahzadeh *et al.* (2020).

CYSTOCOLEUS Thwaites (1849)

As this is a monotypic genus the description below (*C. ebeneus*) constitutes the generic description. Distinguished from *Racodium* (Racodiaceae) by the contorted, nodulose hyphae. *Ephebe*, *Spilonema* and *Thermutis* have cyanobacteria and their asci are K/I–.

Literature:
Fletcher & Dalby (2009a), Hawksworth *et al.* (2011), Muggia *et al.* (2008), Nelsen *et al.* (2009).

Cystocoleus ebeneus (Dillwyn) Thwaites (1849) **NE**



Thallus filamentous, forming wefts or mats, often in small circular patches, the margin not delimited, of elongated but contorted nodulose hyphae, closely surrounding and adhering to single filaments of the *Trentepohlia* photobiont. Filaments numerous, 10–15 µm diam., very dark brown to sooty black, contorted, bent, branches randomly arranged and shortly spiky or wiry; the mycobiont cells short and barrel-shaped with strongly thickened walls, I+ blue-black, N+ reddish. Ascomata and conidiomata not known. No lichen products detected by TLC. **BLS 0477**.

On siliceous rock faces (rarely on tree trunks), in situations where the air is persistently humid but not directly wetted by water; mainly upland. A characteristic species of the Racodietum rupestris, overgrowing *Lepraria*, algae and mosses, etc., often intermixed with *Racodium rupestre*; frequent. S.W. & N. England (Dartmoor, Peak District, Pennines), Wales, W. Scotland. Also rare on sandrock outcrops in The Weald in S.E. England (Sussex, Kent).

The mycobiont is often hard to see being immersed in the photobiont cell walls. Frequently confused with *Racodium rupestre* and only separated with certainty microscopically (see illustration below under *Racodium*); it differs in the contorted and narrow, nodular, shorter-celled hyphae which appear rather paler than those of *R. rupestre* under the microscope.

RACODIACEAE Link (1826)

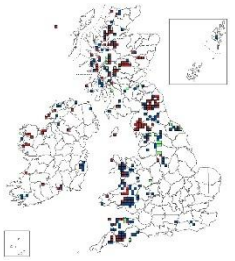
The family contains the single genus *Racodium* Fr. (1829, nom. cons.) which is itself monotypic, so its description below constitutes that of the family. See Hawksworth & Riedl (1977) and Hawksworth *et al.* (2011) for explanation of the complex nomenclature. *Racodium* is placed in the Racodiales in the system of Abdollahzadeh *et al.* (2020).

RACODIUM Fr. (1829)

As this is a monotypic genus the description below (*R. rupestre*) constitutes the generic description. *Racodium* is distinguished from *Cystocoleus* by the straight mycobiont hyphae (see illustration below). *Ephebe*, *Spilonema* and *Thermutis* contain cyanobacteria as the photobiont.

Literature:
Fletcher & Dalby (2009b), Hawksworth & Riedl (1977), Hawksworth *et al.* (2011).

Racodium rupestre Pers. (1794) **NE**

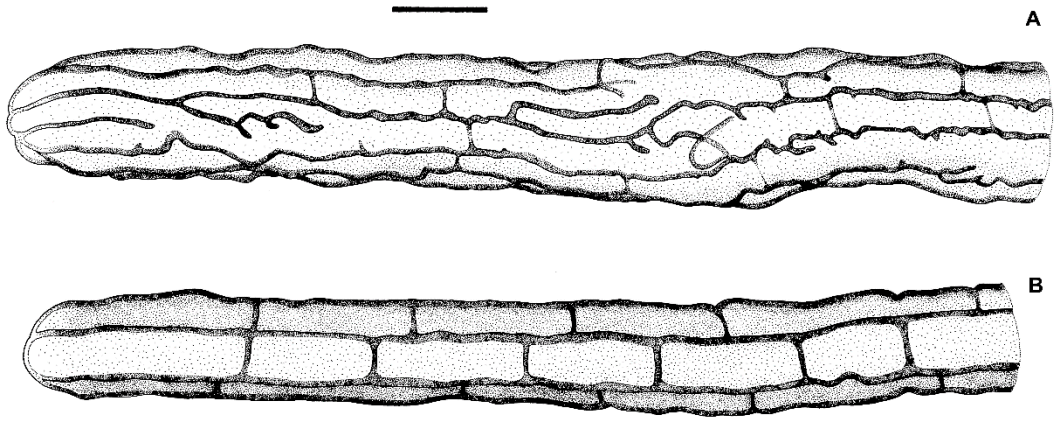


Thallus filamentous, of elongated straight hyphae, longitudinally arranged, closely surrounding the photobiont strands, not corticate, dark brown to black, forming wefts or circular patches, the margin not delimited; hyphae 4–7 per photobiont filament, straight and parallel, unbranched, not nodulose, closely surrounding the *Trentepohlia* photobiont; filaments 10–15 µm diam., chloroplasts I+ blue-black, unbranched, angled, dark brown to sooty black. Ascomata and conidiomata not known. No lichen products recorded. **BLS 1229**.

On vertical faces or below overhangs on siliceous rock (sometimes on more base-rich crystalline rocks), where the air is humid but is not directly wetted, mostly upland; characteristic of the Racodietum rupestris, occasionally growing intermixed with *Cystocoleus ebeneus*; locally common.

Mainly in upland areas of the British Isles and most common in the west.

Distinguished from *Cystocoleus ebeneus* by the straight (not contorted or entwined) hyphae that are not N+ reddish and which have more elongated cells that are slightly darker when seen under the microscope.



Cystocoleus and *Racodium* filament apices. **A**. *C. ebeneus*; **B**. *R. rupestre*. Scale bar = 10 µm.

CHAETOTHYRIALES: family unassigned

PHYLLOBLASTIA Vain. (1921)

Thallus crustose or occasionally very minutely squamulose, often film-like, not corticate or with a thin cortex of isodiametric cells. **Isidia** disc-shaped to scutelliform, often present but only in non-European species. **Photobiont** chlorococcoid but cells usually angular-rounded and in irregular groups or plates. **Involucrellum** absent. **Ascomata** perithecia, sessile, hemispherical to subglobose, pale orange to black. **Hamathecium** absent but periphyses typically present. **Asci** fissitunicate, mostly 8-spored. **Ascospores** cylindrical to ellipsoidal, transversely septate to muriform, with or without constrictions at the septa, colourless, sometimes with a thick gelatinous perispore. **Conidiomata** unknown. **Chemistry**: no substances detected by TLC. **Ecology**: all species are foliicolous.

There are currently no sequence data available for the genus, and its position within the Verrucariales is uncertain. Unpublished molecular data indicates that *Phylloblastia* belongs to the Chaetothyriales, perhaps close to the mostly non-lichenized *Ceramothyrium* (Orange *et al.* 2023, Miyazawa & Ohmura 2024).

Psoroglaena is close to *Phylloblastia* in morphological terms but is distinguished by its usually yellowish perithecia with a neck-like projection of the ostiolar area, a usually microsquamulose to filamentous, rarely crustose thallus and more or less fusiform ascospores.

Literature:
Flakus & Lücking (2008), Kazemi *et al.* (2024), Llop & Gómez-Bolea (2009), Sérusiaux & Lücking (2009), Sérusiaux *et al*. (2007).

1 Ascospores (16–) 20–60 × 4.5–13 µm, ellipsoidal, submuriform **2**
Ascospores (10–) 14–16 × 4–5 µm fusiform-ellipsoidal to slightly clavate, 3-septate..... ***inexpectata***

2 Ascospores (16–) 20–35 (–40) × 4.5–9 (–10) µm, submuriform with (3–) 5–9 transverse septa ... ***fortuita***
Ascospores 27–50 (–60) × 8–13 µm, submuriform with 7–10 transverse septa..... ***bielczykiae***

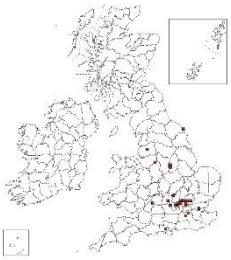
Phylloblastia bielczykiae Flakus & Lücking (2008) **NE**
Thalli forming patches on the leaf surface, around the perithecia, film-like, diffuse, greenish grey, composed of grey-brown hyphae with cells 12–20 × 3–4 µm, apparently lacking symbiotic algae although clumps of chlorococcoid cells are often associated with the thallus. Perithecia sessile, subglobose to hemispherical, with a flattened to depressed top, 0.15–0.18 mm diam. Involucrellum absent. Periphyses colourless, 20–25 × *ca* 4 µm. Asci clavate to obovoid, 8-spored, to 70 × 36 µm. Ascospores ellipsoidal to fusiform with rounded ends, straight to slightly curved, submuriform, with 7–9 transverse and 0–1 (–2) longitudinal septa, slightly constricted at the septa, 27–50 (–60) × (4.5–) 8–13 µm. Conidiomata not known. **BLS 2921**.

On *Ilex* leaves; appears occasional in S. England.

Similar to *P. fortuita,* but with larger and more septate ascospores and longer periphyses. British material closely resembles *P. bielczykiae*, though this has a more developed lichenised thallus. It was described from a single site in tropical savanna in Bolivia (Flakus & Lücking, 2008), so it may well be that our collections belong to a separate species. See also discussion under *P. fortuita*.

Phylloblastia fortuita Llop & Gómez-Bolea (2009) **LC**
Thalli scattered on the leaf surface, well-developed around the perithecia, film-like, diffuse, greenish grey, composed of colourless interwoven hyphae. Photobiont chlorococcoid, algal cells 6–10 µm diam. Perithecia sessile, subglobose to hemispherical, with a flattened to depressed top, 0.1–0.2 (–0.24) mm diam., to 0.1 mm

high, greyish dark brown, the outer wall appearing felted. Involucrellum absent. Exciple 18–32 µm thick, composed of 1–2 rows of globose cells, with an inner layer of angular cells. Paraphyses absent. Periphyses colourless, 6.5–12 × 3.5–5 µm. Asci clavate to obovoid, 8-spored, 40–60 × 15–20 (–25) µm, the apex slightly thickened, not blueing in iodine. Ascospores ellipsoidal to fusiform with rounded ends, straight to slightly curved, submuriform, with (3–) 5–9 transverse and 1–2 longitudinal septa in the middle cells, slightly to strongly constricted at septa, (16–) 20–35 (–40) × (4.5–) 5–9 (–10) µm. Conidiomata not known. **BLS 2591**.

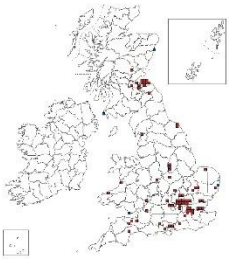


On long-lived, evergreen leaves, commonest on *Ilex* but also on *Buxus*, *Hedera*, *Laurus* and *Viburnum*; common in S. England, scattered further north.

Sometimes in mixed populations with *P. inexpectata* on the same leaf. Ascospores seem to become much larger shortly before release from the asci, perhaps leading to the quoted large variation in size. Some collections on *Ilex* in S. England with even larger ascospores are provisionally equated with *Phylloblastia bielczykiae* (see above), but could simply be especially well-developed material of *P. fortuita*.

Phylloblastia inexpectata Sérus., Coppins & Lücking (2007) **LC**

Thallus foliicolous, often along the main nerves of the leaves, thin (15–25 µm thick), inconspicuous, brown-green or pale grey-green, often with a pink tinge, smooth; cortex a single layer of cylindrical to irregular cells. Perithecia hemispherical to depressed, appearing applanately wart-shaped, 0.1–0.15 mm diam. and <0.1 mm high; pink-brown to almost black, sometimes with a darker red tinge around the depressed ostiole, covered by a thin algal layer until mature; periphyses always present, of a layer of cells with triangular-ovoid apices. Asci clavate or obovoid, 40–48 × *ca* 15 µm, with a thin wall except at the apex, wall K/I–, but protoplasm typically K/I red-brown. Ascospores 8 per ascus, fusiform-ellipsoidal, the upper median and distal cells slightly clavate, with rounded ends, 3-septate, (10–) 14–16 × (4–) 4.5–5 µm. Conidiomata not known. **BLS 2464**.



On non-deciduous leaves (*Buxus*, *Ilex*, *Rhododendron*, *Prunus laurocerasus*, *Hedera*); rare. Common in S. England and S. Scotland, scattered elsewhere.

Both this species and *P. fortuita* appear to have become much more common and widespread in recent years, though this may be partly due to recording effort.

EREMITHALLALES Lücking & Lumbsch (2008)

The Eremithallales contains a single family, the Melaspileaceae Walt. Watson (1929), syn. Eremithallaceae Lücking & Lumbsch (2008). It was included in the Lichinomycetes by Lücking *et al.* (2008), but considered as of uncertain position within the Dothideomycetes by Ertz & Diederich (2015) and Lücking *et al.* (2017a).

MELASPILEACEAE Walt. Watson (1929)

Thallus crustose or immersed, often inconspicuous or evanescent, cortex and medulla not differentiated. **Photobiont** *Trentepohlia*, within the substratum. **Ascomata** apothecia, erumpent to superficial, elongate, sometimes branched, the hymenium exposed permanently or by a longitudinal slit. **Thalline margin** absent. **Exciple** black, well-developed, sometimes forming lobules surrounding the disc. **Hymenium** not blueing in iodine. **Hamathecium** of narrow, sparsely branched and

anastomosing paraphyses, sometimes pigmented at the apex, sometimes with periphyses lining the upper part of the exciple. **Asci** clavate to ellipsoidal, persistent, with a poorly developed apical cap and an ocular chamber, usually not blueing in iodine, 8-spored. **Ascospores** usually 1-septate, colourless or becoming brown, sometimes ornamented. **Anamorphs** unknown.

The family contains three genera, *Encephalographa* A. Massal., *Eremithallus* Lücking, Lumbsch & L. Umaña and *Melaspilea* Nyl. (see below).

MELASPILEA Nyl. (1857)

Thallus crustose, immersed, often evanescent or scarcely apparent. **Photobiont** *Trentepohlia* or rarely trebouxioid. **Ascomata** apothecia, immersed to superficial, lirelliform or rounded and sometimes branched; disc exposed or slit-like, black. **Thalline margin** absent. **Exciple** indistinct to well-developed, continuous below the hymenium to stipe-like, dark brown to black. **Epithecium** usually dark brown. **Hypothecium** colourless to brown. **Hamathecium** of thread-like paraphyses, sparsely branched to anastomosed, colourless or brown-striate; I± blue. **Asci** elongate-clavate, generally thickened at the apex and with an internal apical beak, usually K/I–. **Ascospores** 1-septate, rarely more, ellipsoidal to sole-shaped, smooth-walled to warted, colourless at first but generally brown at maturity. **Conidiomata** unknown. **Chemistry**: thallus reactions mostly negative, rarely with an unidentified pigment by TLC. **Ecology**: on bark, lichenicolous, some species on rock.

This generic name has been traditionally employed for crustose lichens with lirelliform apothecia and brown, 1-septate ascospores. It is very heterogeneous as it encompasses species referable to several different genera, families and orders. An initial phylogenetic survey was carried out by Ertz & Diederich (2015), but the group remains in need of a modern revision and it is possible that none of the species treated here belong to *Melaspilea* s. str. The lichenicolous species currently placed in *Melaspilea* should almost certainly be removed, probably to the Asterinales (see above, and Diederich *et al*. 2018).

The type and only collection of *M. constrictella* Stirt. was reputedly collected from Argyll, but is now considered not to have originated from our region. Several further, apparently undescribed species referable to this wide concept of *Melaspilea* are known from Britain.

M. granitophila has been transferred to *Arthonia* (see Frisch et al. 2014, Cannon *et al.* 2020), *M. proximella* to *Melaspileella* and *M. lentiginosa* to *Stictographa* (Ertz & Diederich 2015, this volume).

Literature:

Ertz & Diederich (2015), Flakus *et al*. (2014), Perlmutter *et al.* (2015), Sanderson *et al.* (2009).

1 Growing on lichens 2
Not growing on lichens 4

2(1) Ascospores 13–15 (–16) × (5–) 5.5–7 (–7.5) µm; on *Phaeographis* ..... ***Stictographa lentiginosa***
Ascospores 18–32 × 9–16 µm; on *Verrucaria* or *Graphis elegans* 3

3(2) Apothecia 0.3–1.5 × 0.2–0.5 mm, with a slit-like disc; on *Graphis elegans* ..... ***diplasiospora***
Apothecia 0.15–0.5 × 0.1–0.2 mm, with the disc exposed; on *Verrucaria* ..... ***leciographoides***

4(1) On rocks 5
On bark 6

5(4) Apothecia rounded to shortly lirellate, 0.1–0.4 mm long; ascospores (9.5–) 11–14 (–19) µm long ..... ***Arthonia granitophila***
Apothecia lirellate, 0.4–1 (–1.4) mm long; ascospores 17–23 µm long ..... ***interjecta***

6(4) Apothecia elongate; disc remaining slit-like 7
Apothecia elongate, rounded or angular; disc finally exposed, then not slit-like 10

7(6) Ascospores mainly <15 µm in length 8
Ascospores mainly >15 µm in length 9

8(7) Ascospores 12–14 (–18) µm long, lirellae 0.2–0.5 mm long ..... ***bagliettoana***
Ascospores 8.5–11 µm long, lirellae 0.2–2 mm long ..... ***atroides***

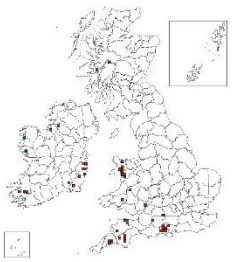
9(7) Ascospores 19.5–27 (–32) µm long; paraphyses not anastomosing ..... ***diplasiospora***
Ascospores 14–21 (–23) µm long; paraphyses anastomosing ..... ***lentiginosula***

10(6) Apothecia sessile, <0.75 mm diam. or in length; exciple thick; ascus apex K/I– 11
Apothecia erumpent, 0.2–1.25 (–1.5) mm diam.; exciple thin; ascus apex K/I+ blue ..... ***amota***

11(10) Apothecia 0.1–0.2 (–0.3) mm diam.; hymenium K/I+ blue ..... ***Melaspileella proximella***
Apothecia (0.2–) 0.3–0.75 mm diam.; hymenium K/I– 12

12(11) Ascomata elongate, straight or curved; ascospores 12–14 (–18) × 4.8–6 (–8) µm, with polar appendages when young ..... ***bagliettoana***
Ascomata rounded to angular; ascospores 17-21(-28) × 6-8.5(-12) µm, apparently without appendages ..... ***ochrothalamia***

Melaspilea amota Nyl. (1867) **NT**

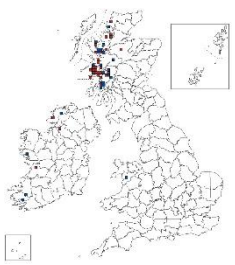


Thallus evanescent, grey to cream, probably not obligately lichenized. Apothecia to 0.2–1.25 (–1.5) mm diam., rounded or angular, erumpent, disc flat; exciple thin; hymenium colourless to brownish in parts, I+ blue; hypothecium dark brown; paraphyses branched and anastomosing. Asci 45–75 × 12–25 µm, (4-) 8-spored, clavate, with an internal apical beak, apex K/I+ blue. Ascospores 14.5–18.5 × 7.5–12.5 µm, sole-shaped, smooth, remaining colourless or becoming pale brown. **BLS 0864**.

On smooth bark of old *Quercus* and rarely other species, including *Acer campestre*, *Fagus* and *Tilia*; avoids strongly acidic or base rich bark; local, certainly under-recorded. S.W. England (Cornwall, Hampshire, Devon, Gloucestershire, Wiltshire), N. Wales, W. Scotland, throughout Ireland.

Distinguished from *M. ochrothalamia* and *Melaspileella proximella*, which also have a dark hypothecium, by the K/I+ blue hymenium and ascus apices, and from *M. atroides* in the shape of the apothecia.

Melaspilea atroides Coppins (1992) **Nb IR**



Thallus immersed in bark, white to cream or yellow-tinged near the apothecia, becoming evanescent. Apothecia lirelliform, black, 0.2–2 × 0.1–0.2 mm, oblong to elliptical in outline, sometimes branched or curved, disc slit-like; exciple inflexed and raised, 24–31 µm wide, dark brown, K+ dark green; hymenium with brownish pigmented columns, I+ blue; hypothecium dark brown; paraphyses sparse, anastomosing, the apices with brown granules. Asci 22–30 × 11–15 µm, 8-spored, clavate, with an internal apical beak. Ascospores 8.5–12 (–13) × 3–3.5 µm, sole-shaped, becoming warted and brown. Pycnidia ± immersed, ± globose, black, 30–60 µm diam. Conidia bacilliform or slightly curved, colourless, aseptate, 4–5 × *ca* 1 µm. Thallus K+ orange; no lichen products detected by TLC. **BLS 1718**.

On *Corylus*, associated with *Graphis*, *Pyrenula* and *Thelotrema* species; widespread in W. Scotland (Kintyre to Assynt); a few records from N. Wales (Merioneth), & W. Ireland (Killarney, Connemara, Donegal).

Easily confused with *Arthonia atra*, which has 3-septate ascospores, and a transfer to that genus might well be justified. *A. excipienda* differs in a less well-developed exciple and larger ascospores.

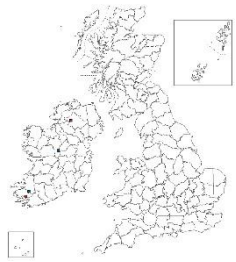
Melaspilea bagliettoana Zahlbr. (1904) **NT**

Thallus inconspicuous, probably not obligately lichenized. Apothecia lirelliform, 0.2–0.5 × 0.1–0.2 mm, unbranched, straight or curved; disc slit-like, finally exposed, brownish; exciple developed only laterally, 30–36 µm wide; epithecium and exciple brown in K; hymenium colourless, I+ blue. Paraphyses unbranched or sparingly branched above, periphyses apparently absent. Asci 28–34 × 15–17 µm, 8-spored. Ascospores 12–14 (–18) × 4.8–6 (–8) µm, colourless to smoky brown, when young with one or more polar flagella. **BLS 0876**.

On *Fraxinus*, on 'bare' bark, in oceanic woodlands; rare, probably under-recorded. S.W. England (Dartmoor), S.W. Wales (Pembroke), W. Scotland (W. Ross, E. Inverness).

This species may be referable to *Melaspileella* (q.v.), on the basis of the ascospores which have polar appendages when young (Ertz & Diederich 2015, Jordal *et al*. 2022).

Melaspilea diplasiospora auct. br., *non* (Nyl.) Müll. Arg. (1887) **NE**



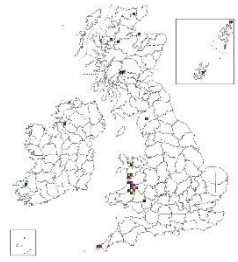
Thallus immersed in host lichen. Apothecia 0.3–1.5 × 0.2–0.5 mm, elongate, unbranched, occasionally curved, partly immersed to superficial; disc slit-like; exciple well-developed, raised; hymenium colourless, I+ blueish; paraphyses sparsely branched. Asci 75–105 × 28–37 µm, 8-spored, clavate, with an internal apical beak. Ascospores 19.5–27 (–32) × 9.5–13.5 (–16) µm, sole-shaped, smooth, brown. **BLS 0866**.

On *Graphis elegans*, on smooth bark of *Ilex* and on *Tilia*; not recorded recently but easily overlooked. Wales (Merioneth), scattered in Ireland.

Old apothecia fall away to leave a black elongate outline. Distinguished from other British species referred to *Melaspilea* by the longer ascospores.

Melaspilea diplasiospora was transferred to the saprotrophic genus *Melaspileopsis* by Ertz & Diederich (2015), but the GB collections do not conform to the type and presumably belong to one or other lichenicolous genera of the Asterinales (see above in this volume). It appears not to be the same as *Hemigrapha graphidicola* Diederich & Common (Diederich *et al*. 2019).

Melaspilea interjecta (Leight.) A.L. Sm. (1911) **Nb IR**



Thallus evanescent or thinly scurfy, pale green-grey to pale fawn; photobiont cells 5–16 µm, diam., trebouxioid. Apothecia 0.4–1 (–1.4) × 0.2–0.3 (–0.5) mm, lirellate, simple or forked, at first with a slit-like disc and a tumid margin, later developing additional slits or becoming subgyrose-contorted; exciple well-developed, reddish brown-black, K± olivaceous; epithecium pale to dark brown, K± olivaceous; hymenium 70–85 µm tall, colourless, I+ yellowish, K/I+ blue; hypothecium concolorous with exciple; paraphyses 1.5–2 µm diam., richly branched and anastomosed. Asci 47–53 × 21–26 µm, 8-spored; apical dome with a narrow ocular chamber. Ascospores 17–23 × 7–9 µm, 1-septate, slipper-shaped, constricted and easily broken at the septum, colourless but old spores brown and finely warted. **BLS 1719**.

On siliceous rocks in humid or flushed situations; rare. Wales (Brecon, Cardigan, Merioneth), England (Cornwall, Cumbria), Scotland (Highlands), a few records from Ireland.

M. interjecta has the appearance of an *Opegrapha* (or perhaps *Arthonia calcarea* s.l.), although specimens with subgyrose apothecia are likely to be overlooked as *Polysporina simplex*. Formerly considered a synonym of *Poeltinula cerebrina*, a species of hard limestone with a very different thallus, ascus structure and ascospore pigmentation.

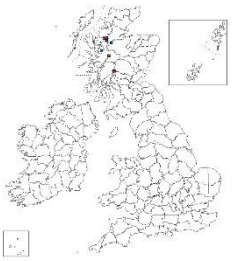
Melaspilea leciographoides Vouaux (1913) **NE**

Thallus immersed in host lichen. Apothecia 0.15–0.5 × 0.1–0.2 mm, rounded at first but becoming elongate,

sometimes in groups of 2–6, superficial; disc exposed; exciple thin, raised; hymenium colourless, I+ blue; hypothecium brownish; paraphyses branched, the apices capitate, swollen to 3.5 µm diam.. Asci 65–80 × 23–28 µm, 8-spored, clavate. Ascospores 18–22 × 9–12 µm, finally pale brown, sole-shaped. **BLS 1948**.

On an unidentified *Verrucaria* sp.; no recent records and the status of the species is uncertain. N. England (S. Lancashire).

Melaspilea lentiginosula (Nyl.) A.L. Sm. (1911) **NT IR**

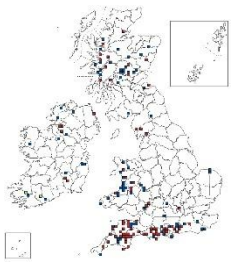


Thallus inconspicuous. Apothecia 0.2–0.8 × 0.1–0.2 mm, oblong to elliptical in outline, branched, usually curved, sometimes aggregated, superficial; disc slit-like; exciple thick, raised, inflexed; hymenium colourless, I+ blue; hypothecium colourless and in contact with the substratum; paraphyses sparsely branched. Asci 37–50 × 14–26 µm, (4-) 8-spored, clavate, with an internal apical beak. Ascospores 14–21 (–23) × 6–11 µm, sole-shaped, ± warted, brown. **BLS 1949**.

On smooth surfaces of mature *Pinus* bark; rare. N.W. England (Westmorland), N. Scotland (Perth, West Inverness, West Ross).

The species was described an illustrated by Jordal *et al.* (2017). *Melaspileella proximella* (Asterinales) differs in the consistently rounded apothecia, the generally coloured hypothecium and hymenium, the latter also being K/I–.

Melaspilea ochrothalamia Nyl. (1865) **Nb**



Thallus absent or inconspicuous, possibly immersed in other lichens and then lichenicolous; the frequently observed orange to rust-coloured coloration, especially near the apothecia, is likely to be caused by damage to the host lichen. Apothecia (0.2–) 0.3–0.75 mm diam., rounded to angular by compression, solitary or in groups of 2–3, superficial; disc exposed; exciple well-developed, sometimes orange-tinged; epithecium green to orange-brown; hymenium pale brown, I–; hypothecium pale brown; paraphyses to 4 µm diam., sparsely branched; apices capitate, pale green to brown. Asci 54–70 × 15–30 µm, 8-spored, clavate, with an internal apical beak. Ascospores 17–21 (–28) × 6–8.5 (–12) µm, sole-shaped; apices sometimes attenuated, smooth (surface roughened, under scanning electron microscope), pale brown. **BLS 0867**.

Often regarded as a lichen but appears to be a generalist lichenicolous fungus, found on lichens on smooth bark, especially on *Quercus*, also *Castanea*, *Fagus*, *Salix* and *Sorbus*, in moist woodlands with infected lichens including *Anisomeridium ranunculosporum*, *Lecanora symmicta*, *Megalaria pulverea*, *Phylictis agelaea*, *Schizotrema quercicola* and *Thelotrema lepadinum*; widespread in S.W. & S. England, Wales, N. Scotland, rare in E. England (Norfolk), N. England (Northumberland), S. Scotland (Kirkcudbright, Lothian), scattered records across Ireland (Kerry, Cork, Wicklow, Donegal, Londonderry).

The rounded to angular apothecia, often with orange-brown pigments, are particularly characteristic. *Melaspileella proximella* differs in the K/I+ pale blue hymenium and shorter apothecia, with a conspicuous raised exciple. *Melaspilea amota* has a dark blue hymenium and ascus tips.

LEOTIALES Korf & Lizoň (2001)

MNIAECIACEAE Baral (2019)

Mniaecia was treated as a distinct lineage within the Leotiales by Baral (2016), and the family was formally introduced in Johnston *et al*. (2019).

Recent research (Quijada *et al.* 2018, Tian *et al.* 2024) suggests that the lichenicolous genus

Epithamnolia Zhurb. (2012) belongs in the Mniaeciaceae. There is an unconfirmed report of *Trizodia acrobia* from algal film in Wales (Anglesey); that species might also be related to the Mniaeciaceae (Quijada *et al.* 2018); see Stenroos *et al*. (2010) for more information.

EPITHAMNOLIA Zhurb. (2012)

Ascomata not known. **Conidiomata** brown to blackish or rarely blue-green, smooth or rugose, irregularly subglobose, becoming cupuliform with age, initially almost closed and half-immersed in the host thallus, finally superficial with an irregular opening, scattered or in small groups. **Exciple** medium to dark brown, the surface layer of globose to angular cells, extended vertically towards the opening, K−. **Conidiophores** absent or reduced to short fertile hyphae lining the inner wall of the exciple. **Conidiogenous cells** formed terminally or laterally below septa, proliferating percurrently to a small degree with an indistinct collarette and periclinal thickening, colourless, lageniform to narrowly ellipsoidal, smooth-walled. **Conidia** arising singly, not catenate, colourless, filiform to cylindrical, rarely bacilliform, strongly curved in some species, sometimes attenuated towards the obtuse or slightly truncate ends, ± straight, 0- to multi-septate, not constricted at the septum, smooth- and thin-walled, sometimes with sparse inconspicuous guttules.

All species are lichenicolous, and several were once placed in an unrelated genus *Hainesia* (Suija *et al*. 2017). The conidiomata have frequently been described as pycnidia, but they do not conform to that structural morph. At least some species appear not to be strongly host-specific, but molecular data are sparse. Conidial length, septation and curvature seem to be variable depending on state of maturity of the collection, making identification problematic. Much of the information here has been adapted from Suija *et al*. (2017).

Several British collections cannot definitely be assigned to published species. A specimen on *Ephebe lanata* from Cumbria has blue-green conidiomatal walls and may be referable to *E. atrolazulina* (Etayo) Diederich (2018).

Literature:
Suija *et al*. (2017), Zhurbenko (2012).

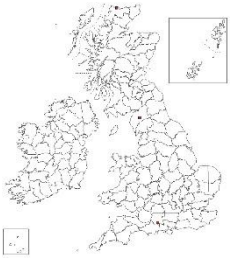
1 Conidia 10–30 µm long, 0–1(–3)-septate ..... ***pertusariae***
Conidia > 35 µm long, 0–6 (–8)-septate..... ***xanthoriae***

Epithamnolia pertusariae (Etayo & Diederich) Diederich & Suija (2017) **NE**

Conidiomata (30–) 80–150 µm diam., cupulate to discoid, partially immersed in the host thallus. Exciple brown, composed of angular to elongate cells. Conidiophores septate, unbranched or branched, of 1–3 elongate filiform cells, each 5–11 × 1.3–2.8 µm. Conidiogenous cells 6–9.5 × 1.6–2 µm, formed terminally or laterally below septa, colourless, smooth-walled. Conidia bacilliform to filiform, straight or slightly bent, basally truncate, apically ± rounded, attenuated towards both ends, 0–1(–3)-septate, 10–24.5 × 1–1.5 µm. **BLS 2292**.

On an unknown lichen, Scotland (Mull) and on *Varicellaria hemisphaerica* (East Lothian); also unconfirmed records from *Lecania naegelii* (Scotland: Great Cumbrae), *Lepraria* sp. (S. Devon) and *Tephromela atra* (N. Devon).

Epithamnolia xanthoriae (Brackel) Diederich & Suija (2017) **NE**



Conidiomata 100–250 µm, eventually cupulate and ± superficial. Conidiophores septate, unbranched or branched, of 1–3 elongate filiform cells, each 7–11 × 2–2.2 µm. Conidiogenous cells 5–11 × 1.5–2.5 µm. Conidia filiform, straight or rarely bent, sometimes strongly curved when attached to the conidiophore, basally slightly

truncate, apically rounded, distinctly attenuated towards both ends, 0–5(–8)-septate, (25–) 40–84 × (1.8–) 2–3 (–4) µm. **BLS 2671**.

On *Xanthoria parietina*, England (S. Wiltshire); morphologically similar specimens from *Clauzadeana macula* (Scotland: W. Sutherland), *Lecanora cenisia* (Scotland: Angus), *L. confusa* (England: Scilly Is), *L. gangaleoides* (England: Cumberland), *L. pulicaris* (Scotland: Banffshire, Midlothian), *Lecidella elaeochroma* (Scotland: W. Inverness) and *Lepra corallina* (England: Westmorland).

MNIAECIA Boud. (1885)

Thallus not present, **photobiont** absent. **Ascomata** apothecia, initially closed but becoming discoid, sessile, superficial, non-gelatinous, white or blue-green, with a smooth margin, without setae or hairs; disc concave to convex. **Exciple** composed of of upwardly directed hyphae that meet the surface at a low angle, the cells globose below and prismatic above, without crystals. **Hamathecium** of numerous slender septate paraphyses, which are unbranched or forked above and have slightly swollen to clavate apices; gel weak or absent. **Asci** 8-spored, cylindric-clavate, with a thick, non-amyloid apical dome containing a cylindrical tube- or plug-like structure (visible in Congo Red). **Ascospores** ± ellipsoidal, aseptate, smooth, without a distinct perispore, colourless. **Anamorph** unknown. **Chemistry**: not known. **Ecology**: on leafy liverworts in montane areas.

Mniaecia species are considered to be biotrophic parasites of liverworts (e.g. Raspé & De Sloover 1998), and has not been associated in a symbiosis with algae. As such there would be justification for omitting it from this account, but it is retained as the genus is recorded primarily by lichenologists in Britain.

Literature:
Baral (2016), Baral *et al.* (2020), Coppins & Chambers (2009), De Sloover (2001), Egertová *et al.* (2016), Johnston *et al*. (2019), Quijada *et al.* (2018), Raspé & De Sloover (1998), Tian *et al*. (2024).

1 Apothecia blue-green when moist ..... ***jungermanniae***
Apothecia whitish, cream or pinkish when moist 2

2(1) Ascospores 8–11 × 4–5.5 µm, asci 59–69 × 8–10 µm..... ***albida***
Ascospores (13–) 15–22.5 × 7–8.5 µm, asci 140–190 × 15–18 µm ..... ***nivea***

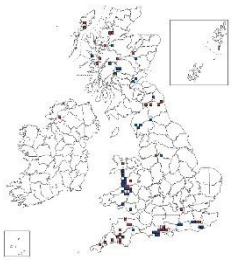
Mniaecia albida (P. Crouan & H. Crouan) Priou & Baral (2020) **NE**

Apothecia 130–180 (–270) µm diam. and 90–130 µm high, pulvinate to turbinate, white to very pale cream when fully hydrated and yellowish when dry, sessile, scattered or in small clusters. Exciple colourless, the basal part composed of thin-walled globose cells 6–9.5 µm diam., the outer surface in the upper part covered with short upwards-directed clavate to cylindrical thin-walled cells 9–14.5 µm in length and 3–4.2 µm diam., the terminal cells further elongated and hypha-like, to 35 µm in length and 2.5–3 µm diam., fairly thin-walled, smooth, the apices obtuse. Paraphyses 1.5–2 µm diam., copious, quite thick-walled, unbranched, the ends obtuse and strongly recurved. Asci 59–69 × 8–10 µm, cylindric-clavate to clavate, with a short tapering stalk, the apices distinctly thickened, not blueing in iodine, 8-spored. Ascospores obliquely uniseriate to biseriate, 8–10.8 × 3.9–5.3 µm, rather variable in shape, ellipsoidal to clavate or cylindric-clavate, often becoming 1- or rarely 2-septate with maturity, very thin-walled, colourless, smooth, containing multiple small oil droplets, without a perispore. Anamorph unknown. **BLS 2790**.

On clay soil covered by an algal film, England (S. Devon), and over decaying bryophytes on old mine sites, W. Wales. Also on liverworts (*Calypogeia* sp & *Diplophyllum albicans*) on sandstone rock in woodland England (Sussex).

The species appears to be variable especially in ascospore size, and more than one taxon may be involved (Baral *et al*. 2020). Other collections are associated with leafy liverworts.

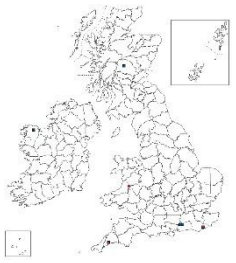
Mniaecia jungermanniae (Nees ex Fr.) Boud. (1906) **NE**



Apothecia 0.2–0.6 (–2.0) mm. diam., blue-green when moist, drying green-black; disc flat with a slightly raised margin; exciple composed of thin-walled globose to slightly angular cells; epithecium and exciple bright blue-green, K+ dull yellow-green, N−, hymenium 100–150 µm tall, colourless or pale blue-green above; paraphyses with swollen apices, often clavate, green, to 7 µm diam. Asci 140–200 × 17–22 µm, cylindric-clavate, 8-spored. Ascospores (14–) 16–23 × 8–12 µm, ellipsoidal or rarely pyriform, colourless, aseptate, thin- and smooth-walled. **BLS 0904**.

On leafy liverworts (e.g. *Cephalozia*, *Diplophyllum*, *Nardia*) on acid turf, rocks or rotting wood; mostly upland; local. N. and W. Britain, also in acid soils areas along the south coast, N. Ireland.

Mniaecia nivea (Crouan) Boud. (1907) **NE**



Like *M. jungermanniae* but the apothecia are whitish or pinkish (lacking blue-green pigment), with the exciple consisting of intertwined hyphae and paraphyses without swollen apices. Asci are 140–190 × 15–18 µm and ascospores (13–) 15–22.5 × 7–8.5 µm, length/width ratio of the spores averaging 2.15: 1 in *M. nivea* (approx. 1.85: 1 in *M. jungermanniae*). **BLS 0905**.

Habitats similar to *M. jungermanniae*: apparently rare but probably overlooked as very inconspicuous when dry. England (Cornwall), Scotland (Mid Perthshire), Wales (Ceredigion), Ireland (West Mayo).

Similar in the field to some *Vezdaea* species which, however, have very different asci. Likely to have been confused in the past with *M. albida*; records from Sussex fall into this category.

LICHENOSTIGMATALES Ertz, Diederich & Lawrey (2013)

PHAEOCOCCOMYCETACEAE McGinnis & Schell (1985)

The Lichenostigmatales contains the single family Phaeococcomycetaceae, the type of which belongs to a genus of saprotrophs assigned to the "black yeasts", with cells with melanized walls that proliferate by budding rather than septation (Ertz *et al.* 2013b). In addition to *Phaeococcomyces*, two genera commonly studied by lichenologists are included, *Etayoa* Diederich & Ertz and *Lichenostigma* (see below), the last having asexual morphs historically assigned to the form-genus *Phaeosporobolus*. Species are morphologically similar to those of *Lichenothelia* (Lichenotheliaceae: Lichenotheliales; q.v.) although the two groups are not closely related. *Etayoa* does not occur in our region.

LICHENOSTIGMA Hafellner (1982)

Thallus absent (lichenicolous), surface mycelium absent or very sparse. **Ascostromata** scattered over the host thalli, dark brown to blackish, ± globose when young, later often becoming elongate, frequently slightly or distinctly centrally depressed, sometimes resembling lirellae when old, breaking

down irregularly to release the spores. **Exciple** composed of ± globose, thick-walled stromatic cells, proliferating by budding, outer cells dark brown, often with a verrucose or mosaic-like ornamentation, internal cells colourless to pale brown. **Hamathecium** absent. **Asci** developing between stromatic cells without distinct locules, (4–) 8-spored, ± globose to broadly ellipsoidal, ± sessile, the wall very thick in the apical region, often with a distinct ocular chamber, structurally fissitunicate but frequently deliquescing. **Ascospores** colourless when young, outer wall occasionally K/I+ blue, sometimes becoming dark brown when old, 1-septate, ellipsoidal or elongate, with roundish or attenuated and pointed apices. **Conidiomata** frequent, often intermixed with ascomata from which they are macroscopically indistinguishable. **Conidiophores** absent. **Conidiogenous cells** pale to medium brown, developing directly from stromatic cells, polyblastic, seceding with the conidia. **Conidia** multicellular, composed of a ball of cells, ellipsoidal, brown, smooth but sometimes with a verrucose to echinulate ornamentation when over-mature, the cells ± globose to ellipsoidal.

Ascomata and conidiomata of *Lichenostigma* species have a unique structure and ontogeny, though they are superficially similar to ascomata of *Lichenothelia* which also have small black fruit-bodies and broadly similar asci and ascospores. Most species of *Lichenostigma* subgen. *Lichenogramma* should probably be assigned to the latter genus. The group needs further revision and host specificity is uncertain, but three species currently assigned to *Lichenostigma* occur in our region. The descriptions and key are largely adapted from Ertz *et al*. (2013b).

Literature:
Berger & Brackel (2011), Calatayud *et al.* (2002), Ertz *et al*. (2013b), Fernandez-Brime *et al*. (2010), Hafellner (1982), Hawksworth & Hafellner (1986).

1 Ascomata connected by a net of usually superficial brown vegetative hyphae; conidiomata not known; on *Circinaria* and *Lobothallia* ..... ***Lichenothelia elongata***
Ascomata (where present) not connected by a net of brown hyphae; conidiomata prominent 2

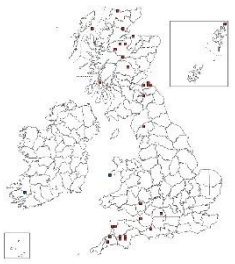
2(1) Conidia 6–10 × 5.5–9 µm, composed of 4–9 cells [in optical section 4–5(−8) cells]; ascomata extremely rare; ascospores brown; on corticolous species of *Lecanora* ..... ***chlaroterae***
Conidia larger, at least 10 × 8.5 µm, composed of at least 8 cells; ascospores colourless or brown 3

3(2) Conidia mostly 10–15 × 8.5–11 µm, composed of 8–17 cells [in optical section 6–10 cells]; ascomata extremely rare; ascospores colourless; mainly on Pertusariales ..... ***alpinum***
Conidia mostly 14–23 × 10–16 µm, composed of 14–35 cells [in optical section 10–21 cells]; frequently accompanied by ascomata; ascospores dark brown, ellipsoidal, 9–12 × 4.5–6 µm 4

4(3) Ascomata in clusters, to 200 µm diam; ascospores with deep irregular fissures forming a rough areolate pattern; on *Diploschistes* ..... ***Lichenothelia rugosa***
Ascomata scattered, to 120 µm diam.; ascospores verruculose; most records on *Usnea* but also on other, mainly epiphytic fruticose lichens ..... ***maureri***

Lichenostigma alpinum (R. Sant., Alstrup & D. Hawksw.) Ertz & Diederich (2013) **NE**

Phaeosporobolus alpinus R. Sant., Alstrup & D. Hawksw. (1990)



Superficial mycelium absent. External cells of stromata medium to dark reddish brown, with a verrucose to sometimes indistinctly mosaic-like ornamentation. Ascomata very rare and not certainly identified (see Ertz *et al*. 2013b). Conidiomata frequent, (20–) 25–100 (−150) µm diam.; conidia ± globose to ellipsoidal, (10–) 11–13.5 (−15) × (7–) 8.5–10.5 (−12) µm, composed of (4–) 8–17 (−22) smooth, rarely verrucose cells [in optical section (4–) 6–10 (−12) cells], cells (3–) 3.5–5 (−6) µm diam. **BLS 2143**.

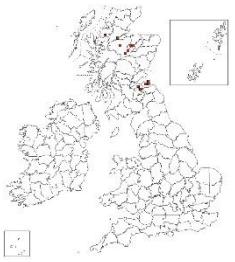
On thalli of *Lepra*, *Ochrolechia*, *Pertusaria* and *Phlyctis*; scattered throughout

Scotland, also S.W. and N.W. England and Wales (Monmouthshire).

Ascomata have not been recorded from Britain and Ireland, and rare specimens of putative teleomorphs from elsewhere certainly refer to more than one species (Ertz *et al*. 2013b). For this reason the species is considered to be an aggregate, and records on some other hosts (e.g. *Phaeographis* from Devon) may belong to cryptic taxa. Older records on *Lecanora* spp. probably refer to *L. chlaroterae*.

Lichenostigma chlaroterae (F. Berger & Brackel) Ertz & Diederich (2013) **NE**

Phaeosporobolus chlaroterae F. Berger & Brackel (2011)



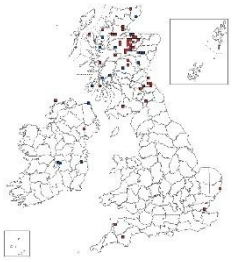
Superficial mycelium absent. Ascostromata very rare, not known in British and Irish populations, macroscopically indistinguishable from conidiostromata. Conidial stromata frequent, variable in diameter, in young populations frequently less than 20 µm diam., in older populations to 80 µm diam. or more; external cells with a verrucose or granulose ornamentation. Conidia ± globose to ellipsoidal, (5.5–) 7–10 (−13) × (5–) 6–9 (−11) µm, composed of (3–) 4–9 (−16) cells that are smooth, rarely with an echinulate ornamentation when overmature [in optical section (3–) 4–6 (−8) cells], cells (2.5–) 3–4.5 (−6) µm diam. **BLS 2632**.

On thalli and apothecia of *Lecanora* spp., including *L. chlarotera* s.l., *L. confusa* and *L. pulicaris*; also one record on *Glaucomaria carpinea*; scattered throughout Scotland, also S.W. England (Dorset, Scilly Is). Certainly under-recorded.

Distinguished especially by its small conidia, in addition to host identity. As with other *Lichenostigma* species, cryptic species are suspected within the species aggregate.

Lichenostigma maureri Hafellner (1983) **NE**

Phaeosporobolus usneae D. Hawksw. & Hafellner (1986)



Superficial mycelium absent. Stromata (30–) 50–100 (−120) µm diam.; external cells with a verrucose ornamentation. Ascomata frequent; asci (4–) 8-spored, 20–25 × 13–18 µm; ascospores ellipsoidal, 1-septate, when young colourless and smooth, soon becoming dark brown and verruculose, 9–12 × 4.5–6 µm. Conidiomata frequent, often intermixed with ascomata from which they are macroscopically indistinguishable; conidia ± globose to ellipsoidal, (9–) 14.5–22.5 (−24) × (8–) 10.5–16 (−17) µm, composed of (8–) 14–36 (−45) cells [in optical section (6–) 10–21 (−23) cells], cells (3–) 3.5–4.5 (−6) µm diam.

On thalli of *Usnea* spp., more rarely recorded from other fruticose species such as *Evernia prunastri* and *Pseudevernia furfuracea*; scattered throughout Scotland, Ireland and S.W. England.

Older records on *Lecanora* should probably be assigned to *L. chlaroterae*, and the status of collections from southern England on *Lecidella* and *Flavoparmelia* need confirmation.

LICHENOTHELIALES K. Knudsen, Muggia & K.D. Hyde (2013)

LICHENOTHELIACEAE Henssen (1986)

The Lichenotheliales contains the single family Lichenotheliaceae, and genus, *Lichenothelia*. None of the species are lichenized, but are frequently assumed to be so by field mycologists, and also confused with *Lichenostigma* (Lichenostigmataceae, Lichenostigmatales). *Lichenothelia* was not formally treated in the second edition of *Lichens of Great Britain and Ireland*, but was included in keys. A more detailed account is provided here.

LICHENOTHELIA D. Hawksw. (1981)

Ascomata ascostromata, developing singly from a crustose, black, often areolate and apparently non-lichenized thallus, sometimes extended longitudinally, loosely associated with various algae. **Ascostromata** convex to hemispherical, composed of pseudoparenchymatous cells, the asci developing in locules within, outer wall dark brown to black, similar to the thallus in structure, a central disc-like depression forming at maturity by dissolution of the tissue over the ascus-containing layer so that the ascomata finally appear as if lecideine with a swollen black margin. **Hamathecium** of pseudoparaphyses, persistent, short-celled, often angular, very irregularly branched and anastomosing. **Asci** broadly clavate to elongate-clavate or almost subcylindrical, short-stalked, fissitunicate, thick-walled especially towards the apex which has an internal apical beak when young, outer coat of the ascus turning deep blue or unchanged in iodine, 8-spored. **Ascospores** biseriately arranged, ellipsoidal to soleiform, rounded at the apices, 1- to 3-septate or submuriform, slightly or clearly constricted at the central septum, golden to dark brown, ± smooth-walled to finely verruculose, with a gelatinous perispore which is conspicuous, present at maturity, and swelling markedly in K. **Anamorph**: not known. **Chemistry**: all reactions negative. **Ecology**: most species are lichenicolous, some (including the type) appearing to be neither lichenized or lichenicolous and with obscure nutritional status.

Lichenothelia occupies an isolated position within the Dothideomycetes (Muggia *et al.* (2012), Ertz *et al.* 2013b, Hyde *et al*. 2013, Diederich *et al.* 2018), and its closest relatives are unknown. Species of *Lichenostigma* share many morphological characteristics with *Lichenothelia*, and a number probably need to be transferred, especially those assigned to *Lichenostigma* subgenus *Lichenogramma* (Ertz *et al*. 2013b). The molecular phylogenies contributed by Ertz *et al.* (2013b) and Muggia *et al.* (2015) demonstrate that the two genera are not at all closely related. Four species are currently accepted as British, including *L. elongata* that is transferred here from *Lichenostigma*.

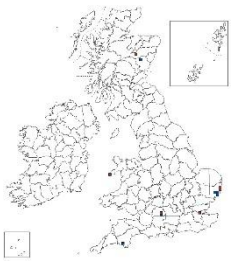
Literature:
Ametrano *et al.* (2019), Diederich *et al.* (2018), Ertz *et al.* (2013b), Hawksworth (1981), Henssen (1987), Hyde *et al*. (2013), Muggia *et al*. (2012, 2015).

1 Ascospores 25–30 × 11.5–15 µm; on *Bagliettoa* ..... ***renobalesiana***
Ascospores smaller, within the range 10–13 × 5–8.5 µm..... 3

2(1) Ascomata (ascostromata) often longitudinally elongated; on *Circinaria* and *Lobothallia*..... ***elongata***
Ascomata irregular but mostly ± circular; ascospores sometimes becoming 2- to 3- (to 4-) septate (occasionally submuriform) 3

3(2) Ascospores only faintly ornamented; associated with various crustose lichens ..... ***convexa***
Ascospores with deep irregular fissures forming a rough areolate pattern; on *Diploschistes*..... ***rugosa***

Lichenothelia convexa Henssen (1987) **NE**



Thallus not lichenized, black, sometimes aggregated, with irregular meristematic outgrowths. Ascostromata developing from superficial hyphae, non-ostiolate, but eventually opening by irregular wall decay, multilocular, irregularly rounded, ± flat to convex, 100–200 × 90–120 (–150) µm, composed of round to angular cells, dark brown externally and colourless to light brown, internally, I− (dextrinoid), often sterile. Hymenial gel I+ blue, the reaction sometimes weak. Asci in locules in the stromata, fissitunicate, broadly saccate to clavate, 20–30 (–35) × 10–20 µm, 8-spored. Ascospores colourless to light brown when young, becoming darker brown, 10–12 × 5–6.5 µm, ellipsoidal, 1- to 4-septate, sometimes becoming submuriform, faintly ornamented, with a gelatinous perispore when young. **BLS 0784**.

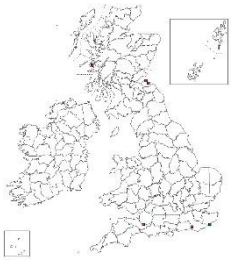
On siliceous rock (sandstone and flint), probably initially parasitic on crustose lichens but frequently persisting

and found on bare rock; S. England (Wiltshire, Essex, Suffolk), Wales (Caernarvon), Scotland (Angus, S. Aberdeenshire).

The ascospores have a primary septum that forms first, and the others are thinner and appear more tardily. The description has been adapted from Muggia *et al*. (2015).

Lichenothelia elongata (Nav.-Ros. & Hafellner) P.F. Cannon (2025) **NE**

Lichenostigma elongatum Nav.-Ros. & Hafellner (1996)



Superficial hyphae forming black strands on the surface of the host, unbranched or with few branches, 200–500 µm long and 8–20 µm diam., of rather variable thickness. Ascostromata black, superficial, elongate, appearing as intercalary thickenings of hyphal strands, 50–200 µm long and 30–60 µm diam.; stromata with cells ± globose, external cells with dark brown walls, the pigment granular, internal cells colourless. Asci subglobose to broadly ovoid, 20–25 × 15–l8 µm. Ascospores broadly obovoid, 1-septate, colourless and with a distinct gelatinous perispore when young, becoming brown and finely granular at maturity, (9–) 10–13 × 6–8.5 µm. Conidiomata not known. **BLS 2102**.

On thalli and apothecia of *Circinaria calcarea* and *Lobothallia radiosa*, England (Kent, Somerset, Sussex), Scotland (Ulva, E. Lothian); doubtless much under-recorded.

This species was considered to belong to *Lichenothelia* by Ertz *et al*., but the necessary combination was not made. That is rectified on page 68 of this publication.

Lichenothelia renobalesiana D. Hawksw. & Atienza (2008) **NE**

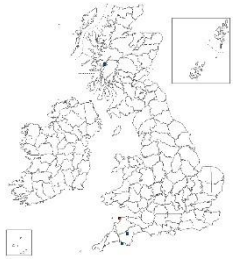
Thallus absent (lichenicolous). Ascostromata apothecia, scattered or in small groups, glossy black, (50–) 150–200 (–250) µm diam., hemispherical at first but with a central discoid depression at maturity so that the ascomata appear lecideine with swollen margins; exciple of subglobose to polyhedral cells, dark brown to black and slightly warted, cells of the internal layer thinner and paler. Asci broadly clavate, short-stalked, fissitunicate, 8-spored, 63–94 × 31–42 µm. Ascospores soleiform, rounded at the apices, 1-septate, occasionally with a thin additional pseudoseptum in the upper cell, slightly constricted at the median septum, remaining pale brown for a long time and becoming reddish brown at maturity, thick-walled, smooth, 25–30 × 11.5–15 µm, with a distinct gelatinous perispore when young. **BLS 2519**.

On hard calcareous rocks, growing primarily on endolithic thalli of *Bagliettoa* spp. and *Verrucaria hochstetteri*. S.W. England (Devon, Somerset, Gloucestershire), also Scotland (Shetland).

The species was initially confused with the perithecial *Polycoccum opulentum* (Th. Fr. & Almq.) Arnold (Atienza & Hawksworth 2008), and old records of that species may well refer to *L. renobalesiana*. The description has been adapted from that work.

Lichenothelia rugosa (G. Thor) Ertz & Diederich (2013) **NE**

Lichenostigma rugosum G. Thor (1985)



Thallus absent (lichenicolous). Ascostromata usually aggregated, irregular in shape, sometimes with a slightly constricted base, 50–200 um diam. and 30–50 µm high, disc convex to flat, black. Exciple consisting of ± globose cells, 5–13 µm diam., the inner colourless and the outer cells with brown walls. *Asci* globose to obovoid, fissitunicate, 22–26 × 15–20 µm, mostly 8-spored. Ascospores colourless when young, later brown or sometimes brown-black, ellipsoidal to obovoid, 1-septate or rarely 2-, 3- or 4-septate, with deep irregular fissures forming a rough areolate pattern, 10–13 × 5–7 µm, with a gelatinous perispore visible when young. **BLS 2104**.

On thalli and apothecia of *Diploschistes caesioplumbeus* and *D. scruposus*, S.W. England (Devon) and W. Scotland (Lismore).

L. rugosa was contrasted with *Lichenostigma maureri* Hafellner (1983) by Thor (1985), which has verruculose ascospores that tend to be more strongly dark brown-pigmented.

LICHINODIALES M. Prieto, M. Schultz, Olariaga & Wedin (2019)

LICHINODIACEAE M. Prieto, M. Schultz, Olariaga & Wedin (2019)

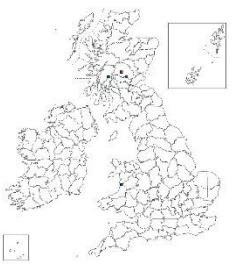
The order contains a single genus, *Lichinodium*, so the description below serves for the higher taxa. There are currently four species accepted in the genus, including two with molecular sequence data. The group belongs to the Leotiomycetes according to Prieto *et al*. (2019) and to the Leotiales *fide* Quijada *et al.* (2020), but its closest neighbours are not clear.

LICHINODIUM Nyl. (1875)

Thallus fruticose, gelatinous, ascending, forming tiny cushions, to 2 mm high, attached with a few colourless rhizines, irregularly but ± densely branched; branches anisotomic, with a few long stout main branches and many small side branches, cylindrical, dark brown, translucent when wet. **Hyphae** parallel, cells round, forming a cortex two to four cells wide around the photobiont that occupies the medulla. **Haustoria** absent. **Photobiont** *Rhizonema*, in clustered chains. **Ascomata** apothecia, biatorine, sessile. **Disc** red-brown to black, convex; margin and exciple absent. **Hymenium** ± colourless, I–. **Hamathecium** of paraphyses branched only at the base, sparsely septate, tips not or slightly thickened. **Asci** K/I–, cylindrical to narrowly clavate, irregularly (2-) 8-spored. **Ascospores** colourless, aseptate, ovoid. **Conidiomata** pycnidia, lateral, pale brown. **Conidia** filiform. **Chemistry**: no lichen products detected by TLC. **Ecology**: usually epiphytic on foliose lichens, rarely on bryophytes or directly on rock or bark.

Literature:
Aptroot (2009a), Arvidsson (1979), Henssen (1963a), Prieto *et al.* (2019).

Lichinodium sirosiphoideum Nyl. (1875) **Nb**



Thallus fruticulose, forming gelatinous cushions 1–2 mm high, branches 0.2–2 mm long and *ca* 150 µm diam. at the base, 30–80 µm diam. at the margins, brown. Hyphae parallel, cells ± globose, forming a cortex two to four cells thick around the photobiont that occupies the medulla. Photobiont cells 5–7 µm diam. Ascomata (not found in British material) to 0.8 mm diam., not marginate; disc convex, light reddish brown; hymenium 75-95 µm high; paraphyses 1.5-2.5 µm diam., hardly thickened at the apex; asci cylindrical to narrowly clavate, 55–75 × 7–10 µm; ascospores ± globose to ellipsoidal, 5–7 × 4–5 µm. Conidiomata lateral, wart-like, pale brown; conidia 12–20 × *ca* 0.5 µm. **BLS 1875**.

Over mosses and lichens on siliceous outcrops and boulders; rare. Scotland (Argyll, Mid Perthshire), Wales (Cardigan).

Differs from other small fruticose lichens containing cyanobacterial photobionts (almost all of which are saxicolous) by the *Rhizonema* photobiont, the anisotomic branching and the gelatinous thallus.

SARRAMEANALES B.P. Hodk. & Lendemer (2011)

SARRAMEANACEAE Hafellner (1984)

Thallus crustose, sorediate in most species. **Photobiont** chlorococcoid algae. **Ascomata** apothecia, sessile, brown to black, not marginate, sometimes emergent from thalline warts. **Thalline margin** present or becoming excluded. **Exciple** thin, not differentiated at maturity. **Hymenium** inspersed with oil droplets in some species. **Hamathecium** of paraphyses, largely unbranched. **Asci** with a uniform tholus that may be amyloid or not, without an ocular chamber, surrounded by I+ gel, 8-spored. **Ascospores** colourless, either helically twisted within the ascus, septate and long-pointed at both ends, or ellipsoidal and aseptate, without a perispore. **Conidiomata** pycnidia with colourless walls and unbranched conidiophores. **Conidia** rod-shaped, pointed at both ends.

The Sarrameanaceae is the only family within the Sarrameanales (Hodkinson & Lendemer 2011, Miadlikowska *et al.* 2014), and contains the three genera *Chicitaea*, *Loxospora* and *Sarrameana*, only the first two occurring in our region.

Literature:
Guzow-Krzemińska *et al.* (2018), Hodkinson & Lendemer (2011), Miadlikowska *et al.* (2014), Ptach-Styn *et al*. (2024)

1 Thallus UV+ white, K–, Pd–; containing 2'-*O*-methylperlatolic acid ..... ***Chicitaea***
Thallus K+ bright yellow, Pd+ yellow-orange, UV–; containing thamnolic acid .....***Loxospora***

CHICITAEA Guzow-Krzem., Kukwa & Lendemer (2024)

Thallus pale grey-green to olive-grey, thin or thick, surface smooth to verrucose, sorediate, isidiate or without vegetative propagules. **Ascomata** apothecia (known in one species), lecanorine, sessile, concave. **Thalline margin** present, scabrid when young, later entire, dentate, persistent, often flexuose. **Disc** dark reddish-brown to black, not pruinose. **Hymenium** colourless, inspersed with infrequent oil droplets. **Hamathecium** of unbranched paraphyses. **Hypothecium** colourless or pale yellow-brown. **Asci** clavate to obovoid, I–, KI+ slightly blue-green, damaged asci amyloid. **Ascospores** 6–8 per ascus, broadly ellipsoidal, straight or slightly bent, thin-walled. **Conidiomata** pycnidia (found in one species), immersed, visible as minute black dots. **Conidia** bacilliform. **Chemistry**: 2'-*O*-methylperlatolic acid (major) and perlatolic acid (minor or trace; reported only from one species).

Similar to *Loxospora*, but for the presence of 2'-O-methylperlatolic acid (vs. thamnolic acid), asci without an amyloid apical dome (vs. asci with a uniformly amyloid apical dome) and aseptate, broadly ellipsoidal, straight or slightly bent ascospores (known only in the type species; vs. transversely septate ascospores).

Chicitaea and *Loxospora* are both monophyletic, as is the combined taxon (Ptach-Styn *et al*. 2024, from which the description above has been derived). Only one species of *Chicitaea* occurs in our region.

Chicitaea cristinae (Guzow-Krzem., Łubek, Kubiak & Kukwa) Guzow-Krzem., Kukwa & Lendemer (2014) **NE**

Loxospora cristinae Guzow-Krzem., Łubek, Kubiak & Kukwa (2018)

Thallus crustose, continuous, sorediate, to several cm diam., to *ca* 120 µm thick in non-verruculose parts, smooth, folded, cracked-areolate to verruculose in some parts (warts to 300 µm in width); cortex shiny or rarely matt,

greyish white, greenish grey to yellowish grey, some parts with a pale brown tinge; medulla thin; prothallus indistinct, white, not fibrous; Soralia at first delimited, distinctly punctiform or rounded, developing from the flat part of thalli or apically on warts, becoming irregular and later often fusing or confluent and forming a granular, ± continuous crust; soredia white to greenish grey, sometimes pale brownish white, 35–75 µm diam., often in rounded or elongated consoredia. Photobiont trebouxioid. Ascomata and conidiomata unknown. Chemistry 2'-O-methylperlatolic acid, cortex K–, C–, P–, UV–, medulla K–, C–, P–; UV+ whitish; (description derived from Guzow-Krzemińska *et al.* 2018). **BLS 2739**.

On mossy bark of *Quercus* and *Betula*, Scotland (Argyll).

Distinguished from *Loxospora elatina* by the sorediate, thin, smooth and folded, cracked-areolate to only partly verruculose thallus, the soralia soon becoming confluent, and the presence of 2'-*O*-methylperlatolic acid (Guzow-Krzemińska *et al.* 2018). May be confused with *Lecanora farinaria* but this is K+ yellow, UV–. Likely to be overlooked as paler thalli of *Mycoblastus caesius* which is also UV+ white, K–, Pd– and has perlatolic acid, sequencing may be required to separate these, but descriptions of *C. cristinae* imply that the UV fluorescence may not be as bright as in *M. caesius*.

LOXOSPORA A. Massal. (1852)

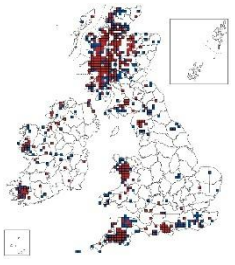
Thallus crustose, thin to thick, greyish to yellowish grey, sometimes with soralia. **Photobiont** trebouxioid. **Ascomata** apothecia, sessile, emerging from thalline warts; disc brown, sometimes with pruina. **Thalline margin** concolorous with the thallus, becoming broken up and ragged, sometimes sorediate. **Exciple** brown, thin. **Hymenium** I+ blue. **Hypothecium** colourless. **Hamathecium** of slightly branched paraphyses, not or only slightly swollen at the tips. **Asci** 8-spored, with a uniformly amyloid apical dome. **Ascospores** broadly fusiform to ellipsoidal with acuminate tips, somewhat curved or twisted, 3- to 7-septate, colourless. **Conidiomata** pycnidia, immersed. **Conidia** bacilliform, aseptate, colourless. **Chemistry**: thamnolic acid, rarely gyrophoric acid. **Ecology**: mostly on bark, sometimes wood.

Haematomma (Haematommataceae, Lecanorales) differs in the scarlet-red discs with the pigments russulone or haematimmone, *Lecanora*-type asci and the presence of atranorin in the thallus.

Literature:
Guzow-Krzemińska *et al.* (2018), Kantvilas (2000), Ptach-Styn *et al*. (2024).

1 Thallus thin, continuous to cracked-areolate with mostly discrete soralia; areoles may become convex but never tuberculate or isidium-like ..... ***chloropolia***
Thallus tuberculate (sometimes only locally) or with areoles that resemble coarse isidia; soralia forming extensive granular-sorediate patches ..... ***elatina***

Loxospora chloropolia (Erichsen) Ptach-Styn, Guzow-Krzem., Tønsberg & Kukwa (2024) **NE**



Thallus crustose, grey, matt or more often shiny, thin, continuous, slightly folded, cracked to cracked-areolate; areoles flat or rarely convex, not constricted at the base. Soralia whitish to greenish-grey, flat or more often convex, rounded or irregular, mostly discrete and separated, bursting from flat parts of thallus or from areoles, sometimes crowded and the neighbouring soralia more or less fused. Soredia to 50 µm diam., often in consoredia to 100 µm diam. Apothecia very rare, to 1.2 mm diam.; thalline margin present, not or partly to completely sorediate; disc reddish-brown, thinly white-pruinose; hymenium to 100 µm high; Epithecium straw-brown (K+ pale reddish-brown), with dense granules dissolving in K. Paraphyses not capitate, sometimes anastomosing. Asci 8-spored, with a uniformly KI+ blue apical dome. Ascospores 0–3 (–5)-septate, helically coiled in asci, colourless, fusiform, curved, 35–48 × 5–7 µm. Pycnidia not known. Chemistry: thamnolic acid (major), elatinic acid (minor, trace or absent) and squamatic acid (trace or

absent). Cortex, apothecial section, soralia and medulla K+ lemon-yellow, Pd+ yellow to orange, UV–. **BLS 2900**.

On acid-barked trees (conifers, also *Alnus*, *Betula*, *Populus*, *Quercus*), less often on wood, in old or boggy woodland. Widespread in W. and N. Scotland, also Wales (confirmed Meirionnydd) England (confirmed Devon, Hampshire).

Only recently separated from *Loxospora elatina*, and not reliably distinguishable except using DNA sequencing but the majority of British records are likely to be of this species. The map contains all records identified as *L. elatina* in its traditional sense.

The K+ immediately bright yellow, soft soralia distinguishes *L. chloropolia* from similar species (apart from *L. elatina*), e.g. *Biatora chrysantha*, *Lecanora alboflavida*, *Mycoblastus caesius*, *Mycobilimbia epixanthoides* and *Varicellaria hemisphaerica*.

Loxospora elatina (Ach.) A. Massal. (1852) **LC**

Thallus crustose, effuse, grey, matt, thin (at the margin) or more usually thick, continuous or cracked, slightly folded at least at the margins; areoles usually strongly convex, tuberculate and constricted at the base or resembling coarse isidia, sometimes pustulate, dispersed or aggregated; prothallus often distinct, white, felted; soralia whitish to greenish-grey, usually convex, irregularly rounded, bursting from the top of areoles, often fused and tending to coalesce locally on the thallus or covering most parts of the thallus; soredia to 60 µm diam., often in consoredia to 120 µm diam. Apothecia rare, 0.4–1.5 mm diam.; thalline margin present in young apothecia, smooth to flexuose, verrucose or dentate, sometimes with small soralia, later excluded; exciple thin, flesh-coloured to pale grey, orange-brown in section, smooth or more often flexuous, to 100 µm thick; disc reddish-brown, thinly white-pruinose; hymenium to 125 µm high; epithecium straw-brown (K+ pale reddish-brown), with dense granules dissolving in K. Paraphyses not capitate, sometimes anastomosing. Asci 8-spored, with a uniformly KI+ blue apical dome. Ascospores 0–5-septate, helically coiled in asci, colourless, fusiform with acuminate apices, curved, 35–53 (–64) × 4.5–6.5 (–7) µm. Pycnidia not known. Chemistry: thamnolic acid (major), elatinic acid (minor, trace or absent) and squamatic acid (trace or absent). Cortex, apothecial section, soralia and medulla K+ bright lemon-yellow, Pd+ yellow to orange, UV–. **BLS 0551** (*s. lat.*), **BLS 2901** (*s. str.*).

To date only confirmed from a single record from S.E. Scotland (East Lothian) on *Betula* in a ravine woodland. Should be looked for in eastern Scotland but *Loxospora chloropolia* appears to be the dominant species in Britain.

SCHAERERIALES Lumbsch & S.D. Leav. (2018)

SCHAERERIACEAE M. Choisy ex Hafellner (1984)

The Schaereriales contains a single genus *Schaereria*, so the description below constitutes that of the family and order. It appears to be most closely related to the Sarrameanales (Resl *et al.* 2015, Kraichak *et al*. 2018).

SCHAERERIA Körb. (1855)

Thallus squamulose or crustose-areolate, with the areoles often somewhat dispersed and convex, grey to reddish brown. **Prothallus** often well-developed, black. **Photobiont** *Trebouxia*. **Ascomata** apothecia, immersed or sessile, black. **Thalline margin** absent. **Exciple** persistent, black, dark brown in section, K–, cupulate, of ± globose cells. **Epithecium** brown or bright green, at least in K, or partly

violet and K+ bright green, occasionally discoloured brown (old material). **Hymenium** I+ weakly blue (ascus walls). **Hypothecium** brown, but upper part (subhymenium) usually colourless. **Hamathecium** of paraphyses that are lax in K, occasionally branched above; apical cells often swollen and sometimes moniliform. **Asci** ± cylindrical or rarely clavate, thin-walled, with a single wall layer, not thickened apically, only the outermost gelatinous layer K/I+ faint blue, discharge by splitting of the apex, *Schaereria*-type. **Ascospores** globose to ellipsoidal, aseptate, uniseriately, biseriately or irregularly arranged in the asci, colourless, smooth, with or without a distinct perispore. **Conidiomata** pycnidia, immersed in the thallus. **Conidiogenous cells** subcylindrical, conidia borne apically. **Conidia** bacilliform, aseptate, colourless. **Chemistry**: orcinol depsides and a tridepside. **Ecology**: on siliceous rocks, upland to montane, bark. One non-British species is possibly lichenicolous.

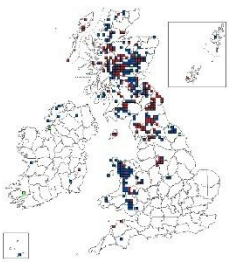
The genus is distinguished from other squamulose lichens with *Lecidea*- or *Aspicilia*-like apothecia by the thin- and single-walled cylindrical asci that lack any distinct apical thickening, and the lax paraphyses.

Literature:
Gilbert & Hawksworth (2009), Hafellner (1984), Kantvilas (1999, 2023), Kraichak *et al*. (2018), Resl *et al*. (2015).

1 Corticolous ..... ***corticola***
Saxicolous 2

2(1) Thallus squamulose; squamules 1–2.5 (–3) mm long, 1–1.5 mm thick; ascospores uniseriate in the ascus, globose ..... ***cinereorufa***
Thallus areolate; areoles <1 mm diam., usually <0.5 mm thick; ascospores biseriate in the ascus, ellipsoidal ..... ***fuscocinerea***

Schaereria cinereorufa (Schaer.) Th. Fr. (1861) **LC**

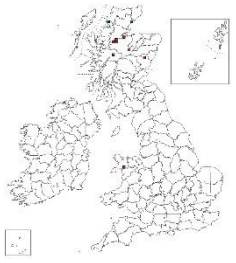


Thallus squamulose; squamules compact, 1–2.5 (–3) × 0.5–1 mm, 1–1.5 mm thick, ± bullate, surface verrucose, not clearly lobate, grey-brown to deep reddish brown; prothallus black, well-developed. Apothecia 0.5–1.2 mm diam., immersed to ± sessile, black, disc concave to flat; exciple mostly persistent, dark brown, thick; hymenium 90–120 µm tall; hypothecium brown to brown-black. Asci 55–65 × 8–10 µm, cylindrical. Ascospores without a perispore, (6–) 7–9 (–10) µm diam., globose, uniseriately arranged. Pycnidia 0.06–0.1 mm diam., usually numerous, immersed; wall dark brown, K–; conidiogenous cells 6–11 × *ca* 1.5 µm; conidia 3.8–6 × *ca* 0.8 µm. Thallus and medulla C± pink, K–, KC–, Pd–, UV– (± gyrophoric acid). **BLS 1311**.

On granite, hard sandstones and schists, more rarely overgrowing mosses, in upland situations; local. England (Devon, Somerset and Leicestershire northwards), Wales, Scotland, scattered throughout uplands in Ireland.

The squamules could be mistaken for those of an *Acarospora*, but are readily identified by the open discs of the apothecia and the larger and ± globose ascospores. The C+ pink reaction is variable, even within single specimens.

Schaereria corticola Muhr & Tønsberg (1992) **Nb**

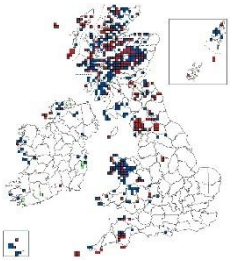


Thallus crustose, forming small grey patches to a few cm diam. among other crustose lichens, a distinct blackish prothallus sometimes present. Areoles distinct or inconspicuous, bearing discrete punctiform dark brown (abrading to green) soralia to 2 mm diam., soredia farinose. Apothecia sparse to numerous, black, sessile, 0.15–0.3 mm across, exciple becoming obscured with age as the discs become convex. Ascospores with a perispore, broadly ellipsoidal to subglobose, (10–) 13–16 (–20) × (8–) 9–12 (–14.5) µm. Soralia C+ pink, K–, Pd–, UV– (gyrophoric, 5-O-methylhiasic and ± lecanoric acids). **BLS 1897**.

On old *Juniperus* and other acid-barked trees including *Alnus*, *Betula* and *Populus*; Highland Scotland, Wales (Merioneth).

Strongly resembles *Rimularia fuscosora* (Baeomycetales: Trapeliaceae) in thalline characters; both are epiphytes with punctiform, brown soralia, but those of *Rimularia* are generally K+ yellow→red crystals (norstictic acid). They are readily separated by differences in apothecial characters.

Schaereria fuscocinerea (Nyl.) Clauzade & Cl. Roux (1985) **LC**

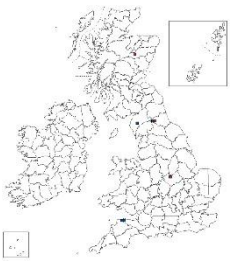


Thallus crustose, conspicuous, grey-brown to brown, in exposed situations sometimes black, areolate; areoles flat to convex or bullate, (0.2–) 0.3–0.6 (–0.8) mm diam. Apothecia small, 0.3–1 mm diam., black, immersed at first but becoming sessile; disc at first concave, then flat and finally convex; exciple sometimes distinct at first but then often soon excluded, dark brown but thin in section; hymenium 90–110 (–120) µm tall; epithecium green, sometimes encrusted with violet granules. **Asci** ± cylindrical, 55–75 × 10–12 (–15) µm. Ascospores without a perispore, elongate-ellipsoidal to broadly pyriform, ± biseriately arranged, (10–) 12–16 (–18) × 5–6 (–8) µm. Pycnidia immersed; conidia cylindrical, 5.6–6.5 × *ca* 1 µm. Cortex and medulla C± pink, K–, KC–, Pd–, UV– (gyrophoric acid, ± unidentified compounds). **BLS 1313**.

On hard siliceous rocks, in sunny exposed situations and often associated with yellow *Rhizocarpon* species; frequent. W. & N. Britain, from the Channel Islands to the Shetland Isles; extending locally to upland Ireland.

Frequently mistaken for *Rimularia gyrizans* and *R. mullensis*, with which it often grows, but those species have richly branched paraphyses, *Rimularia*-type asci and Pd+ yellow or orange, C– thalli. Somewhat similar to *Clauzadeana macula* (Lecanorales:Lecanoraceae) with which it is often found or the rare *Orphniospora moriopsis* (q.v.). A morph from Arran with ascospores 14–17 × 6.5–8 µm and norstictic as well as gyrophoric acid has been reported and merits further study to clarify its status.

Schaereria fuscocinerea var. **sorediata** (Houmeau & Cl. Roux) Coppins (1992) has small, convex soralia 0.1–0.4 mm diam., blackish on the surface and greenish within, on a dark grey thallus. **BLS 1898**.



On acid sandstone rocks and boulders and on old mine workings; England (N. Devon (Exmoor), Leicestershire and Durham), Scotland (S. Aberdeenshire).

Rarely encountered, its status needs further examination.

SCLEROCOCCALES Réblová, Unter. & W. Gams (2016)

DACTYLOSPORACEAE Bellem. & Hafellner (1982)

Ascomata, when present, apothecia, becoming discoid, flat or convex, superficial or sometimes erumpent, sessile or shortly stalked. **Hamathecium** consisting of persistent pseudoparaphyses. **Asci**

persistent, clavate, mostly 8-spored, not fissitunicate, without apical structures, splitting apically, non-amyloid, with an external amyloid gelatinous cap. **Ascospores** colourless to brown, mostly 1-septate, ellipsoidal to subglobose, smooth-walled with appendages or ornamented. **Anamorphs** dematiaceous hyphomycetes producing sporodochia with irregular chains of pigmented aseptate or multiseptate conidia, or effuse colonies with conidiophores with integrated conidiogenous cells that proliferate percurrently, and catenate, colourless, clavate or fusiform conidia. **Ecology**: terrestrial and marine, lignicolous, lichenicolous or associated with beetles as a part of intestinal microbiota.

Literature:
Diederich *et al.* (2018), Réblová *et al.* (2016).

SCLEROCOCCUM Fr. (1825)

Thallus (when present) grey to brown or black, pulvinate. **Photobiont** *Trentepohlia* (one species) or absent. **Ascomata** apothecia, scattered or in small groups, dark brown to black, discoid, usually with a distinct margin, at least when young. **Exciple** pale to dark brown, cells mostly arranged radially, at least in the peripheral region. **Hypothecium** of interwoven hyphae. **Hymenium** colourless, blueing in iodine. **Epithecium** weakly developed to distinct, brown. **Hamathecium** of paraphrases, septate, branched at least at the tip, the apices usually clavate and usually brown-pigmented. **Asci** clavate, short-stalked or ± sessile, thick-walled but not fissitunicate, apical structures not present, with a thick I+ blue gelatinous coating present at least in the apical part, usually 8-spored. **Ascospores** brown, 1- to 3-septate, the cells sometimes unequal in size, the wall uniformly thick, sometimes weakly ornamented. **Conidiomata** convex sporodochia, violaceous grey to dark brown to black. **Conidiophores** colourless, often densely aggregated. **Conidia** in irregularly branched chains, generally septate or submuriform, ellipsoidal or irregular, dry, subspherical; wall brown, thick, smooth or verrucose. **Chemistry**: not detected by TLC. **Ecology**: lichenicolous or lichenized.

Most species are lichenicolous and have dark brown to black sporodochia, and/or black lecideine apothecia. The links between the *Dactylospora* teleomorphs and *Sclerococcum* anamorphs have been explored by Diederich *et al.* (2012, 2018) and Pino-Bodas *et al*. (2017). Most species are lichenicolous, but a number of putatively saprotrophic species on rotten wood and bryophytes are known. In Britain and Ireland these comprise *Sclerococcum bloxamii* (Berk.) Olariaga *et al.*, *S. caledonicum* (Hafellner) Olariaga *et al.*, *S. lurida* (Hafellner) Olariaga *et al.*, *S. stygium* (Berk. & M.A. Curtis) Olariaga *et al.* (all on rotten wood) and *Dactylospora scapanaria* (Carrington) D. Hawksw., apparently parasitic on leafy liverworts (Hawksworth 2003). Species excluded from the genus include the British and Irish *S. normandinae* Diederich & Etayo, now placed in *Cladophialophora* (Chaetothyriales: Herpotrichiellaceae; Diederich *et al.* 2012).

Sclerococcum parasitaster (Nyl.) Ertz & Diederich (2018) (syn. *Dactylospora parasitaster* (Nyl.) Arnold) **BLS 2733** has been reported several times from Scotland associated with a diverse range of lichens, but there are no modern descriptions of the species and its status is unknown.

Literature:
Diederich & Van den Boom (2017), Diederich *et al.* (2012, 2018), Etayo (1995), Hafellner (1979), Ihlen *et al.* (2004), Olariaga *et al.* (2019), Pino-Bodas *et al.* (2017), Smith (2009), Triebel (1989).

1 Colonies with conidiomata (sporodochia) 2
Colonies with apothecia 8

2(1) Conidia aseptate or rarely 1-septate, (3.5–) 4–7 (–8) µm diam. ..... ***simplex***
Conidia all or almost all septate 3

3(2) Conidia all or almost all 1-septate 4
Conidia multiseptate 5

4(3) Conidia all 2-celled, smooth, 11–14.5 × 9–11 µm, the septum 1.5–3 µm thick; on *Phaeophyscia orbicularis* ..... ***phaeophysciae***
Conidia (1–) 2-celled to occasionally submuriform, wall occasionally fissured, 10–13 × 6–9 µm, the septum 1–1.5 µm thick; on *Glaucomaria rupicola* ..... ***montagnei***

5(3) Conidia 21–30 × 12–20 µm, the walls ornamented, crystalline ..... ***griseisporodochium***
Conidia < 20 µm in diam. or in longest dimension 6

6(5) Sporodochia orange to dark brown; initially lichenicolous on *Dirina massiliensis* but developing an independent thallus ..... ***Spiloma auratum***
Sporodochia dark brown to black; remaining lichenicolous 7

7(6) Conidia 2–6-celled, ± globose, smooth-walled; on *Lepra corallina* ..... ***sphaerale***
Conidia 2–4-celled, ± ellipsoidal, with a lacerate-granulose ornamentation; on *Tephromela atra* ..... ***tephromelarum***

8(1) Asci containing more than 8 spores 9
Asci 8-spored 10

9(8) Asci 24–40 (–80)-spored; ascospores 1-septate, (4–) 5–7 (–8) × 2–3 (–3.5) µm ..... ***microsporum***
Asci 16-spored; ascospores 3(–7)-septate, (10.5–) 12–18 × 3.5–4.5 µm ..... ***ophthalmizae***

10(8) Ascospores always or almost always 1-septate 11
At least some ascospores more than 1-septate or submuriform 18

11(10) Epithecium brown, K+ purple 12
Epithecium brown, K– 13

12(11) Ascospores 9–14.5 µm long; hymenium 55-65 µm high; on *Baeomyces rufus* ..... ***athallinum***
Ascospores (11–) 12–16.5 (–19) µm long, hymenium 55-90 µm high; on *Amygdalaria* and *Porpidia* ..... ***purpurascens***

13(11) On foliose lichens (*Lobaria* and *Ricasolia*); ascospores 12–17 × 4.5–6.5 µm, minutely warted ..... ***lobariellum***
On crustose lichens 14

14(13) Hypothecium colourless to light brown or olivaceous ..... ***saxatile***
Hypothecium medium to dark brown, reddish brown or almost black 15

15(14) Ascospores consistently 1-septate 16
Ascospores occasionally 2- or 3-septate; on *Ochrolechia parella* ..... ***parellarium***

16(15) Apothecia with a broad roughened margin and tiny disc, 0.1–0.25 mm diam.; on *Blastenia* and *Rufoplaca* ..... ***tegularum***
Apothecia larger, 0.2–0.4 (–0.6) mm diam. with a ± narrow margin; on *Amygdalaria* and *Porpidia* 17

17(16) Apothecial margin often radially striate; ascospores mid brown, without a perispore ..... ***amygdalariae***
Apothecial margin smooth; ascospores pale brown, with a thin perispore ..... ***australe***

18(10) Ascospores (1–) 3-septate 19
Ascospores at least usually with more than 3 septa, sometimes submuriform 22

19(18) Hypothecium medium brown to reddish brown, orange, or greenish brown.....20
Hypothecium pale brown; on *Ochrolechia parella* .....***parellarium***

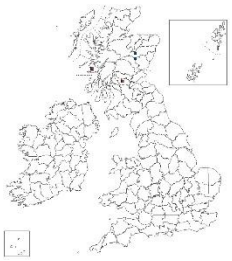
20(19) Apothecia with a distinctly concave disc; ascospores (14–) 17–21 (–24) µm long, the wall of old spores finely warted .....***suburceolatum***
Apothecia with a ± flat disc; ascospores (7–) 9–13 (–16) µm long, remaining smooth.....21

21(20) Exciple rough-walled or radially striate; ascospores (3–) 4–6.5 (–8.5) µm broad; at least mostly on *Amygdalaria* .....***attendendum***
Exciple smooth; ascospores 3.5–4.5 µm broad; on Pertusariaceae.....***parasiticum***

22(18) Apothecia 0.5–0.8 mm diam. with a ± flat disc when mature; hypothecium pale brown; ascospores (5.5–) 6–8 (–9) µm broad, with 5 (–7) transverse septa .....***frigidum***
Apothecia 0.15–0.5 mm diam., the disc concave to flat; hypothecium sometimes slightly violet at the base; ascospores 4–6 µm broad, usually 7-septate (less frequently 3- or 5-septate)..... ***urceolatum***

Sclerococcum amygdalariae (Triebel) Ertz & Diederich (2018) **NE**

Dactylospora amgydalariae Triebel (1989)

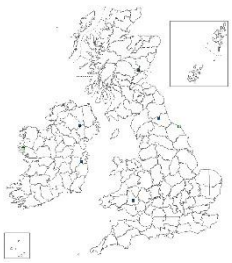


Thallus absent (lichenicolous). Apothecia dull black, broadly sessile, (0.2–) 0.3–0.4 (–0.6) mm diam., rounded or irregular in outline, the margin black and bulging, usually radially striate, disc concave to flat. Exciple 20–50 µm thick, the outer layer carbonaceous black-brown, the inner part medium to dark brown; hypothecium medium to dark brown; hymenium colourless to slightly brownish, (45–) 50–60 (–80) µm high. Paraphyses often forked apically, rarely anastomosing, 1–1.5 (–2) µm diam., the apices strongly clavate with thick dark brown caps; epithecium dark brown, not changing colour in K. Asci 8-spored, 30–45 × 11–15 µm. Ascospores 1-septate, dark brown, bluntly ellipsoidal to broadly ovoid, ± constricted at the septum, with a thick multilayered wall, (7–) 7.5–9.5 (–12) × (3.5–) 4–5 (–6) µm in size. Conidiomata not known. **BLS 2041**.

On thalli of *Amygdalaria pelobotryon* and *A. consentiens,* Scotland (Angus, S. Aberdeenshire, Stirlingshire). A record on *Porpidia melinodes* from Ulva might belong to a separate species.

Sclerococcum athallinum (Müll. Arg.) Ertz & Diederich (2018) **NE**

Dactylospora athallina (Müll. Arg.) Hafellner (1979)

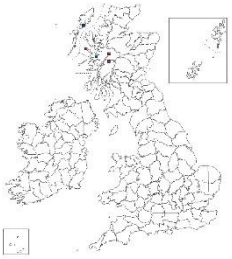


Thallus absent (lichenicolous). Apothecia sessile or slightly immersed, black, disc flat with a thin but distinct margin, very dark brown, 0.3–0.8 mm in diam. Exciple dark reddish brown, composed of radially arranged angular; hypothecium light to ochre brown; hymenium 55–65 mm high; epithecium reddish brown, K+ reddish purple. Paraphyses *ca* 2 µm diam., branched above, the apices ± clavate, to 5 µm diam. Asci 8-spored, 35-45 × 10–13 µm. Ascospores brown, 1-septate, thin-walled, 9–14.5 × 4–7 µm. Conidiomata not known. **BLS 2042**.

On thalli of *Baeomyces rufus*, apparently not causing damage to the host; scattered throughout Wales, N. England, E. Scotland and Ireland.

Sclerococcum attendendum (Nyl.) Ertz & Diederich (2018) **NE**

Dactylospora attendenda (Nyl.) Arnold (1874)



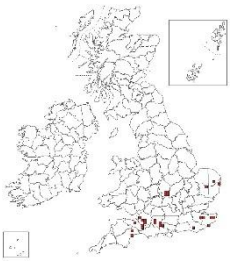
Thallus absent (lichenicolous). Apothecia dull black, with a broad to narrowed base, (0.15–) 0.3–0.5 (–0.65) mm diam., rounded to slightly irregular; the disc flat, initially deeply depressed; margin bulbous to narrow, later slightly excluded. Exciple 20–30 (–35) µm thick, dark brown, sometimes lighter in the inner area; hypothecium usually dark brown, 40–50 µm high; hymenium colourless to light brownish, (40–) 50–65 µm high. Paraphyses unbranched or apically forked, 1–1.5 (–2) µm diam., the apices often slightly clavate and agglutinated, with narrow pale to dark brown caps; epithecium dark brown. Asci 8-spored, 35–52 × 7.5–15 µm. Ascospores (2–) 4-celled, grey-brown to medium brown, ellipsoidal to cylindrical, rounded or slightly pointed at both

ends, rarely slightly constricted at the septa, (10–) 11–15 (–17) × (4–) 4.5–5.5 (–6.5) µm in size. Conidiomata not known. **BLS 2043**.

On thalli of *Amygdalaria pelobotryon*, Scotland (W. Inverness, Sanday, Harris) with reports needing confirmation on *Porpidia rugosa* and *Aspicilia caesiocinerea*.

According to Ihlen (1998) this is a plurivorous species on a range of crustose lichens (*Amygalaria*, *Icmadophila*, *Pilophorus* and *Porpidia*).

Spiloma auratum Sm. (1809) **LC**



Thallus clearly distinct but thin (10–25 µm thick), white, sometimes clearly starting its development on other lichen species. Photobiont *Trentepohlia* with rounded to elongated cells, yellow-green with oily orange guttules. Ascomata absent. Conidiomata sporodochia, first appearing as pale orange dots on the thallus, developing into orange to very dark brown, convex cushions 0.4–0.9 mm diam. and 0.3–0.4 mm high, often coalescing and thus irregularly covering large portions of the thallus, typically bright yellow-orange when eroded (mature conidia dispersed or abraded, revealing the underlying thallus and conidiogenous layer which contain anthraquinone crystals), reacting K+ purple. Conidiophores forming a dense but very thin layer (10–20 µm) at the base of the sporodochium, formed of erect parallel colourless septate hyphae 3–6 µm diam.. Conidiogenous cells lateral or terminal, cylindrical or slightly inflated at their base and elongate, 5–10 × 3–5 µm, rarely annellidic. Conidia arising in chains and remaining so for a long time, first colourless, globose or ovoid, with a thick wall, aseptate but soon with one distoseptum; while still in chains, becoming brownish with a verruculose outer wall, 8–11 × 5–9 µm, strongly constricted at the septum so that each conidium appears to be made of two inflated cells; further septation can occur so that each conidium can be 4-septate but without increased size; in upper parts of the sporodochium, usually aggregated in groups of 2–6 and probably dispersed as such. Chemistry: 7-chloroemodin (major), emodin (major), 7-chlorocitreorosein (major), citreorosein (major), 7-chloroemodic acid (minor), emodic acid (minor), 7-chloroemodinal (minor), emodinal (minor)[determined by HPLC].

On bark in sheltered situations, and on limestone walls and mortar of churches, almost always associated with *Dirina massiliensis* but later developing an independent thallus; quite widespread in S. England. Corticolous populations occur in Europe.

Most probably related to *Sclerococcum griseosporodochium* (Sparrius *et al.*, *in litt.*) but it seems that neither species will ultimately remain in that genus so a new combination is not made.

Sclerococcum australe (Triebel & Hertel) Ertz & Diederich (2018) **NE**

Dactylospora australis Triebel & Hertel (1989)

Thallus absent (lichenicolous). Apothecia dull black, slightly immersed to broadly sessile, (0.15–) 0.3–0.4 (–0.5) mm diam., usually with a distinct, sometimes narrow, sometimes bulging, and slightly notched margin, disc flat. Exciple (15–) 20–40 (–50) µm thick, the outer layer black-brown, the inner layer light to medium brown; hypothecium light brownish to medium brown, very rarely dark brown, 50–60 µm thick; hymenium colourless, 45–65 (–80) µm high. Paraphyses usually forked apically, rarely anastomosing, 1.5–2 (–2.5) µm diam., the apices strongly clavate, with dark brown caps; epithecium medium to dark brown, not changing colour in K. Asci 8-spored, 30–45 × 11–15 µm. Ascospores 1-septate, dark brown, ellipsoidal or ovoid, not or slightly constricted at the septum, with a thick multilayered wall, with a thin perispore, (7.5–) 9.5–11.5 (–13.5) × (4–) 4.5–5.5 (–6) µm in size. Conidiomata not known. **BLS 2044**.

On thalli of *Porpidia macrocarpa* and *Porpidia* sp., not causing visible damage to the host; Scotland (W. Inverness, Mid Perthshire, W. Ross).

Sclerococcum frigidum (Hafellner) Ertz & Diederich (2018) **NE**

Dactylospora frigida Hafellner (1985)

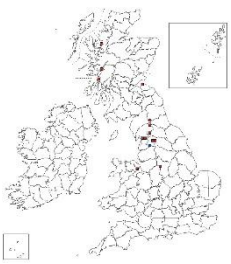
Thallus absent (lichenicolous). Apothecia scattered, sessile, black, the disc at first concave, then flat, with a thin, smooth, slightly protruding margin, 0.5–0.8 mm diam. Exciple brown internally, the margin consisting of radially arranged hyphae, internally of angular to globose cells; hypothecium pale brownish; hymenium colourless;

epithecium greenish-brown; paraphyses branched above, the apices with with pigmented caps. Asci 8-spored, 60–70 × 12–15 µm. Ascospores brown, with 5 (-7) transverse septa and often one or two of the middle compartments with a longitudinal septum, smooth, (14–) 17–22 × (5.5–) 6–8 (–9) µm. Conidiomata not known. **BLS 2045**.

On sterile thalli of *Brigantiaea fuscolutea*, Scotland (W. Perthshire); see Hawksworth (1990).

The species should be compared with *S. urceolatum* (see below) which has been reported on various montane crustose lichens; that species also has multiseptate rather than submuriform ascospores (Hafellner 1985).

Sclerococcum griseisporodochium Etayo (1995) **NT**



Thallus grey-mauve, with *Trentepohlia* as photobiont. Apothecia not known. Conidiomata sporodochia, I−, arising singly, 0.3–0.8 mm diam., slightly convex to hemispheric, grey-mauve; conidiophores forming a colourless layer below the spore mass, unbranched or sparsely branched, arranged ± parallel to one another, 4–6 µm diam., composed of cylindrical cells with rugose walls, somewhat constricted at the septa; conidiogenous cells probably terminal, resembling the conidiophore cells; conidia arising in chains, tightly adhering to those produced from adjacent conidiogenous cells to form multicellular propagules 21–30 × 12–20 µm, irregular in shape, individual cells mainly distoseptate, thick walled, subglobose to ellipsoidal, brown, HCl+ orange, 1-septate, 12–15 × 7–9 µm, walls ornamented and covered by calcium carbonate crystals. **BLS 2480**.

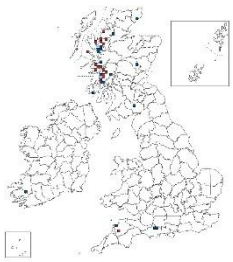
On vertical, shaded tufa and limestone, often associated with *Opegrapha dolomitica*; Wales (Denbighshire), N. England (Pennines, Cumbria), Scotland (Argyll, E. Lothian & W. Ross).

Although originally described as a lichenicolous fungus, it is now considered to form its own lichenized thallus. The violaceous grey sporodochia can easily be mistaken for soralia or moribund apothecia.

The disposition of *S. griseisporodochium* in this genus is uncertain; Ertz *et al.* (2013a) stated that it belonged within the Arthoniales but no further information was provided.

Sclerococcum lobariellum (Nyl.) Ertz & Diederich (2018) **NE**

Dactylospora lobariella (Nyl.) Hafellner (1979)



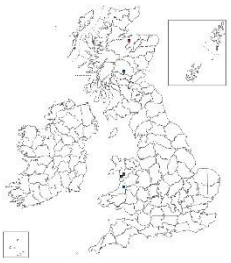
Thallus absent (lichenicolous). Apothecia scattered, sessile, flat to convex with a narrow margin that becomes excluded, black, 0.3–0.6 mm diam.; exciple in section light to dark reddish-brown, the cells radiately arranged, with sometimes slightly swollen cell walls, dense and dark brown on the outside; hypothecium dark reddish brown, hymenium colourless, inspersed with oil droplets, 50–70 µm high; epithecium thin, dark reddish brown, K+ olive-brown; paraphyses *ca* 2 µm diam., mostly branched towards the apices, the apices slightly clavate with reddish-brown pigment. Asci usually 8-spored. Ascospores 1-septate, reddish brown, narrowly ellipsoidal, thin-walled, the lower cell often somewhat narrower and shorter than the upper one, the wall minutely warted, 12–17 × 4.5–6.5 µm. Conidiomata not known in British material. **BLS 2046**.

On *Lobaria pulmonaria* and *Ricasolia virens*; W. Scotland extending locally to the N. and E.; S.W. England (Devon, Dorset), S.W. Ireland.

The material on *Ricasolia* could be assignable to *S. ricasoliae* (Vouaux) Flakus, Rodr. Flakus & Etayo (2019), but that species has not yet been recorded from Europe (Diederich *et al.* 2024).

Sclerococcum microsporum (Etayo) Ertz & Diederich (2018 **NE**

Dactylospora microspora Etayo (1991)

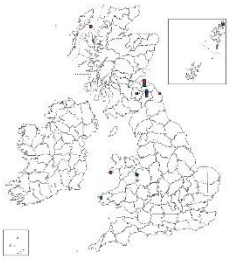


Thallus absent (lichenicolous). Apothecia sessile, slightly constricted at the base, 0.3–0.7 mm diam., dark brown to almost black, flat, with a thin persistent concolorous margin. Exciple of radially arranged cells, brown in the inner tissues, grey-black in the outer cells, K+ greenish; hymenium 50–60 µm tall, I+ deep blue; hypothecium dark brown, composed of interwined hyphae. Paraphyses with capitate apices with deep brown-black gel on the surface, K+ greenish. Asci clavate, 24–40 (–80)-spored. Ascospores ellipsoidal, 1-septate, not or barely constricted at the septum, brown, grey when young, (4–) 5–7 (–8) × 2–3 (–3.5) µm. Conidiomata not known. **BLS 2047**.

On thalli of *Bacidia rubella*, *Bryobilimbia sanguineoatra* and *Parmeliella thriptophylla*, Scotland (E. Inverness, Mid Perthshire), Wales (Cardigan, Merioneth).

The multispored asci are unusual in the genus, but there are no sequences available to confirm its placement. It appears not to be host-specific, and was originally described from *Catinaria atropurpurea* in northern Spain. See also Hawksworth (1994).

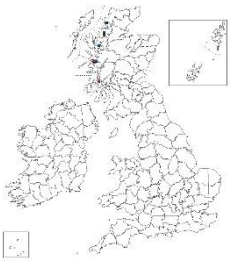
Sclerococcum montagnei Hafellner (1996) **NE**



Thallus absent (lichenicolous). Apothecia not known. Sporodochia primarily at the edge of the host areoles, black, with a rough surface, sometimes covered by degraded host cortex at the margin, 0.2–0.3 mm diam. Conidiophores are only slightly differentiated from the vegetative mycelium, densely packed. Conidiogenous cells terminal, mostly monoblastic,. Conidia in irregular chains, colourless and thick-walled when young, the transverse walls often oblique, later pure brown, predominantly 2-celled and 10–13 × 6-9 µm in size, when 1-celled 8–10 × 6–8 µm, or submuriform with a few transverse and longitudinal walls and 13–17 × 7–9 µm in size, the conidial walls often noticeably irregular in thickness, rather brittle and fissured, without a well-defined ornamentation.

On thalli of *Glaucomaria rupicola*, Wales (Montgomery, Caernarvon, Pembrokeshire), England (Northumberland) and scattered throughout Scotland. Almost certainly overlooked.

Sclerococcum ophthalmizae Coppins (2018) **NE**

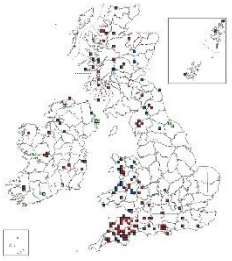


Thallus absent (lichenicolous). Apothecia 0.12–0.4 mm diam., scattered, black; disc concave to flat; margin smooth. Exciple 25–30 µm thick, reddish brown (K–) or green tinged in the upper part; cells to 10 µm diam. Hymenium 50–60 µm tall, colourless; epithecium brown, K–; hypothecium pale grey- or reddish-brown, K–. Paraphyses 1.5–1.7 µm diam.; apices to 3 µm diam. Asci *ca* 50 × 12–17 µm, 16-spored. Ascospores (10.5–) 12–18 × 3.5–4.5 µm, narrowly ellipsoidal, cylindrical to fusiform, sometimes curved, brown, smooth-walled or slightly roughened when old, 3(–7)-septate. Conidiomata not known. **BLS 2000**.

On thalli of *Lepra ophthalmiza*, W. Scotland (Kintyre, Skye, Westerness: Loch Sunart, West Ross). Apparently endemic.

Sclerococcum parasiticum (Flörke) Ertz & Diederich (2018) **LC**

Dactylospora parasitica (Flörke) Arnold (1887)



Thallus absent (lichenicolous). Apothecia (0.2–) 0.3–0.6 µm diam, discoid, hardly stipitate, black, not pruinose, surrounded by a narrow smooth dark reddish brown to black exciple. Hymenium 50–70 µm tall. Paraphyses 2–2.5 µm diam, sparsely branched towards the slightly swollen apices, covered in a thick I+ blue gelatinous coat and with a reddish brown epithecial layer. Asci 44–54 × 8.5–12 µm, cylindric-clavate, short-stalked, 8-spored. Ascospores (9–) 11.5–12.5 (–16) × 3.5–4.5 µm, ± cylindrical with rounded ends, dark brown when mature, rather thick-walled, smooth, often slightly constricted at the ± median primary septum and usually with two further septa developing closer to the primary septum than the ascospore apex, without a perispore. Conidiomata not known. **BLS 1973**.

On *Lepra*, *Ochrolechia* and *Pertusaria* spp., throughout Britain and Ireland except for C. and E. England.

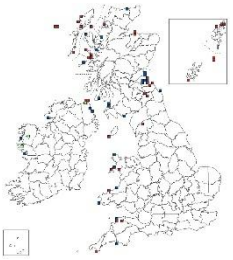
This could be an aggregate species, the available sequences fall in several clades (Diederich *et al.* 2018) and other species on Pertusariales appear to be largely host-specific. Similar collections on hosts other than those of the Pertusariales are provisionally referred to *Sclerococcum parasitaster* (Nyl.) Ertz & Diederich (2018) (syn. *Dactylospora parasitaster* (Nyl.) Arnold) **BLS 2733**.

Sclerococcum parellarium (Nyl.) Ertz & Diederich (2018) **NE**

Dactylospora parellaria (Nyl.) Arnold (1887)

Thallus absent (lichenicolous). Apothecia (0.08–) 0.2–0.5 mm diam., discoid, larger ascomata rather irregular in outline, hardly stipitate, black, not pruinose, surrounded by a fairly broad concolorous exciple that sometimes appears verrucose due to the presence of minute knob-like projections. Hymenium 50–70 µm tall. Paraphyses 2–

2.5 µm diam, sparsely branched towards the slightly swollen apices, covered in a thick I+ gelatinous coat and with pigmented apices and a reddish brown epithecial layer. Asci 29–38 (–55) × 9.5–12 µm, cylindric-clavate, short-stalked, 8-spored. Ascospores 8.5–11.5 (–13.5 when multiseptate) × 4.5–5.5 µm, widely cylindrical with rounded ends to ellipsoidal, dark brown when mature, rather thick-walled, smooth, often slightly constricted at the ± median primary septum and sometimes with one or rarely two further transverse septa, without a perispore. Conidiomata not known. **BLS 2048**.



On thalli of *Ochrolechia parella*, N. and W. Britain and Ireland, mainly coastal.

Similar to *S. parasiticum* (see above) but with slightly shorter and wider ascospores, typically with fewer septa. Other species on Pertusariales include *S. ophthalmizae* (q.v.) which has 16-spored asci and *S. saxatile* (q.v.) which has consistently 1-septate ascospores and a radially striate exciple.

Sclerococcum phaeophysciae Diederich & van den Boom (2017) **NE**

Thallus absent (lichenicolous), apothecia not known. Colonies forming superficial flattened or rarely convex sporodochia, dark brown to blackish, rounded, elongate or irregular in form, 200–600 µm diam., not or occasionally confluent. Vegetative hyphae colourless, immersed in the host thallus, indistinct. Conidiophores not or sparsely branched, colourless or pale brown. Conidiogenous cells monoblastic or rarely polyblastic, subglobose to ellipsoidal, mainly 5–10 µm diam., hardly distinguishable from other conidiophore cells. Conidia produced singly, separating easily, dry, subglobose, ellipsoidal or angular, medium to dark brown, smooth-walled, usually 1-septate, (10–) 11–14.5 (–17) × (8–) 9–11 (–12) µm, septum 1.5–3 µm thick, dark brown, often with a distinct blackish lamella; wall mostly medium brown, 0.7–1.2 µm thick, in some parts much thicker and darker, up to 2.2 µm thick. **BLS 2789**.

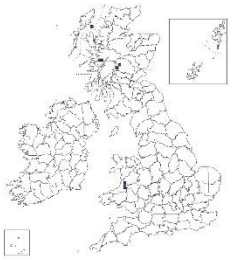
On *Phaeophyscia orbicularis*, sometimes in company with *Arthonia phaeophysciae*; Scotland (E. Lothian, E. Perthshire).

The description has been adapted from Diederich & Van den Boom (2017). *S. montagnei* (q.v.) is very similar but has somewhat smaller sporodochia and narrower conidia that are occasionally fissured.

Sclerococcum purpurascens (Triebel) Ertz & Diederich (2018) **NE**

Dactylospora purpurascens Triebel (1989)

Thallus absent (lichenicolous). Apothecia black, glossy, purplish when moist, sessile, (0.2–) 0.3–0.5 (–0.6) mm diam., rounded to slightly irregular, with a concave to flat disc and a narrow clearly defined margin. Exciple 30–40 (–50) pm thick, reddish brown in section; hypothecium pale to medium brown; hymenium colourless to slightly brownish, (55–) 60–80 (–90) pm high, occasionally with conspicuous, orange-coloured contents in the lower part of the hymenium and in the upper part of the hypothecium; paraphyses unbranched or apically forked, 1–2 µm diam., the apices clavate with reddish brown-pigmented caps; epithecium reddish brown, the epithecium and paraphysis caps K+ purple-red. Asci 8-spored, (36–) 40–50 × 11–14 (–18) µm. Ascospores 1-septate, pale to medium brown, ellipsoidal, sometimes slightly curved, occasionally slightly pointed, thin-walled, slightly constricted at the septum, without a perispore, (11–) 12–16.5 (–19) × (4.5–) 5–6.5 (–7.5) µm in size. Conidiomata not known. **BLS 2049**.



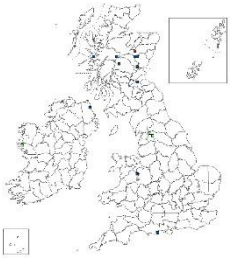
On thalli of *Amygdalaria pelobotryon* and *Porpidia tuberculosa*; Wales (Cardiganshire) and Scotland (Mid Perthshire, W. Inverness, Outer Hebrides).

Apparently distinct from *S. amygdalariae*, the hymenium and epithecium of which do not stain K+ purple-red. *S. athallinum* (q.v.) does show this feature, but has smaller ascospores and is a parasite of *Baeomyces*.

Sclerococcum saxatile (Schaer.) Ertz & Diederich (2018) **NE**

Dactylospora saxatilis (Schaer.) Hafellner (1979)

Thallus absent (lichenicolous). Apothecia initially sunken into the host thallus, when young with a slightly concave disc and thick, bulging margin that is often radially striate, becoming sessile or often somewhat raised, with a flat disc and narrow but



distinct margin, 0.25–0.7 mm diam.; exciple dark brown internally with radiating cells; hypothecium pale brown; hymenium colourless, 65–85 µm high; epithecium brown. Asci slightly clavate to broadly cylindrical, usually 8-spored, 40–55 × 11–16 µm. Paraphyses 2–3 µm diam., branched in the upper third, with slightly clavate apices to 6 µm diam., brown-pigmented. Ascospores brown, 1-septate, thick-walled, cells approximately equal in size, 9–15 × 4.5–7.5 µm. Conidiomata not known. **BLS 2050**.

On thalli of *Pertusaria amarescens*, scattered throughout N. and W. Britain, also N. Ireland.

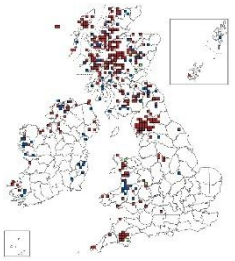
Sclerococcum simplex D. Hawksw. (1979) **NE**

Thallus absent (lichenicolous), apothecia not known. Mycelium immersed in host tissues, with colourless to pale brown flexuose hyphae. Conidiophores aggregated into dense tufted convex sporodochia (50–) 100–300 µm diam., not or sparsely branched, colourless or more usually pale brown, formed of swollen cells mainly 3–5 µm diam. Conidiogenous cells monoblastic or more rarely polyblastic, subglobose to ellipsoidal, mainly pale brown, not very distinct. Conidia produced in short basipetal chains, separating rather easily, dry, acrogenous, subglobose, brown to dark brown, mainly aseptate, smooth- and thick-walled, (3.5–) 4–7 (–8) µm diam. **BLS 2195**.

Colonies forming discrete patches on *Lepra ophthalmiza*, mainly on the apothecial warts of the host but also occurring on the thallus; also recorded from *Mycoblastus sanguinarius* Scotland (W. Inverness, W. Ross).

Known from a broad range of Pertusariaceae species according to Diederich *et al*. (2024).

Sclerococcum sphaerale (Ach.) Fr. (1825) **LC**



Thallus absent (lichenicolous), apothecia not known. Colonies forming roundish convex clearly delimited dark brown to black sporodochia 0.1–0.5 mm diam.; mycelium ± immersed in the outer layers of the host lichen; stroma poorly developed or ± absent. Conidiophores aseptate, subglobose to ellipsoidal or polyhedral, mainly 4–6 (–8) µm diam., colourless to pale brown. Conidiogenous cells monoblastic or polyblastic, subglobose, shortly cylindrical or ellipsoidal, sometimes rather inflated, mainly 4–10 × 3–7 µm. Conidia in compact, irregular but frequently almost biseriate chains, dry, irregularly subglobose to ellipsoidal, (8–) 10–15 (–17) µm overall, composed of 2–6 (–9) ± fused subglobose cells, walls moderately thick and ± smooth (sometimes becoming slightly uneven), brown to dark brown, almost black in mass, individual cells of groups mainly (4–) 6–10 µm diam. **BLS 1848**.

On thalli of *Lepra corallina*, usually suppressing the production of isidia; very common. N. and W. Britain and Ireland.

The description has been adapted mostly from Hawksworth (1975a). Records from other species of Pertusariales (especially *Pertusaria pseudocorallina*) may refer to other species according to Diederich *et al*. (2024).

Sclerococcum suburceolatum (Coppins & Fryday) Ertz & Diederich (2018) **NE**

Dactylospora suburceolata Coppins & Fryday (2012)

Thallus absent (lichenicolous). Apothecia 0.2–0.8 mm diam., black or with a dark brown margin; disc concave; margin prominent, persistent, smooth. Exciple 60–75 mm thick, upper and especially outer part dark brown, K–; lower part dilute brownish or ± colourless, but often with a thin, dark brown outer edge; cells to 12 µm diam. Hypothecium red-brown, K+ dulling or K+ dull olivaceous; hymenium 70–95 µm tall, colourless to dilute red-brown; epithecium red-brown, K+ dulling [never purplish]; paraphyses mostly slender, 1–1.5 µm thick, apices slightly widening to *ca* 3 µm diam., each with a distinct, dark brown apical cap. Asci *ca* 70 × 12–14 µm, 8-spored. Ascospores (14–) 17–21 (–24) × (5–) 6–7 (–9.5) µm, narrowly ellipsoidal, brown, smooth-walled but with the wall of old spores finely warted, (1–) 3-septate. Conidiomata not seen. **BLS 2608**.

On the thallus of an unidentified whitish–yellowish muscicolous crustose lichen, Scotland (Mid Perthshire).

According to Fryday & Coppins (2012), the host could perhaps be *Bryobilimbia hypnorum* (Lib.) Fryday, Printzen & S. Ekman (see Fryday *et al*. 2014). Compared with *S. urceolatum* (see below), it has generally larger apothecia, a broader exciple, a taller hymenium, and consistently 3-septate ascospores that are slightly broader.

Sclerococcum tegularum (Arnold) Ertz & Diederich (2918) **NE**

Dactylospora tegularum (Arnold) Hafellner (1979)

Thallus absent (lichenicolous). Apothecia initially ± sunken into the host thallus, black, with a broad roughened margin and tiny disc, 0.1–0.25 mm diam.; exciple dark brown internally, cells arranged radially in the upper part; hypothecium colourless to light brownish; hymenium colourless, 45–60 µm high; epithecium brown. Paraphyses unbranched or branched only at the apices, 2–2.5 µm diam., the apices clavate, to 5 µm diam., brown-pigmented. Asci clavate, 8-spored but not infrequently with fewer than 8 spores, 35–45 × 10–14 µm. Ascospores brown, 1-septate, thick-walled, 9.5–13.5 × 6.5–7 µm. Conidiomata not known. **BLS 2475**.

On *Blastenia crenularia* and *Rufoplaca arenaria*, Scotland (Mid Perthshire, St Kilda).

According to Hafellner (1979), *Sclerococcum tegularum* is very similar to *S. saxatilis* (q.v.), but differs in apothecial size and hymenium height.

Sclerococcum tephromelarum Etayo & Calat. (1998) **NE**

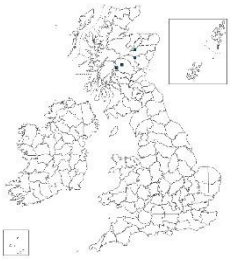
Thallus absent (lichenicolous), apothecia not known. Sporodochia convex, frequently becoming crateriform, black, rounded or slightly elongated, 0.05–0.15 mm diam., not confluent. Vegetative hyphae colourless or slightly brownish. Conidiophores strongly agglomerated. Conidiogenous cells terminal, the same colour as the conidia. Conidia of variable shape, dark brown, 2- to 4-celled, 11–21 × 8–15 µm, very thick-walled, with a roughly lacerate-granulose ornamentation.

On *Tephromela atra*, growing on bleached areas of the host thallus; England (Somerset) and Scotland (Argyll, Berwickshire and E. Perthshire).

Characterized especially by the very thick-walled, ornamented conidia.

Sclerococcum urceolatum (Th. Fr.) Ertz & Diederich (2018) **NE**

Dactylospora urceolata (Th. Fr.) Arnold (1874)



Thallus absent (lichenicolous). Apothecia initially partly immersed and punctiform, becoming almost superficial, with a concave to flat disc, 0.15–0.5 mm diam. Exciple dark brown, the hypothecium sometimes slightly violet at the base; hymenium colourless; epithecium dark brown with a violet tinge or brown or chestnut brown. Paraphyses branched above, *ca* 1.5 µm thick, the apices ± clavate, brown. Asci clavate, short-stalked, 8-spored, 40–50 × 12–17 µm. Ascospores elongated or fusiform, rounded at both ends, straight or slightly curved, brown, usually 7-septate (less frequently 3- or 5-septate), sometimes with a longitudinal wall in 2 or 3 cells, 15–23 × 4–6 µm.

On terricolous or muscicolous thalli of various lichens, e.g. *Megaspora verrucosa*, *Pannaria pezizoides*, *Protothelenella sphinctrinoidella*, Scotland (Angus, Banff, Mid-Perthshire).

VERRUCARIALES: family unassigned

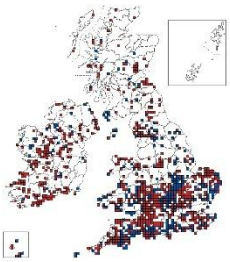
BOTRYOLEPRARIA Canals *et al*. (1997)

As this is a monotypic genus the description below (*B. lesdainii*) constitutes the generic description. *Botryolepraria* differs from *Lepraria* by its microscopic shrub-like clusters of free hyphae crowned by subterminal algal cells in a form resembling a bunch of grapes. The two genera are not at all related in phylogenetic terms.

Literature:

Canals *et al*. (1997), Kukwa & Pérez-Ortega (2009), Orange & Laundon (2009).

Botryolepraria lesdainii (Hue) Canals, Hern.-Mariné, Gómez-Bolea & Llimona (1997) **LC**



Thallus diffuse, malachite green, byssoid, soft and spongy in texture, soredia absent; free hyphae (not directly associated with algae) abundant, forming a network; hyphae thin-walled, with frequent septa; photobiont cells in clusters at the ends of hyphal branches, not completely enclosed by hyphae; soredia and isidia absent; photobiont a green alga (Chlorophyta). Ascomata and conidiomata unknown. Thallus C–, K–, Pd–, UV– (a triterpenoid, 6α-acetoxyhopan-22-ol [lesdainin]). **BLS 1628**.

On shaded calcareous rocks and walls, on calcareous mudstone, limestone and mortar, on surfaces sheltered from direct rain, in shade, frequent both in natural habitats and on old walls. Widespread and locally abundant in England, Wales and Ireland, scattered records in Scotland.

B. lesdainii can be reliably identified in the field by the spongy, notably blue-green thallus on calcareous substrata. Species of *Lepraria* differ in the presence of true soredia, the more distant septa in the hyphae, and the occurrence of compounds other than lesdainin.

STIGMIDIUM Trevis. (1860)

Thallus mostly absent (lichenicolous), apparently lichenized in one species (photobiont *Dilabifilum*) or parasitic on brown algae. **Vegetative hyphae** branched, colourless or pale brown with fairly elongate cells, normally at least mostly immersed within host tissues. **Stromata** absent. **Ascomata** perithecia with melanized walls and short necks, setae absent but sometimes with hyphal appendages or developing within a mat of vegetative mycelium, immersed in host thalli or becoming erumpent. **Hamathecium** varied, of narrow pseudoparaphyses, often rudimentary and frequently deliquescing at maturity. **Periphysoids** line the ostiole in some species. **Asci** often few in number, clavate to saccate, thick-walled and fissitunicate with the upper part attenuated, apical structures not differentiated, not bluing in iodine, usually 8-spored. **Ascospores** arranged biseriately, cylindrical to clavate or ellipsoidal, thin- and smooth-walled, usually colourless but sometimes browning late in development, 1- (rarely 3-) septate, the cells often with two guttules giving the impression of further septa; perispore not present. **Anamorphs** not known in most species. **Chemistry**: no lichen chemicals not reported.

Stigmidium is a poorly known but apparently speciose genus, of uncertain phylogenetic position and with almost no sequence data available, and it is almost certainly polyphyletic. For some time it was assumed to have affinities with the Mycosphaerellaceae, but is currently placed provisionally within the Verrucariales (Kohlmeyer & Volkmann-Kohlmeyer 1998, Diederich *et al.* 2018). Many species were revised in a monograph published by Roux & Triebel (1994), who suggested affinities with the genus *Sphaerellothecium* Zopf; that has morphologically similar ascomata that are formed superficially on a network of pigmented hyphae. A draft key to lichenicolous fungi from Britain and western Europe (Hawksworth *et al*. 2010) also contains much useful information. The degree of host specificity of *Stigmidium* species is largely unknown, and many cannot be distinguished effectively without knowledge of host identity.

Currently, 30 species of *Stigmidium* have been recorded from Britain and Ireland, with a number of further undescribed taxa (see below). *S. marinum* (Deakin) Swinscow has long been assumed to be a lichenicolous fungus associated with *Wahlenbergiella* species, but Aptroot *et al*. (2017) considered it to be a lichen with a *Dilabifilum* photobiont; more research on the associations would be helpful. *S. ascophylli* (Cotton) Aptroot was originally described as a *Mycosphaerella* species, and is a biotrophic associate of fucoid algae (Kohlmeyer & Volkmann-Kolhmeyer 1998). Webber (1967) noted that the

association appears to be ubiquitous, and there have been some claims of mutualistic interaction.

Numerous collections of *Stigmidium* spp. have been made associated with lichens from which species have not previously been described, and bearing in mind uncertainties regarding host specificity, most at least of these must remain identified to genus only. These include collections from *Athallia cerinelloides*, *Bacidia absistens*, *Bacidina caligans*, *B. neosquamulosa*, *B. saxenii*, *Bryobilimbia hypnorum*, *B. sanguineoatra*, *Caloplaca obscurella*, *Coenogonium pineti*, *Coppinsiella ulcerosa*, *Dermatocarpon meiophyllizum*, *D. miniatum*, *Flavoplaca flavocitrina*, *Fuscidea gothoburgensis*, *F. intercincta*, *Lathagrium cristatum*, *Lecania hutchinsiae*, *L. rabenhorstii*, *L. turicensis*, *Lecanora gangaleoides*, *L. helicopis*, *Lepra albescens*, *Leptogium saturninum*, *Mycobilimbia epixanthoides*, *Naetrocymbe carneobrunneola*, *Porpidia tuberculosa*, *Psilolechia leprosa*, *Pyrenula occidentalis*, *Scythiora phlogina*, *Sporodictyon cruentum*, *Staurothele fissa*, *Stereocaulon evolutum*, *Trapelia placodioides* and *Verrucaria latebrosa*.

Stigmidium gyrophorarum (Arnold) D. Hawksw. has almost certainly not been correctly reported from Britain and Ireland. Hawksworth (1983) refers to a historical specimen from Ben Lawers on *Catapyrenium* squamules, but the species was described from *Umbilicaria* and studies from elsewhere differ in their interpretation. Judging from Hawksworth & Diederich (1988) and Darmostuk & Garvrilenko (2016) is is not a typical *Stigmidium* and is likely to belong elsewhere; possibly more than one species is involved. The status of *S. punctillum* (Arnold) D. Hawksw. is uncertain; Triebel & Scholz (2001) considered that it is probably not lichenicolous, and the only British record was considered to be dubious by Hawksworth *et al.* (2010). It is excluded from this account pending further investigation.

Detailed published information on many species is scanty. The key and many of the descriptions below are based on Hawksworth *et al*. (2010) and Roux & Triebel (1994).

Literature:
Aptroot *et al.* (2017), Diederich *et al.* (2018), Hawksworth *et al.* (2010), Kohlmeyer & Volkmann-Kohlmeyer (1998), Roux & Triebel (1994, 2005), Triebel & Cáceres (2004), Webber (1967).

As most species are identified using the host as a major factor, a key is not provided, but the table below summarizes the host/parasite relationships.

Host family	**Host genus/genera**	***Stigmidium* species**
Acarosporaceae	*Acarospora*	*fuscatae*
Arthoniaceae	*Arthonia*	*arthoniae*
Caliciaceae	*Buellia*	*buelliae*
Fucaceae (brown algae)	*Ascophyllum*, *Pelvetia*	*ascophylli*
Graphidaceae	*Graphis*	*microspilum*
Lecanoraceae	*Cladonia*	*subcladoniicola*
	Lecanora, ? *Glaucomaria*	*congestum*
	Lecidella	*lecidellae*
Megasporaceae	*Circinaria*	*aggregatum*
Ochrolechiaceae	*Varicellaria*	*eucline*
Pannariaceae	*Pannaria*	*mitchellii*
	Pectenia	*degelii*
Parmeliaceae	*Xanthoparmelia* (assumed)	*xanthoparmeliarum*
Peltigeraceae	*Peltigera*	*leucophlebia*
		peltideae
	Solorina	*solorinarium*
Pertusariaceae	*Pertusaria*	*eucline*
Physciaceae	*Anaptychia*	*hageniae*
Placynthiaceae	*Placynthium*	*placynthii*

Host family	Host genus/genera	*Stigmidium* species
Porocyphaceae	*Ephebe*	*ephebes*
Ramalinaceae	*Bilimbia*	*mycobilimbiae*
	Ramalina	*ramalinae*
	Thalloidima	*tabacinae*
Teloschistaceae	*Flavoplaca*	*epistigmellum*
Verrucariaceae	*Henrica*	*superpositum*
	Thelidium, *Verrucaria*	*tetrasporum*
	Verrucaria	*clauzadei*
		rivulorum
	Wahlenbergiella, Verrucaria	*marinum*

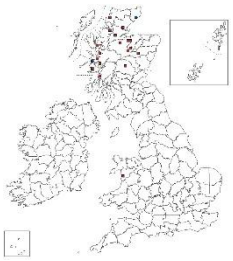
Stigmidium aggregatum (Mudd) D. Hawksw. (1975) **NE**

Ascomata minute, aggregated together into groups of three to twelve, semi-immersed in the host thallus, globose, black; the upper wall black and the lower part reddish-black; paraphyses indistinct; asci clavate, 8-spored; ascospores cylindrical to fusiform-cylindrical, 1-septate, ± colourless, 22–30 × 4.5–9 µm. Pycnidia not known [description from Mudd 1861, Kocourková & Knudsen 2010]. **BLS 2220**.

On thalli of *Circinaria calcarea*, N. Ireland (Co. Down).

Described from a maritime islet, presumably on limestone; however the type is missing (Kocourková & Knudsen 2010) and no other definitively identified collections are known. Material on *Pertusaria* and *Varicellaria* spp. should be referred to *S. eucline*.

Stigmidium arthoniae (Arnold) Hafellner (1994) **NE**



Ascomata scattered but quite numerous, globose, 100–200 µm diam., one third to half erumpent, with a slightly depressed ostiole; wall composed of dark brown pseudoparenchymatous cells; paraphyses absent, periphyses well-developed, sometimes bifurcate. Asci clavate, sessile, the apex attenuated, rounded and thick-walled, 40–60 × 7.5–19 µm. Ascospores irregularly arranged, ± cylindrical to slightly cylindric-clavate, broadly rounded at both ends, colourless, 1- or rarely 3-septate, not constricted at the septa, often with 4 oil droplets, 17–23 × 4.5–5 µm. Pycnidia not known [description from Keissler 1930]. **BLS 2221**.

On thalli of *Arthonia radiata*, Highland Scotland, with one record from Wales (Merioneth).

Stigmidium ascophylli (Cotton) Aptroot (2006) **NE**

Ascomata 100–130 × 80–90 µm, pyriform, black, scattered, immersed in the host thallus, the ostiole small, slightly protruding but not prominent. Paraphyses absent but the upper part of the perithecium lined with short upwardly-pointing periphysoids that merge into periphyses within the ostiole. Asci few, cylindric-ellipsoidal, often curved, the apex thickened, 8-spored, 50–60 × 18–20 µm. Ascospores biseriately arranged, fusiform-ellipsoidal, colourless, 1-septate, not or hardly constricted at the septum, 18–21 × 4–5 µm. Pycnidia not known [description primarily from Cotton 1908].

In living thalli of *Ascophyllum nodosum* and *Pelvetia canaliculata*, rarely recorded but reportedly ubiquitous with the hosts.

The host-fungus relationship has led to some treating the association as a "mycophycobiosis" (Hawksworth 1988, Kohlmeyer & Volkmann-Kohlmeyer 1998).

Stigmidium buelliae Zhurb. & Himelbr. (2012) **NE**

Ascomata brownish black, subglobose, 40–80 µm diam., with an ostiole that may open widely, mostly semi-immersed, to 30 per host apothecium. Ascomatal wall dark brown above, medium brown below, composed of angular cells. Periphysoids short, periphyses well-developed, scarcely septate, 12–20 µm long. Asci subcylindrical, inflated near the centre, ± sessile, (33–) 36–54 (–71) × (10–) 12–16 (–18) µm, 8-spored. Ascospores bi- or triseriately arranged, narrowly clavate to cylindrical with

the upper cell sometimes slightly wider, (12.5–) 14.5–17.5 (–22.5) × 3–4 (–5) µm, not constricted at the single median septum, colourless, usually with two large guttules per cell, smooth, without a perispore. Pycnidia not known [description from Zhurbenko *et al*. 2012]. **BLS 2849**.

In apothecia of *Buellia disciformis*; a single record from Scotland (W. Inverness). Zimmermann & Berger (2018) found a specimen from Austria with slightly smaller ascospores.

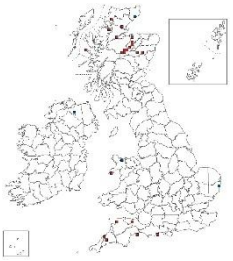
Stigmidium clauzadei Cl. Roux & Nav.-Ros. (1994) **NE**

Ascomata ± globose, 80–130 × 65–120 µm, dark brown to black, in clusters in the host areoles, the wall composed of thick-walled rounded to angular cells. Periphysoids elongate, to 24 × 4 µm, composed of 3–6 cells, periphyses to 20 µm in length. Asci clavate to saccate, 44–47 × 15–19 µm, thick-walled, ± sessile, 8-spored. Ascospores arranged biseriately, 12.5–17.5 × 5–6.5 µm, ellipsoidal, hardly constricted at the single median septum, colourless, with a thin gelatinous perispore. Pycnidia not known [description from Roux & Navarro-Rosinés 1994]. **BLS 2470**.

On thalli of *Verrucaria nigrescens* and *V. viridula*, scattered throughout Britain (England: Essex, Wales: Monmouthshire, Scotland: W. Ross).

Stigmidium rivulorum (q.v.) occurs on freshwater-aquatic species of *Verrucaria*; it has smaller ascomata and slightly narrower ascospores.

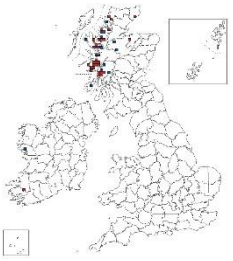
Stigmidium congestum (Körb.) Triebel (1991) **NE**



Ascomata globose to ellipsoidal, 40–85 × 30–80 µm, black, numerous and densely packed on apothecial discs of the host, immersed or partly erumpent, with a barely visible ostiole; wall medium to dark brown; periphyses and periphysoids 5–11 × 1–2.5 µm. Asci 24–37 × 10–18 µm, broadly cylindrical, clavate to subglobose, 8-spored. Ascospores ellipsoidal to cylindrical, rounded at both ends, 12–14 (–16) × (2.5–) 3–4 µm, colourless, 1-septate, not or barely constricted at the septum, thin-walled, the cells usually with two oil droplets, with a finely verruculose outer wall. Pycnidia intermixed with ascomata, 27–50 × 20–38 µm, brown but with a very pale or even colorless lower part. Conidia short and straight, 2–3 × 0.5–1 µm [description from Roux & Triebel 1994]. **BLS 2222**.

In apothecia of *Lecanora chlarotera* agg.; common in Highland Scotland and S.W. England, also known from N. Wales, E. England (Suffolk) and N. Ireland. A collection on *Glaucomaria carpinea* might need reassessment. See also under *S. solorinarium*.

Stigmidium degelii R. Sant. (1993) **NE**



Ascomata scattered, not confluent, subglobose, 80–110 µm diam. and 100–130 µm tall, immersed in the surface layers of the host lichen, finally slightly protruding; the wall dark brown above, lateral and basal parts pale brown; hamathecium absent. Asci usually obclavate, the apex strongly thickened, 30–35 × 10–15 µm, 6(-8?)-spored. Ascospores irregularly arranged, (9–) 11–16 × (3–) 4–5 µm, clavate to ellipsoidal, the upper cell somewhat broader, colourless, 1-septate. Pycnidia often numerous, globose, 30–50 µm diam., wall pale brownish. Conidia bacillar, 4–5 × 0.8–1.0 µm [description from Santesson 1993]. **BLS 2223**.

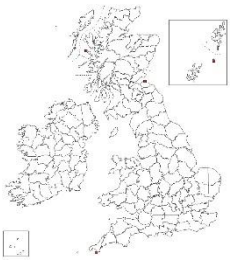
On thalli of *Pectenia atlantica*, *P. cyanoloma* and *P. plumbea*, not causing galls or discoloration of the host thallus; widespread in W. and N. Scotland, also W. Ireland.

Stigmidium ephebes (Henssen) D. Hawksw. (1975) **NE**

Ascomata developing in elongate or rounded galls to 1 mm long and 0.5 mm diam., 70–125 × 60–120 µm, usually numerous, completely immersed with only the ostioles visible as black dots; wall brownish, consisting of compressed and dead cells; hamathecium absent, periphyses line the ostiole. Asci clavate with thick walls, 35–45 × 12–13 µm, 8-spored. Ascospores 16–20 × 4–5 µm, 1-septate, colourless, often slightly curved and slightly constricted at the septum. Pycnidia 45–70 × 35–55 µm, with dark walls. Conidia short-cylindrical, 1.5-2 × *ca* 1 µm [description from Henssen 1963]. **BLS 2225**.

Reported from England (unlocalized) on *Ephebe lanata* by Henssen (1963); no further details are available.

Stigmidium epistigmellum (Nyl. ex Vouaux) Kocourk. & K. Knudsen (2009) **NE**

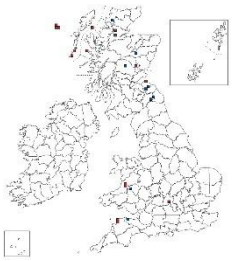


Ascomata half immersed in host tissues in loose groups of 3–10 or more, black, globose to subglobose, ostiolate, 80–100 (–120) diam.; wall dark brownish-black above, lighter or reddish brown below, of thick-walled angular cells. Hamathecium of pendent periphysoids lining the upper wall of ascomatal cavity, branching, 12–17 µm long, composed of three cells, breaking down at maturity; the ostiole lined with periphyses that are pigmented around the opening. Asci narrowly saccate, 40–50 × 10–15 µm, thick-walled above, sessile or shortly stipitate, 8-spored. Ascospores arranged biseriately, (14.5–) 16–19 (–21.5) × (3.5–) 4–5 µm, narrowly clavate, 1-septate, colourless, not or slightly constricted at the median septum. Pycnidia 30–35 µm diam., dark brown; conidia 3–4 × 0.5–1.0 µm [description from Kocourková & Knudsen 2009]. **BLS 2657**.

On thalli and apothecia of *Flavoplaca marina*, England (Cornwall), Scotland (E. Lothian, Sanday, Fair Isle).

American populations cause large pathogenic infections, eventually causing bleaching and destruction of the host. British collections have slightly shorter ascospores (11.5–18 × 3.8–4.8 µm).

Stigmidium eucline (Nyl.) Vězda (1970) **NE**

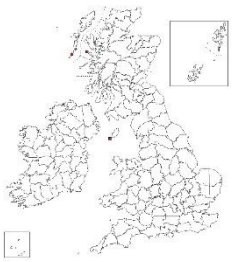


Ascomata globose, *ca* 100 µm diam., black, densely clustered into groups on black or dark grey spots on the host thallus; wall *ca* 30 µm thick, blackish brown, with an indistinct cellular structure; periphysoids visible only in immature fruiting bodies, branched and thick-walled, deliquecent in mature fruiting bodies. Asci ovoid, the upper part somewhat elongate and narrowed, broadly rounded at the tip, short-stalked, 8-spored. Ascospores ovoid or ellipsoidal, with both ends rounded, 12–15 × 5–6 µm, 1-septate, the upper cell somewhat wider than the lower, colourless, thin-walled. Pycnidia not known [description from Vezda 1970]. **BLS 2606**.

On thalli of *Pertusaria pseudocorallina*, *Varicellaria hemisphaerica* and *V. lactea*, apparently common throughout Scotland, extending south through W. Wales to S.W. England.

Formerly confused with *S. aggregatum* (see Kocourková & Knudsen 2010, and above).

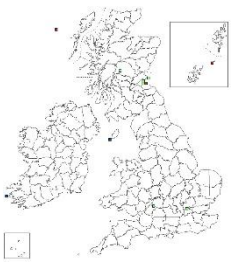
Stigmidium fuscatae (Arnold) R. Sant. (1988) **NE**



Ascomata black, globose, semi-immersed to almost sessile, 50–100 µm diam.; upper part of wall dark brown, the immersed part colourless. Paraphysoids very short, not septate. Asci 4- to 8-spored, clavate to saccate, 30–40 × 10–15 µm, with an ocular chamber, not blueing in iodine. Ascospores colourless, 1-septate, constricted at the septum, clavate-ellipsoidal, 9–12 × 4–5 µm, the walls smooth, thin. Pycnidia not seen [description from Hawksworth *et al.* 2010, Triebel & Cáceres 2004]. **BLS 2226**.

On thallis of *Acarospora fuscata*, Isle of Man, W. Scotland (Barra, Sanday).

Stigmidium hageniae (Rehm) Hafellner (1988**)** **NE**



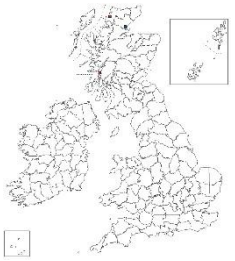
Ascomata 50–70 µm diam., abundantly developed on the lower part of host thalli; asci 8-spored, 35–42 × 12–14 µm; ascospores colourless, 1- to 3-septate, soleiform to cylindric-clavate, (11–) 11.5–13.5(–14) × (3–) 3.3–4 µm [description from Brackel & Döbbeler 2020, Hawksworth 1994]. **BLS 2227**.

On thalli of *Anaptychia ciliaris* (historical records) and *A. mamillata*; England (Gloucestershire, Hertfordshire), Isle of Man, Scotland (E. Lothian, Perthshire, Outer Hebrides, Shetland).

Stigmidium lecidellae Triebel, Cl. Roux & Le Coeur (1995) **NE**

Ascomata entirely immersed in clusters in host apothecia, the ostioles not or hardly protruding, subglobose 60–

90 × 40–75 µm, black; the wall blackish-brown, including at the base; paraphysoids short, to 8 × 2.5 µ, periphyses 5–12 × 1–2.5 µm. Asci 22–36 × 8–13 µm, broadly subcylindrical or clavate, sessile or nearly so. Ascospores colourless, (11–) 12–15 (–16) × 3–4 µm, cylindrical or cylindric-ellipsoidal, rounded at both ends, 1-septate, with two oil droplets in each cell, thin-walled, becoming finely warted at or after maturity, perispore not or barely distinct. Pycnidia rare, 30–35 × 20–25 µm, conidia 2–2.5 × 0.5–1 µm [description from Roux & Triebel 1994]. **BLS 2308**.



In the hymenium of *Lecidella elaeochroma*, W. and N. Scotland (Argyll, Sutherland).

Stigmidium leucophlebiae Cl. Roux & Triebel (1994) **NE**

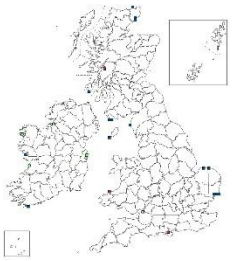
Ascomata numerous and usually densely aggregated, globose, 55–70 × 50–65 µm, black; wall blackish-brown, including at the base; periphysoids and periphyses both 5–8 × 1.5–2 µm. Asci 30–39 × 13–17 µm, clavate, sessile or very shortly stalked. Ascospores colourless, (12–) 13.5–15 (–15.5) × 3.5–5 (–5.5) µm, cylindrical, cylindric-ellipsoidal or slightly subclavate, rounded at both ends, each cell with two oil droplets, the upper cell slightly wider and shorter), thin-walled, without a perispore. Pycnidia rare, *ca* 30 × 18 µm, conidia 2.5–3 × 0.5–1 µm [description from Roux & Triebel 1994]. **BLS 2228**.

Immersed in dying parts of the thallus of *Peltigera leucophlebia*; one record from Scotland (Mid-Perthshire).

The name is invalidly published as it was introduced *ad interim. S. peltideae* (q.v.) has smaller ascospores, and primarily occurs on *Peltigera* species with cyanobionts (primarily *P. membranacea* but also collected once from *P. leucophlebia*).

Stigmidium marinum (Deakin) Swinscow (1965) **NE**

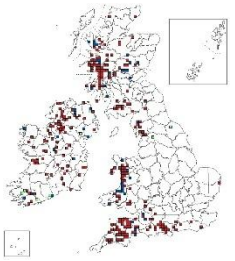
Thallus film-like, greenish or brownish, photobiont *Dilabifilum*, or absent (lichenicolous). Ascomata half to almost wholly immersed. Involucrellum present, black, sometimes well-developed, 100–150 µm diam., tending to extend laterally; sometimes not developed or restricted to a black collar around the ostiole. Exciple colourless to pale brown, 50–100 µm diam.; hamathecium net-like, mainly gelatinised. Asci 30–40 × 10–15 µm, pyriform, 8-spored. Ascospores colourless, 10–15 × 4–6 µm, 1-septate, with pseudosepta often dividing the two cells, the upper cell usually slightly wider than the lower. Pycnidia not known [description primarily from Swinscow 1965]. **BLS 2229**.



On intertidal rocks, frequently associated with (and possibly parasitic on) *Wahlenbergiella mucosa* and *W. striatula*, also with *Verrucaria halizoa* and *V. maura* agg.; scattered around the coastline of Britain and Ireland, doubtless under-recorded. There is a useful illustration of the species in Van Herk *et al.* (2017).

Stigmidium microspilum (Körb.) D. Hawksw. (1975) **NE**

Forming irregular dark grey to brownish patches to 1.5 mm diam. on the host thallus, with a network of immersed thick-walled brown hyphae. Ascomata 80–120 µm diam., black, around half-erumpent, the ostiole conspicuous, slightly depressed. Asci clavate to saccate, 32–40 × 16–19 µm, attenuated towards the apex, sessile, thick-walled especially above, 8-spored. Ascospores cylindrical or narrowly ellipsoidal to narrowly clavate, 1-septate, 13.5−16.5 (–19) × 3.5−5 µm, colourless but pale brown when over-mature, smooth- and thin-walled, without a perispore.



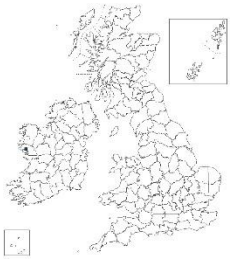
On thalli of *Graphis scripta* agg., very common throughout W. Britain and Ireland, a few scattered records in S.E. and E. England.

Stigmidium mitchellii Roux & Bricaud (1994) **NE**

Ascomata globose or subglobose 55–65 × 50–60 µm, black, scattered to densely aggregated, around half-erumpent; the wall reddish-brown paler below; periphysoids and periphyses 6–13 × 2–3 µm. Asci 28–35 × 10–14 µm, clavate, sessile or nearly so, 8-spored. Ascospores colourless, (10.5–) 12–14 (–14.5) × 3–4 (–5) µm,

cylindric-ellipsoidal to narrowly clavate, rounded at both ends, sometimes slightly narrowed at one end, 1-septate, each cell with two guttules, with equal or nearly equal cells, without a perispore. Pycnidia rare, *ca* 23 × 18 µm diam., conidia 2.5–3 × 0.5–1 µm [description from Roux & Triebel 1994]. **BLS 2230**.

On thalli of *Pannaria conoplea*, Ireland (Connemara). Apparently known only in GBI from the original collection, though there is a further possible record on *Pannaria rubiginosa* from Scotland (W. Inverness) that has yellowish brown ascospores. It has been recorded from the Alps on several other species of Pannariaceae (Berger & Zimmermann 2021).



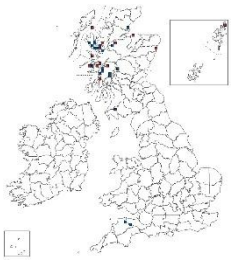
Stigmidium mycobilimbiae Cl. Roux, Triebel & Etayo (1994) **NE**

Ascomata scattered oraggregated, rarely confluent, half or a third embedded in the host thallus, globose, 60–90 × 55–75 µm, black; wall blackish-brown, sometimes paler and more reddish at the base. Periphysoids and periphyses 5–11 × 1.5–2 µm. Asci 29–38 × 10–15 µm, broadly subcylindrical or clavate, sessile or shortly stalked, 8-spored. Ascospores colourless, (10.5–) 11.5–16 (–16.5) × (2.5–) 3–4 (–4.5) µm, cylindrical or narrowly ellipsoidal, rounded at both ends, 1-septate with equal or nearly equal cells, each cell with two guttules, thin-walled, witout a perispore. Pycnidia not known [description from Roux & Triebel 1994]. **BLS 2231**.

On thalli of *Bilimbia lobulata* and *B. sabuletorum*; England (M.W. Yorkshire), Scotland (Lanarkshire), Wales (Pembrokeshire).

Stigmidium peltideae (Vainio) R. Sant. (1960) **NE**

Ascomata immersed in the surface layers of the host lichen, scattered, black, subglobose with a flattened base, ostiolate, 40–70 µm diam. and 45–60 µm tall; wall dark brown to black with heavily sclerotized cell walls, pale brown to almost colourless below. Periphysoids and periphyses 5–11 × 1.5–2.5 µm, the hamathecium becoming gelatinized and indistinct in mature ascomata. Asci elongate-clavate, thick-walled with a distinct internal apical beak, 28–35 × 7–8 µm, 8-spored. Ascospores biseriately arranged, ellipsoidal to narrowly clavate with rounded ends, 1-septate, not markedly constricted at the septum, colourless, 9–12 × 2.5–3.5 µm [description from Hawksworth 1975b and Roux & Triebel 1994]. **BLS 2232**.



On various *Peltigera* spp., most commonly on *P. membranacea* but also recorded on *P. canina*, *P. collina*, *P. horizontalis*, *P. leucophlebia*, *P. hymenina*, *P. praetextata* and *P. rufescens*; frequent in Scotland, a small number of records from S.W. England.

Stigmidium placynthii Cl. Roux & Nav.-Ros. (1994) **NE**

Ascomata globose, 75–80 µm diam., black, scattered and superficial on the host thallus; wall wall reddish brown, Periphysoids 6–16 × 2.5–3 µm, clearly visible, consisting of (2)3–4 short cells; periphyses 6–11.5 × 1.5–3 µm. Asci 27–29 × 9–11.5 µm, clavate or broadly subcylindrical, sessile or nearly so. Ascospores initially colourless then fairly quickly pale brown, (7.5–) 9.5–12 (–13.5) × 3–3.5 (–4) µm, ellipsoidal to cylindrical, with rounded ends, 1-septate, each cell usually with two guttules, thin-walled, smooth, surrounded by a narrow perispore. Pycnidia not observed [description from Roux & Triebel 1994]. **BLS 2761**.

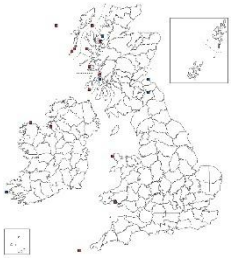
Among squamules of *Placynthium* cf. *garovaglii* on limestone, England (M.W. Yorkshire).

Considered to belong to an infrageneric grouping of species with well-developed periphysoids and ascospores that become pigmented (Roux & Triebel 1994).

Stigmidium ramalinae (Müll. Arg.) Etayo & Diederich (2004) **NE**

Stigmidium epiramalina (Vouaux) Hafellner (1994)

Ascomata 40–50 µm diam. (60–110 µm *fide* Pitard & Harmand 1911), formed on a network of mid brown thin-walled hyphae; subglobose, scattered or in small clusters ± immersed with the upper quarter protruding from the host thallus; wall brown, thick-walled. Hamathecium absent; periphyses not seen. Asci broadly clavate, 20–25 × 8–9 µm (27–32 × 13–16 µm *fide* Pitard & Harmand 1911), short-stalked, 8-spored. Ascospores narrowly ellipsoidal, 11.5–13.5 × 2.5–3.5 µm, colourless (brownish when

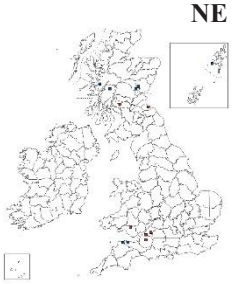


over-mature), 1-septate, not or slightly constricted at the septum, the lower cell narrower than the upper. Pycnidia not known [description from Etayo & Osorio 2004, Pitard & Harmand 1911]. **BLS 2224**.

On thalli of *Ramalina cuspidata* and *R. siliquosa*, W. Britain from the Scilly Is in the south to the Inner and Outer Hebrides, also W. Ireland.

There are some differences in the descriptions of *S. ramalinae* and *S. epiramalina*, noted above. British material corresponds more closely to the description of *S. ramalinae*, but ascospores are somewhat shorter than measurements for either taxon (mostly 9–11 × 3–3.5 µm). The superficial mycelium might suggest an affinity with *Sphaerellothecium*.

Stigmidium rivulorum (Kernst.) Cl. Roux & Nav.-Ros. (1994) **NE**

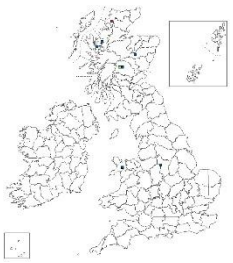


Ascomata two-thirds immersed to superficial on host thalli, globose to subglobose, (40–) 55–80 (–90) µm diam., black; wall dark brown above, paler and thinner below. Periphysoids short with a short basal cell and an elongate distal cell, periphyses present. Asci 35–48 × 14–20 µm, narrowly ovoid, clavate or rarely cylindrical, thick-walled above, 8-spored. Ascospores (13–) 14–16 (–17.5) × (4–) 5–6 (–7.5) µm, 1-septate, colourless, a thin perispore sometimes present. Pycnidia not observed [description from Shivarov 2017]. **BLS 1986**.

On *Verrucaria* spp. in freshwater habitats, including *V. aquatilis*, *V. elaeomelaena*, *V. hydrela* and *V. margacea*; scattered in Scotland, S. Wales and S.W. England.

Compare with *S. clauzadei* (q.v.) on terrestrial *Verrucaria* spp., which has longer, multiseptate periphysoids.

Stigmidium solorinarium (Vain.) D. Hawksw. (1983) **NE**



Ascomata ± globose to pyriform, 55–75 µm diam., sometimes with a distinct neck to 20 µm tall, black, strongly aggregated and sometimes confluent, half or a third embedded in the host thallus; wall dark brown above, colourless or nearly so below. Periphysoids and periphyses 5–10.5 × 1.5–2.5 µm. Asci 22–35 × 9–13 µm, clavate or broadly subcylindrical, sessile or short-stalked, 6- or 8-spored. Ascospores colourless but eventually becoming pale brown, (10–) 10.5–13.5 (–14) × 3–4 (–4.5) µm, varied in shape, ellipsoidal, cylindrical or subclavate, 1-septate with two guttules in each cell, the upper one wider and somewhat shorter than the lower, occasionally becoming 3-septate, eventually becoming finely verruculose, with a thin perispore. Pycnidia subglobose 21–34 × 21–26 µm, conidia 2.5–3.5 × 0.5–1 µm [description from Hawksworth (1986) and Roux & Triebel 1994]. **BLS 2235**.

On thalli of *Solorina saccata*, infected tissues becoming brown; scattered in Scotland, also N. Wales and the Pennines (Peak District).

Stigmidium schaereri (A. Massal.) Trevis. is also reported from *Solorina*, on thalli also parasitized by *Dacampia hookeri* (Borrer) A. Massal. (see Roux & Triebel 1994), and the name has been used in Britain for a species on *Lecanora* now identified as *S. congestum*.

Stigmidium subcladoniicola van den Boom (2016) **NE**

Ascomata partially or fully immersed in the host thallus, subglobose to globose, 30–50 µm diam., sometimes somewhat conical above, brownish black, glossy; wall brown, evenly coloured; periphysoids and periphyses not observed. Asci broadly cylindrical to saccate, often with a distinct short stalk, strongly thickened above, internal apical beak often distinct, 17–25 × 7–9 µm, 8-spored. Ascospores narrowly ellipsoidal, occasionally narrowly obovoid with the greatest breadth above the middle, (6–) 6.5–7 × 2–2.5 µm, 1-septate, often slightly constricted at the septum, colourless, old spores sometimes pale brown, the cells usually biguttulate, smooth, without a perispore. Pycnidia not observed [description from Van den Boom 2016].

On *Cladonia polydactyla*, England (Hampshire, New Forest).

Stigmidium cladoniicola Zhurb. et Diederich (not recorded from our region), was described from *Cladonia macrophylla* (Schaer.) Stenh. and differs in larger ascomata and much larger ascospores.

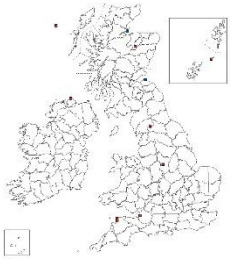
Stigmidium superpositum (Nyl.) D. Hawksw. (1975) **NE**

Ascomata 150–250 µm diam., immersed or superficial and ± sessile on the host thallus. Ascospores colourless, clavate-ellipsoidal, (15–)16–19.5 (–21) × 5–6 (–7) µm, smooth–walled, (0–)1–septate, not constricted at the septum, the cells sometimes with two guttules [description from Zhurbenko 2009 and Hawksworth *et al.* 2010].

On *Henrica theleodes*, Scotland (Mid Perthshire, Ben Lawers). A record from Wiltshire on *Verrucaria murina* needs re-assessment.

Very little is known about this species, though it appears to be reasonably common in upland and northern Europe.

Stigmidium tabacinae (Arnold) Triebel (1989) **NE**



Ascomata globose, 50–80 µm diam., partly to fully immersed in host tissues, black; the wall dark brown above and paler below. Periphysoids and periphyses short, 2-celled, *ca* 6 × 1.5 µm. Asci clavate, 30–34 × 11–13 µm (20–25 × 10–12 µm in British material), 8-spored. Ascospores cylindrical to cylindric-ellipsoidal, the ends rounded, 9–12 (–14) × 3–4.5 µm, 1-septate, constricted at the septum, colourless, very pale brown when over-mature, each cell biguttulate, smooth- and thin-walled, without a perispore. Pycnidia not known [description from Triebel & Cáceres 2004]. **BLS 2237**.

On thalli of *Thalloidima sedifolium*, scattered throughout N. and W. Britain, one record from N. Ireland.

Stigmidium tetrasporum Etayo (1994) **NE**

Ascomata are broadly conical, sessile, with the lower part sunken into the cortex of the host lichen, in numerous and closely packed groups of 25–40 ascomata; 80–150 µm diam. (50–80 µm in British material); wall brownish-black throughout. Hamathecium gelatinized. Asci 27–34 µm × 9–10 µm, pyriform, thick-walled with a thick tholus and deep ocular chamber, 4-spored. Ascospores colourless, 13–14 × 4–5 µm, 1-septate, with one or two guttules in each cell. Pycnidia not known [description from Etayo 1994]. **BLS 2763**.

On thalli of *Thelidium papulare* and *Verrucaria muralis*, England (Somerset). Only known from a single site in GBI.

An inconspicuous and poorly known species. Other species on *Verrucaria* s.l. include *S. clauzadei* and *S. rivulorum*, both of which have 8-spored asci and slightly larger ascospores.

Stigmidium xanthoparmeliarum Hafellner (1994) **NE**

On scattered necrotic patches 1–3 mm diam., initially black, then bleaching in the centre and finally grey, sometimes with 2-3 concentric zones. Ascomata in ± dense groups of 3–6 in the centre, also in a ring, clearly protruding, black, dull or glossy, 60–80 µm diam.; wall dark brown throughout. Hamathecium absent at maturity. Asci saccate, 30–40 × 13–16 µm, with very short stalks, 8-spored. Ascospores 13–16 × 4–5.5 µm, clavate, 1-septate, slightly constricted at the septum, colourless but with a thin perispore that degenerates with age into a fine warts and becoming light brown and sometimes 3-septate. Pycnidia not known [description from Hafellner 1994b]. **BLS 2238**.

On unspecified lichens, Ireland (W. Galway, Wicklow; Seaward 2010). Reported from a range of *Xanthoparmelia* species in Europe; see also Calatayud & Triebel (1999) for more information.

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FAMILIES NOT ASSIGNED TO AN ORDER

APHANOPSIDACEAE Printzen & Rambold (1995)

Thallus crustose to leprose, often mostly consisting of goniocysts. **Photobiont** chlorococcoid. **Ascomata** apothecia, ± flat, in most species without a well-developed exciple. **Hamathecium** of rarely branched thin-walled paraphyses, the apices not swollen. **Asci** thick-walled, with a well-developed apical dome, ocular chamber poorly developed, with a well-developed J+ plug or tube and indistinct central channel and an outer J+ gelatinized layer, 8- or 16-spored. **Ascospores** colourless, aseptate, without a sheath. **Conidiomata** pycnidia where known. **Conidia** aseptate, ellipsoidal, colourless. **Chemistry**: no lichen products known.

The family contains the two genera *Aphanopsis* and *Steinia*, both lichens typically found on disturbed soil (Printzen & Rambold 1995). The ascus type is diagnostic for the family, with the entire tholus staining blue in iodine and with an indistinct central channel. According to Printzen *et al*. (2012) the family occupies a basal lineage within the Leotiomyceta, but more molecular data would be valuable in ascertaining its relationships.

Literature:
Printzen & Rambold (1995), Printzen *et al.* (2012), Westberg *et al*. (2022).

1 Paraphyses ± broad, with conspicuous septa; asci 8-spored; ascospores broadly ellipsoidal ..***Aphanopsis***
Paraphyses narrow, with inconspicuous septa; asci 16-spored; ascospores globose ..... ***Steinia***

APHANOPSIS Nyl. ex P. Syd. (1887)

As this is a monotypic genus the description below (*A. coenosa*) constitutes the generic description.

The genus differs from *Placynthiella* in the apothecial structure and larger ascospores. The asci appear to be close to the *Trapelia*-type, but this possibility requires confirmation with fresh material.

Literature:
Coppins & James (1984), Printzen & Rambold (1995), Westberg *et al*. (2022), Wolseley & Purvis (2009).

Aphanopsis coenosa (Ach.) Coppins & P. James (1984) **LC NR**

Thallus crustose, consisting of goniocysts, minutely granular, effuse, dull green or green-brown, ± gelatinous when wet; goniocysts of ± pseudoparenchymatous hyphae surrounding algal cells; outer hyphae with brown walls; photobiont chlorococcoid, cells either 7–12 µm diam. and ± globose or ellipsoidal, 7–14 × 5–8 µm. Ascomata apothecia, discoid, convex, 0.2–0.6 mm diam., sessile, hemispherical, brown or brown-black, matt; exciple poorly developed, colourless or in part brown, very thin laterally, of vertically aligned, thin-walled hyphae, appearing ± pseudoparenchymatous at the base of the apothecium; hamathecium of paraphyses, 2–4 µm diam., mostly unbranched, occasionally forked, with conspicuous septa, not surrounded by hymenial gel; apices not swollen; hymenium 150–200 µm tall, colourless with irregular, red-brown vertical streaks, I– but appearing blue owing to amyloid ascal walls; hymenial gel absent or poorly developed; hypothecium shallow, pale brown. Asci 8-spored, cylindric-clavate; wall I+ blue; apical dome initially with a broad K/I+ blue plug-like structure that flattens out at maturity. Ascospores aseptate, colourless, 25–38 × 13–18 µm, broadly ellipsoidal but often with one or both ends pointed

or bluntly apiculate, thin-walled, smooth, usually with numerous oil droplets. Conidiomata unknown. No lichen products detected by TLC. **BLS 0728**.

On humid, bare, clayey or fine-grained sandy soil on track sides or ditch margins in woodlands; very rare. E. Scotland (Angus, Forfar). Recorded in Ireland, Co Kerry in 19th century, not seen since.

Gregorella humida and *Epiphloea byssina* have a thallus of similar appearance, but have the cyanobacterium *Nostoc* as photobiont.

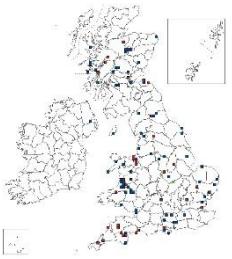
STEINIA Körb. (1873)

Thallus crustose, effuse, leprose or poorly developed. **Prothallus** absent. **Photobiont** chlorococcoid, cells ellipsoidal. **Ascomata** apothecia, scattered, appressed to sessile; disc brown to black, convex. **Thalline margin** absent. **Exciple** either rudimentary or well-developed, then opaque and dense. **Hymenium** gel I+ pale blue. **Hypothecium** pale to dark brown, of vertically aligned hyphae, distinct from the hamathecium. **Hamathecium** of sparse, unbranched slender paraphyses with inconspicuous septa in a distinct gelatinous matrix, not swollen at the apices, often not extending to the epithecium. **Asci** 16-spored, clavate-cylindrical, thin-walled, *Aphanopsis*-type, with a distinct K/I+ blue tholus with an indistinct apical channel. **Ascospores** globose or slightly ellipsoidal, aseptate, colourless, thick-walled but lacking a perispore. **Conidiomata** pycnidia, black. **Conidiogenous cells** elongate-ampulliform, proliferating percurrently. **Conidia** aseptate, ellipsoidal, colourless. **Chemistry**: lichen products not detected by TLC. **Ecology**: mainly on disturbed soils.

Steinia differs from *Aphanopsis* by the narrow paraphyses with inconspicuous septa, embedded in a distinct hymenial gel, and 16- rather than 8-spored asci. There is only one British species.

Literature:
Fletcher *et al*. (2009), Kantvilas & McCarthy (1999), Printzen & Rambold (1995).

Steinia geophana (Nyl.) Stein (1879) **Nb**



Thallus thin, inconspicuous, rarely cracked, membrane-like or uneven-scurfy, pale grey to dull olive-green, ± subgelatinous when wet, with sparse chlorococcoid goniocysts, hardly distinguishable from algal soil crusts. Apothecia 0.2–0.6 mm diam., strongly convex, appressed to sessile; disc dark brown-black, widely scattered, rarely contiguous; exciple rudimentary, becoming excluded, of undifferentiated vertically arranged paraphysis-like hyphae; epithecium red-brown to brown, pigment in irregular granules, K– and not dissolving; hymenium 65–75 µm tall, colourless or patchily pale red-brown; paraphyses 0.5–1 µm diam. Asci 16-spored. Ascospores ± globose, 5–7 µm diam.; wall *ca* 0.5 µm thick. Conidia 1–1.5 × *ca* 0.5 µm. **BLS 1349**.

On periodically damp, often recently disturbed soils, stable dunes, decaying wood, old leather and bones, flints on chalk and roof tiles in lowland and upland, often in metal-enriched habitats; very local and probably seasonally ephemeral. Throughout Britain, a few records from Ireland.

Superficially resembles *Aphanopsis coenosa* which has 8-spored asci, much larger thin-walled ellipsoidal ascospores (25–38 × 13–18 µm), and inhabits unpolluted soil along woodland rides.

ARTHRORHAPHIDACEAE Poelt & Hafellner (1976)

The family only contains a single genus, so the description of *Arthrorhaphis* below constitutes that of the family. Its phylogenetic position still needs work, but according to Frisch *et al*. (2022) *Arthrorhaphis* is included in a clade close to the Ostropales, alongside *Epigloea* (Epigloeaceae) and *Protothelenella* (Protothelenellaceae).

ARTHRORHAPHIS Th. Fr. (1860)

Thallus absent or crustose, without a distinct prothallus, enclosed within the thallus of the host and grey to grey-green, or free at some stage and soon verrucose-squamulose, the squamules strongly convex, bright greenish yellow to whitish grey, not corticate or with a colourless epinecral layer. **Soredia** present in some species. **Photobiont** chlorococcoid, forming a thick layer. **Ascomata** apothecia, sessile or located between the squamules, black, urceolate or discoid, mostly ± filled with brownish green crumbling, drop-like concretions. **Exciple** poorly developed, of lax hyphae with strongly swollen walls. **Hamathecium** of paraphyses, free, thin, branched and net-like, anastomosing, the apices not or only weakly thickened. **Hymenium** often containing oil droplets. **Asci** 8-spored, clavate, K/I–, the wall scarcely thickened at the apex, with an ocular chamber. **Ascospores** cylindrical to mostly acicular, 3- to 15(-28)-septate. **Conidiomata** black, often conspicuous. **Chemistry**: rhizocarpic acid, epanorin and unidentified pigments, as well as the chemistry of host lichens. **Ecology**: on acidic, more rarely ± calcareous, substrata, either parasitic on various crustose or fruticose lichens or at least later, free-living on soil amongst mosses or on weathered rock surfaces in cool regions.

Literature:
Duke & Purvis (2009), Frisch *et al*. (2022), Hafellner & Obermayer (1995), Hansen & Obermayer (1999), Obermayer (1994), Santesson & Tønsberg (1994).

1 Thallus bright greenish yellow; not or rarely parasitic; containing rhizocarpic acid (UV+ orange).....2
Thallus whitish grey or greenish grey, never yellow; parasitic on *Baeomyces, Cladonia* and *Dibaeis* spp.; rhizocarpic acid absent (UV–) 4

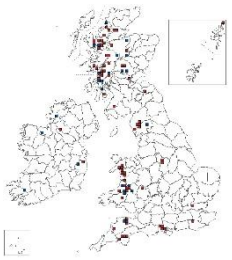
2(1) Thallus ± entirely fine granular-sorediate; epinecral layer absent ..... ***citrinella***
Thallus not sorediate, of convex squamules; epinecral layer present 3

3(2) Spores >25 µm long, (4-) 6- to 9 (-11)-septate .....***alpina***
Spores <25 µm long, 3-septate ..... ***vacillans***

4(1) Host thallus turning blue-green, on *Cladonia* or *Pycnothelia* .....***aeruginosa***
Host thallus not turning blue-green, on *Baeomyces* spp. or *Dibaeis baeomyces* 5

5(4) Ascospores 20–70 × 2–2.5 (–4) µm; on *Baeomyces* spp. .....***grisea***
Ascospores 60–82 × 3–4.5 µm; on *Dibaeis baeomyces* ..... ***muddii***

Arthrorhaphis aeruginosa R. Sant. & Tønsberg (1994) **Nb**

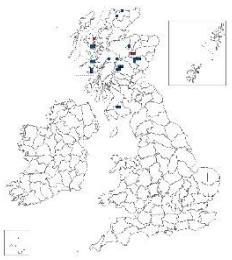


Surface of the affected part of the host thallus brilliant blue-green. Hyphae within the host tissue indistinct, blue-green, in irregular patches in the lower part of the cortex and photobiont layer. Apothecia not common, black, sessile to ± stipitate, ± urn-shaped, to 0.4 mm diam.; margin prominent, to 80 µm thick; exciple blue-green externally but brown close to the disc; hymenium with oil droplets. Ascospores colourless, 80–110 (–120) × (2.5–) 3–4 (–5) µm, 12- to 28-septate. Pycnidia common, black, to 0.1 mm diam., sessile, globose; wall blue-green; conidia tear-shaped, 2.5–3 × *ca* 1.5 µm. UV– (rhizocarpic acid absent). **BLS 1916**.

On *Cladonia* squamules, especially of *C. polydactyla*, also rarely *Pycnothelia papillaria*, in woodland and heathland. Frequent in W. Britain & Scottish Highlands, with scattered records from Ireland.

A. aeruginosa turns the infected areas of its host bright blue-green in colour, and its presence is therefore easily recognized even when sterile.

Arthrorhaphis alpina (Schaerer) R. Sant. (1980) **Nb**



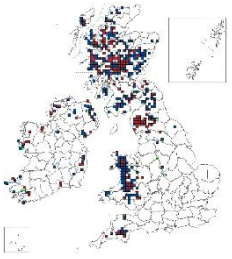
Thallus of strongly convex or bullate squamules to 1 mm diam., either remaining ± discrete or becoming confluent and forming small ± compact irregular patches to *ca* 10 mm diam.; marginal lobes indistinct, not becoming elongate; upper surface bright yellow-green, matt, the surface often roughened and appearing ± pruinose; soredia absent; in section with a colourless, continuous epinecral layer 7–10 µm thick, with calcium oxalate crystals in the medulla; photobiont cells 7–14 µm diam., ± globose. Apothecia 0.1–0.6 (–1.5) mm diam., infrequent, located between squamules, at first slightly concave, becoming flat, the margin excluded or becoming so; true exciple and upper part of hymenium blackish grey-green. Ascospores (20–) 25–45 (–60) × 3–4.5 µm, (4-) 6- to 9 (-11)-septate. UV+ orange (rhizocarpic acid, epanorin, unknown pigment), medulla Pd–. **BLS 0099**.

On soil and decaying mosses, often in crevices on ± vertical siliceous rock faces, montane; rare. Scotland.

When sterile, *A. alpina* cannot be distinguished with certainty from *A. vacillans* and may also be confused with *Catolechia wahlenbergii*, which, though very rare, may occur in similar habitats, and which has a larger thallus with distinct elongate marginal lobes, a smooth ± shiny upper surface and a Pd+ yellow-orange medulla.

According to Frisch *et al.* (2022), the *A. alpina* clade contains a number of subdivisions, including one containing *A. vacillans*, but most are not sufficiently distinct to merit species rank.

Arthrorhaphis citrinella (Ach.) Poelt (1969) **LC**

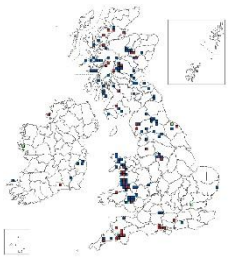


Like *A. alpina*, but of flat to slightly convex areoles to 0.5 mm diam., often rather thin; areoles fragile (readily broken when dry when touched with a needle), soon becoming sorediate; without a distinct, continuous epinecral layer, without calcium oxalate crystals in the medulla. Apothecia rare, 0.2–0.6 (–1) mm diam. Ascospores (35–) 50–70 (–100) × 2–4 (–5) µm. UV+ orange (rhizocarpic acid, epanorin, unknown pigment). **BLS 0100**.

Similar habitats to *A. alpina,* in upland areas; often frequent. Throughout N. & W. Britain and Ireland.

A. citrinella is a species aggregate in its traditional sense (Frisch *et al.* 2022), and it is not clear where British and Irish material should be assigned. *A. citrinella* s. str. has a thallus entirely composed of small loose to compact aggregations of granular soredia on saxicolous bryophytes, and a parasitic phase is absent. *A. farinosa* Frisch & Y. Ohmura (2022) has thalli forming small compact colonies on saxicolous bryophytes and cyanobacteria, with the thallus surface entirely disintegrated into finely granular to farinose soredia. *A. vulgaris* (Schaer.) Frisch, Y.Ohmura, Holien & Bendiksby (2022) is similar to *A. citrinella* but with the thallus of discrete to confluent areoles on soil, terricolous bryophytes and plant remains, or parasitic on *Baeomyces* spp. (rarely on other terricolous lichens); the areoles breaking into soredia, rarely completely disintegrated or lacking sorediate. Both of these species may occur in Britain and Ireland, with *A. vulgaris* considered the most common and widespread component of the *A. citrinella* species aggregate.

Arthrorhaphis grisea Th. Fr. (1860) **Nb**

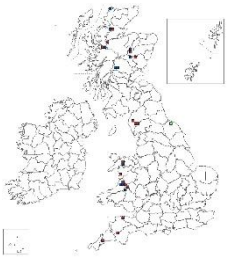


Thallus immersed in modified thalli of *Baeomyces rufus*, rarely *B. placophyllus*, whitish grey to dark grey-green, associated with abundant algae. Apothecia sessile, scarcely constricted at the base, at first strongly urceolate to almost closed with a thick margin, later disc-shaped with an often persistent thick rough margin; disc to 0.5 mm diam.; hymenium strongly inspersed with oil droplets. Ascospores (20–) 30–50 (–70) × 2.5–3.5 (–4.5) µm, 7- to 9- (to 13-) septate. Pycnidia black, immersed or usually superficial. UV– (rhizocarpic acid absent). **BLS 0313**.

Upon the host on acid soils and weathered siliceous rocks; local. Throughout Britain, especially in the west, scattered throughout Ireland.

Often only the pycnidia are present on severely damaged parts of the host.

Arthrorhaphis muddii Obermayer (1994) **Nb**



Thallus verrucose, whitish grey or greenish grey, often rather inconspicuous. Apothecia 0.1–0.4 mm diam., top-shaped, distinctly constricted at the base, at first concave with a protruding thin margin, later flat and almost immarginate; hymenium not inspersed. Ascospores 60-82 × 3.5-4.5 (–5) µm, 10- to 15-septate. UV– (rhizocarpic acid absent), but host thallus can be UV+ orange in part. **BLS 1923**.

On *Dibaeis baeomyces*; on heavy metal-rich shingle gravels in Wales, and on moorland trackside verges and near the summits of mountains in Highland Scotland; rare. S.W. and N.W. England, C. & N. Wales, Scottish Highlands (Perthshire, Ross, S. Aberdeenshire, Sutherland), and a 19th century record from N.E. Yorkshire.

Arthrorhaphis vacillans Th. Fr. & Almq. (1867) **Nb**

Similar to *A. alpina*, but the apothecia are often grouped and ascospores smaller; (14–) 16–22 (–25) × 3–3.5 µm, 3 (-4)-septate. UV+ orange (rhizocarpic acid, epanorin and unknown pigment present). **BLS 0119**.

In similar habitats to *A. alpina* but in more basic habitats; a single record on bryophytes over limestone. Scotland (Inchnadamph, W. Sutherland).

Distinguished from all other species in the genus by its short, 3-septate ascospores, but not possible to distinguish from *A. alpina* when sterile. Said to begin as a parasite on *Baeomyces rufus*, but this is not evident in the British collection. See also under *A. alpina*.

EPIGLOEACEAE Zalbr. (1903)

The Epigloeaceae contains a single genus *Epigloea*, so the description below constitutes that of the family. Its affinities need further study, but indications are that the genus is related to *Arthrorhaphis* and *Protothelenella*, within a clade close to but not included within the Ostropales (Pino-Bodas *et al*. 2017, Frisch *et al*. 2022).

EPIGLOEA Zukal (1890)

Thallus inconspicuous or absent, immersed in gelatinous algal films or lichenicolous. **Photobiont** *Coccomyxa*-type, on or with various chlorophyte algae. **Ascomata** perithecia, gelatinous, dark green to dark brown or black, immersed or subsessile, the wall without algal cells, consisting of unthickened pigmented, periclinally orientated hyphae, perithecial surface with a thin gelatinous coat.

Hamathecium of paraphyses, thin, colourless, unbranched, the apices not swollen. **Asci** 8- to multi-spored, clavate to cylindrical, moderately thick-walled, not fissitunicate (dehiscing via an apical split), the entire ascus wall I+ and K/I+ blue. **Ascospores** 1- to 5-septate, ovoid-ellipsoidal, cylindric-fusiform or bacilliform, colourless, thin-walled, sometimes with cilia- or needle-like appendages at both ends. **Conidiomata** pycnidia, globose, usually taller than wide, black, with a distinct ostiole, filled with gel. **Conidia** terminal, colourless, bacilliform to narrowly or broadly ellipsoidal. **Chemistry**: lichen products not detected by TLC. **Ecology**: inhabiting algal films on rock surfaces, stone fragments, humic soils, moribund bryophytes and lichens, rotten wood and sundry terricolous organic detritus, in perpetually moist or wet, acidic situations, such as upland rock outcrops, shaded woodland and riverside boulders, river shingle and metalliferous sites; rarely corticolous on shaded, damp acid bark, or over bryophytes on branches.

All the species occupy tiny niches in transient habitats, having short-lived and seasonally developed ascomata and are best sought in winter to early spring. The minute, inconspicuous perithecia make detection difficult in the field when the algal films they inhabit are saturated or dry. Consequently, all are probably under-recorded. The precise biological nature of the algicolous lifestyle exhibited by the species, whether lichenized (mutualistic and/or commensal), weakly parasitic or necrotrophic, is obscure.

Literature:
Chambers & David (2009), Czarnota & Hernik (2013), Czarnota & Tanona (2020), David (1987), Döbbeler (1984, 1994), Frisch *et al.* (2022), McCune (2020), Pérez-Ortega & Barreno (2006), Pino-Bodas *et al.* (2017).

1 Asci 8-spored; ascospores 1- to 3-septate 2
Asci *ca* 30–60-spored; ascospores 1-septate 5

2(1) Ascospores 3-septate, more than 18 µm long; with apical appendages ..... ***medioincrassata***
Ascospores 1-septate, less than 18 µm long; apical appendages present or absent 3

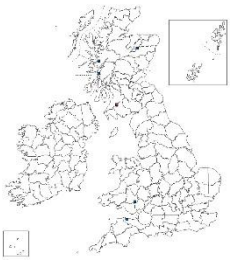
3(2) Ascospores with apical appendages ..... ***filifera***
Ascospores without apical appendages 4

4(3) Ascomata 105–220 µm diam., ascospores ellipsoidal, elongate-conical or soleiform, 10–16 (–18) × 4–6 µm, with or without a constriction at the septum ..... ***renitens***
Ascocarps 90–140 (–150) µm diam., ascospores ellipsoidal, 8–12 (–4) × 3.5–6 µm, sometimes slightly constricted at the septum. ..... ***soleiformis***

5(1) Ascospores (6–) 7–10 (–11.5) × 1.5–2 µm, without apical appendages ..... ***bactrospora***
Ascospores 13–16.5 (–18) × 1.5–2 (–2.5), with apical appendages 6

6(5) Ascospores fusiform, with pointed apices ..... ***grummannii***
Ascospores ellipsoidal, with rounded apices ..... ***urosperma***

Epigloea bactrospora Zukal (1890) **NE**



Perithecia 0.06–0.12 (–0.14) mm diam., globose to ovoid, pale to dark brown, the wall sometimes translucent, with a thin colourless gelatinous coat near the ostiole, which is visible as a pale spot. Asci 32- to 60-spored, (30–) 40–55 (–60) × 7–10 µm. Ascospores (6–) 7–10 (–11.5) × 1.5–2 µm, narrowly bacilliform, 1-septate, not constricted at the septum but the central part of the spore sometimes slightly narrowed, apices mostly rounded, lacking appendages. **BLS 0569**.

On algal-coated decaying vegetation in tightly grazed damp acid grassland, peat by a drainage ditch and algal scum over moribund hypnoid moss on *Corylus* branch in old woodland; rare. Scotland (Argyll, Ayrshire, Banff, Westerness), C. Wales (Brecon), S.W. England (Somerset).

Epigloea pleispora Döbbeler has not yet been recorded from Britain and Ireland; it is similar but with up to 32-spored asci and slightly broader ascospores, (5–) 6–9 (–12) × 2–3 (–3.5) µm in size.

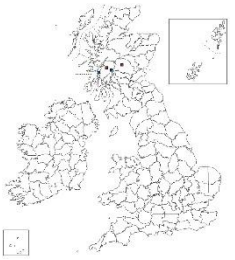
Epigloea filifera Döbbeler (1984) **NE**

Perithecia 0.1–0.15 mm diam., globose, dark brown, with a colourless gelatinous coat 10–15 µm thick. Asci (40–) 50–70 (–78) × 8.5–11.5 µm, 8-spored. Ascospores (10–) 11.5–15.5 (–17) × 3.5–4.5 (–5) µm, ± biseriate, 1- septate, narrowly ellipsoidal to cylindric-fusiform, not or slightly constricted at the septum, with cilia-like apical appendages, straight or curved, (2–) 4–10 µm long. Pycnidia 40–90 µm diam.; conidia aseptate, rod-like, 2–3 × *ca* 0.5 µm. **BLS 0570**.

On an eroding bank of heavy metal-polluted river shingle, with *Placynthiella hyporhoda* and *Vezdaea acicularis*; also on damp coniferous wood chippings; very rare. W. Wales (Cardiganshire).

On the Continent found in pioneer habitats associated with bryophytes such as *Oligotrichum*, *Pogonatum* and *Diplophyllum*.

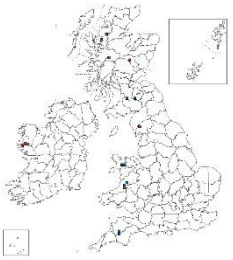
Epigloea grummannii Döbbeler (1984) **NE**



Perithecia 0.06–0.11 (–0.13) mm diam., globose, pale brown, surrounded by a thin, colourless gelatinous coat; ostiole 12–30 (–60) µm, visible as a paler spot. Asci (35–) 40–55 (–67) × (7–) 8–10 (–11) µm, clavate, 32-spored. Ascospores 13–16.5 (–18) × 1.5–2 (–2.5) µm (including appendages), 1-septate, fusiform, with tapering, thread-like appendages to 3 µm in length at each end, usually with two guttules in each cell, irregularly arranged in the ascus. Pycnidia not known. **BLS 1753**.

Ascomata partly or completely immersed in algal films, usually on moribund *Grimmia* and *Hypnum*; rare. C.W. Scotland (Argyll, Mid Perthshire).

Epigloea medioincrassata (Grummann) Döbbeler (1984) **NE**



Thallus inconspicuous or absent, the hyphae immersed into gelatinous algal films, probably not lichenized. Perithecia 0.10–0.19 (–0.22) mm diam., ± globose, pale to dark brown, with a very thin colourless gelatinous outer layer; apex with a circular swelling *ca* 20 µm thick, dimpled when dry and resembling a miniature wine- gum. Asci (35–) 47–70 (–86) × (10–) 11–15 (–16) µm, 8-spored. Ascospores (18–) 24–33 (–38) × 3.5–5 (–5.5) µm (excluding appendages), 3-septate, ellipsoidal to fusiform, not constricted at the septa, with thread-like appendages 2–4 (–8) µm long at either end. **BLS 1834**.

On decayed algal films on rock, detritus, raw humus and moribund bryophytes, on the ground in a wide range of constantly moist, acidic habitats, including N-facing upland rock outcrops, damp stones in heathland, river boulders, and spoil-tips and stonework of derelict buildings on old mining sites; rare, but locally frequent. W. & S.W. Scotland (W. Ross, Argyll, Dumfries), C. & N. Wales, S.W. and N.W. England, W. Ireland.

The species was contrasted with *E. tortuosa* Döbbeler by McCune (2020), which was considered to have somewhat longer 3- to 5-septate ascospores (21-) 25–34 (–40) × 2.5–3.5 (–4) µm with short appendages, while *E. medioincrassata* was stated to have consistently 3-septate ascospores 20–25 (–28) × 3–4 (–5) µm, with longer filiform appendages. Some British and Irish material might be referable to *E. tortuosa*, if indeed the species are distinct.

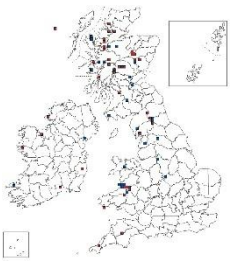
Epigloea renitens (Grummann) Döbbeler (1984) **NE**

Thallus inconspicuous or absent, the hyphae immersed into gelatinous algal films. Perithecia scattered or in loose groups, 0.1–0.18 (–0.22) µm diam., hemispherical to globose, grey to blackish or greenish, smooth, with an outer gelatinous layer, the apical part flattened, forming a broad depression. Asci 8-spored, (40–) 60–80 × 10–12 µm, short-stalked. Spores colourless, 2-celled, the cells unequal in size, with or without a constriction at the septum, soleiform, thin-walled, each cell usually containing a large, round oil droplet, 12–15.5 (–17) × 5–6.5 µm. **BLS 2893**.

Lichenicolous, on goniocysts of *Placynthiella uliginosa* on peaty soil, Wales (Cardiganshire).

Difficult to differentiate from *E. soleiformis*, which has slightly smaller ascomata and ± ellipsoidal ascospores 8–12 (–14) × 3.5–6 µm.

Epigloea soleiformis Döbbeler (1984) **NE**



Perithecia (0.07–) 0.09–0.14 (–0.15) mm diam., globose, with a well-developed depression around the ostiole in dry material, green-black, sometimes grey or grey-black with an aeruginose tinge, with a colourless gelatinous coat 4–15 µm thick. Asci (34–) 40–55 (–60) × 8–10.5 (–12) µm, 8-spored. Ascospores (8.5–) 9.5–12.5 (–14) × 3.5–4.5 (–6) µm, 1-septate, ellipsoidal to slightly soleiform, with a slight median constriction, without appendages. **BLS 1610**.

On algal films over similar substrata as *E. medioincrassata*. Metal-tolerant and particularly associated with abandoned lead-zinc mining sites in W. Britain, where it also occurs on decaying terricolous macrolichens e.g. *Peltigera* and *Cladonia* spp., spoil-tips and spoil fragments on the ground and old building remains. Rarely on damp, acid bark on tree trunks (*Alnus*); local, but widespread. Throughout W. and N. Britain and Ireland.

British material was formerly misidentified as *E. renitens*, which differs in the slightly larger perithecia and ascospores that are not so strongly soleiform. Differences between the two species were discussed by Czarnota & Hernik (2013).

Epigloea urosperma Döbbeler (1994) **NE**

Perithecia 0.06–0.15 µm diam., globose or flattened, blackish-green, paler around the ostiole, surrounded by a gelatinous layer. Asci (26–) 35–45 (–50) × 8–10 (–11) µm, cylindrical to slightly clavate, usually with 32 spores. Ascospores (without appendages) (5–) 6–8 (–9) × 2–2.5 µm, 1-septate, colourless, ellipsoidal with predominantly rounded ends, sometimes with one or two oil droplets per cell; with filiform appendages usually present at each end, very short or to 5 (–6) µm long, less than 0.5 µm thick. Pycnidia 35–65 µm diam., spherical, indistinguishable externally from young ascomta; conidia 2.5–3.5 × *ca* 0.5 µm, bacillar or rarely slightly wedge-shaped. **BLS 2483**.

Lichenicolous on *Placynthiella uliginosa*; very rare (only a single British record). S.W England (Devon). Europe.

Like *E. grummannii*, with 32-spored asci and 1-septate ascospores with apical appendages, but differs in having ellipsoidal ascospores with distinctly rounded ends. The ascospores in *E. grummannii* are fusiform and have narrowly pointed ends.

HARPIDIACEAE Vězda ex Hafellner (1984)

Thallus crustose, areolate or squamulose, reddish brown. **Photobionts** coccal cyanobacteria and/or chlorococcoid algae. **Ascomata** apothecia, sessile or sunken into the thallus, surrounded by a thalline margin. **Hamathecium** of paraphyses, largely unbranched, moniliform above. **Asci** with an amyloid tholus and a broad ocular chamber, surrounded by a K/I+ blue gelatinous layer, 8-spored. **Ascospores** colourless, aseptate, ovoid or falcate, without a perispore. **Conidiomata** pycnidia, immersed in the thallus. **Conidia** bacilliform. **Ecology**: on siliceous rock.

The family contains two genera, *Euopsis* (q.v.) and *Harpidium* Körb. (1855), the latter not found in our region (see Rico 2022 for more information). Thought to belong to the Lichinales and included in that account by Cannon *et al.* (2024), but excluded to an uncertain position within the Pezizomycotina by Scheidegger & Schultz (2004) and Lücking *et al.* (2017b).

EUOPSIS Nyl. (1875)

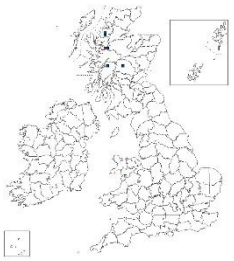
Thallus crustose, granular to minutely squamulose, dark reddish brown, gelatinous when moist; cortex not differentiated; hyphae forming a reticulate pattern around the cyanobacterial photobiont, but pseudoparenchymatous in parts with a green algal photobiont. **Photobiont** *Gloeocapsa*, sometimes also with *Trebouxia*; cells or cell-clusters of *Gloeocapsa* near the surface with red-brown, K+ purplish gelatinous sheaths. **Ascomata** apothecia, with a glossy brown disc. **Thalline margin** well-developed and elevated. **Exciple** narrow, of parallel compacted paraphysis-like hyphae. **Epithecium** pale brown. **Hymenium** colourless, I–. **Hypothecium** colourless or pale brownish, of interwoven hyphae. **Hamathecium** of sparingly branched septate paraphyses, slender, not moniliform. **Asci** cylindrical, thick-walled, 8-spored; inner wall of ascus and tholus K/I+ blue, apical dome K/I–. **Ascospores** aseptate, ellipsoidal, colourless, without a distinct perispore. **Conidiomata** pycnidia, immersed. **Conidiogenous cells** in chains. **Conidia** bacilliform. **Chemistry**: no lichen products detected by TLC. **Ecology**: on moist acid rocks, sometimes over mosses, soil or peaty debris.

Distinguished from *Pyrenopsis* (Lichinales) by the open, disciform apothecia with glossy discs, asci that are partly K/I+ blue, and more slender paraphyses. *Psorotichia* has *Xanthocapsa* as its photobiont and asci which are completely K/I–.

Literature:
Henssen et al. (1987), Jørgensen (2012), Jørgensen *et al.* (2009), Lücking *et al*. (2017b), Rico (2022), Scheidegger & Schultz (2004).

1 Thalline margin uneven, whitish, containing green algae; thallus mainly granular, with whitish patches or dots.....***granatina***
Thalline margin crenulate-squamulose, red-brown, containing cyanobacteria; thallus minutely squamulose, uniformly red-brown .....***pulvinata***

Euopsis granatina (Sommerf.) Nyl. (1875) **Nb**

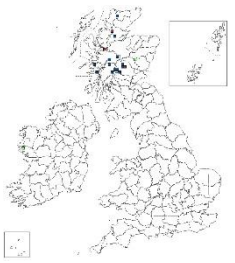


Thallus reddish brown, with small whitish patches or dots, granular, often broken up into nodulose clumps to 1 cm diam.; photobiont *Gloeocapsa* (cells 10–20 µm diam.) but also with *Trebouxia* (cells 7–10 µm diam.) in the thalline margin and in patches in the thallus. Apothecia to 0.5 mm diam., disc open, flat to convex, shiny; thalline margin irregular, elevated, whitish, to 0.1 mm thick, pseudoparenchymatous, containing green algae; exciple 10–25 µm thick; hymenium 70–80 µm tall; hypothecium 60–70 µm tall. Asci 50–60 × 10–12 µm. Ascospores 9–12 × 5–7 µm. **BLS 1216**.

On moist siliceous or slightly basic rocks; rare. S.W. England, Mid Wales, Scottish Highlands.

Generally smaller than *Euopsis pulvinata*, distinguished by the whitish thalline margins containing green algae and the white-dotted thallus.

Euopsis pulvinata (Schaer.) Vain. (1881) **Nb**



Thallus coarsely granular-areolate to squamulose, forming pulvinate patches to 2 cm diam., uniformly reddish brown; photobiont *Gloeocapsa*. Apothecia to 1 mm diam.; disc flat to convex, often shiny; thalline margin crenulate due to granular or subsquamulose outgrowths, concolorous with the thallus, sometimes becoming excluded, to 0.15 mm thick, without green algae; exciple 10–25 µm thick; hymenium 100–125 µm tall; hypothecium 70–80 µm tall. Asci 80–100 × 10–15 µm. Ascospores 10–15 (–17) × 5–8 µm. **BLS 1219**.

On moist siliceous rocks (especially mica-schist), often over dead or dying mosses or small accumulations of soil; rare. Scotland (C. Highlands, Mull), Ireland (Connemara).

STRANGOSPORACEAE S. Stenroos, Miądl. & Lutzoni (2014)

The family contains a single genus *Strangospora*, so the generic description below constitutes that of the family. Its phylogenetic position needs further study, but Miądlikowska *et al.* (2014) found that it occupied a clade close to that of the Dactylosporaceae (Sclerococcales).

STRANGOSPORA Körb. (1860)

Thallus crustose, usually thin and poorly developed, ± continuous, without a well-defined margin; prothallus absent. **Photobiont** chlorococcoid. **Ascomata** apothecia, biatorine, convex, red, brown or black, rarely pruinose. **Exciple** usually very thin to almost absent, of parallel brownish ochre-coloured to colourless hyphae. **Hymenium** variously coloured, I+ deep blue. **Hypothecium** colourless or pale grey-yellow, often cloudy-oily. **Hamathecium** of paraphyses, branched and ± anastomosed, in a gelatinous matrix, the apices free, usually unbranched, ± vertical and unthickened. **Asci** clavate, with a strongly thickened, K/I+ blue wall, particularly at the apex, without gelatinous outer layer and a sometimes strongly K/I+ blue apical dome and sometimes an inconspicuous non-staining apical cushion, multispored. **Ascospores** globose, aseptate, thin-walled, colourless. **Conidiomata** pycnidia, small, globose, colourless to brownish. **Conidia** ellipsoidal. **Chemistry**: no lichen substances detected by TLC. Pigments occur in the apothecia in some species. **Ecology**: on bark or wood, sometimes overgrowing bryophytes.

Biatorella has asci with a K/I+ gelatinous outer layer and an I- apical dome. *Biatoridium* has a multilayered, K/I+ blue apical dome. *Piccolia* has asci with a K/I+ gelatinous outer layer and when young I+ blue, later I− apical dome and anthraquinone crystals on the epithecium.

Literature:
Hafellner (1995, 2004), James *et al.* (2009), Kumar *et al.* (2025), Miądlikowska *et al.* (2014).

1 Apothecia brightly coloured or brownish to black 2
Apothecia pale yellowish or pinkish brown, or pallid, translucent when wet ..... ***Biatoridium***

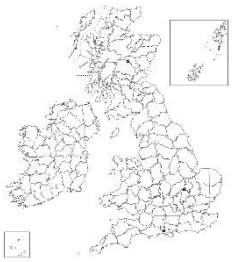
2(1) Apothecia pale orange to scarlet-red 3
Apothecia brown or blackish 4

3(2) Apothecia pale orange to deep orange, densely pruinose, K+ scarlet to red-purple ..... ***Piccolia ochrophora***
Apothecia scarlet-red, not pruinose, K– ..... ***microhaema***

4(2) Apothecia reddish brown, becoming darker and blackish when mature; epithecium yellow- to red-brown; paraphyses 1.5–2 µm diam ..... ***pinicola***
Apothecia blackish or brown-black; epithecium pale blue-grey, olive-grey, pale brown or violet; paraphyses 0.5–1 µm diam. 5

5(4) Exciple well-developed; epithecial pigment N–; pycnidia sessile to stalked; conidia 1.5-2 µm diam. ..... ***deplanata***
Exciple thin to almost absent; epithecial pigment N+ reddish; pycnidia ± immersed, globose; conidia 2.5–3.5 (–4) × 1–1.7 µm ..... ***moriformis***

Strangospora deplanata (Almq.) Clauzade & Cl. Roux (1985) **Nb**
Thallus effuse, thin, partly immersed, ± minutely arachnoid, whitish. Apothecia 0.2–0.5 mm diam., not pruinose, sessile, appressed, at first ± flat with an indistinct margin, becoming convex, dark brown to blackish, paler when

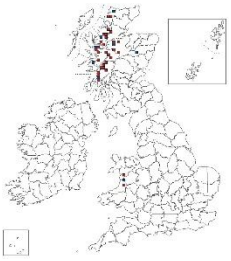


wet, surface ± roughened; exciple well-developed, 33–45 µm thick, distinctly visible in sections, colourless or with the outer part brownish or olivaceous, K+ dull brownish, N–, the hyphae branched, 0.7–1 µm diam. but sometimes swollen to *ca* 3 µm at the edge; hymenium 50–60 µm tall, colourless but ± pale brown, red-brown or usually olivaceous in the upper part, concolorous with the outer exciple, I–; hypothecium well-developed, pale straw yellow, of densely interwoven, compacted hyphae; paraphyses 0.5–1 µm diam., indistinct in water, apices sometimes to 3 µm diam., occasionally branched; in K some paraphyses appear to have an individual gel coating, giving an overall width of 5–8 µm. Asci 45–50 × 15–20 µm, clavate, the apex strongly thickened. Ascospores 2–3 µm diam. Pycnidia 60–120 (–140) µm diam., to 0.2 mm tall, sessile to short-stalked, reddish brown to black but superficial conidia often giving a white-pruinose appearance, wall brown, K–; conidia 1.5–2 µm diam., broadly ovoid to globose. **BLS 1809**.

On young or dry fissured bark of large *Salix*, *Fagus* and *Fraxinus* trunks; very rare. England (New Forest, Bedfordshire), C. Scotland (Perth, Craig Tulloch).

Distinguished from bark-inhabiting morphs of *S. moriformis* by the well-developed exciple of narrower hyphae, the massive hypothecium, epithecial pigment, smaller ascospores, larger sessile to stalked pycnidia and ± globose conidia. *S. pinicola* has a red- to yellow-brown epithecium.

Strangospora microhaema (Norman) R.A. Anderson (1975) **NT**

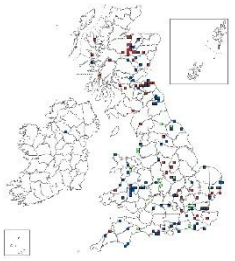


Thallus wide-spreading, inconspicuous, often evanescent, of scattered or contiguous minute low granules, often concentrated around apothecia giving them a spurious thalline margin, pale green-grey or grey. Apothecia 0.05–0.2 (–0.3) mm, convex to globose, ± sessile, scattered or in small, ± contiguous groups of one to three, scarlet to coral red, becoming brighter and somewhat translucent when wet; exciple poorly developed, inconspicuous, hyphae densely anastomosed; hymenium (60–) 70–85 (–95) µm tall, ± golden yellow in parts, the upper 10–20 µm together with the epithecium bright golden yellow, without granular inclusions, K–; hypothecium 25–50 µm thick, colourless to pale yellowish, of closely compacted, short-celled anastomosed hyphae in a gel matrix, I+ dark blue; paraphyses 1 (–1.5) µm diam., richly branched and anastomosing, particularly towards the apices (clearly visible in N+), orange-yellow in part. Asci 60–85 × 18–30 µm, 50- to 70-spored, broadly clavate-ellipsoidal, wall at the apex 4–8 µm thick, sometimes with golden-yellow granular contents. Ascospores (3–) 4–4.5 µm diam. **BLS 1371**.

On acid bark (*Quercus*, *Betula*, *Alnus*, *Rhododendron*, *Salix*) in boggy ancient woodland. N. and W. Scotland, Wales (Cardiganshire, Merioneth).

The small orange-red to scarlet apothecia and the internal orange-red pigmentation of the paraphyses and ascus contents are diagnostic.

Strangospora moriformis (Ach.) Stein (1879) **LC**



Thallus greyish, irregularly granular, sometimes scurfy, often sparse to absent. Apothecia 0.2–0.5 mm diam., appressed, black, rarely dull blue-black or black-brown, not noticeably paler or translucent when wet; exciple thin to almost absent; hymenium to 110 µm tall, upper part and epithecium translucent aeruginose blue-grey (K+ pale greenish grey), or in part pale olive-grey (K–), rarely pale brown (K–) or violet, not granular and never K+ purple, usually N+ mauve-purple; paraphyses 0.5–1 µm diam., densely anastomosed. Asci 40–50 × 7–23 µm, 100- to 200 (–300)-spored. Ascospores 1.5–2.5 µm diam. Pycnidia 50–70 µm diam., ± globose, colourless to brownish; walls dark green; conidia 2.5–3.5 (–4) × 1–1.7 µm, shortly cylindrical. **BLS 1372**.

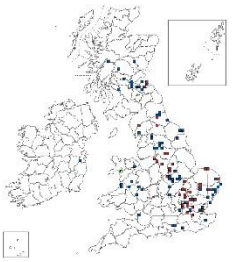
On decorticated conifers, especially worked timber, rarely on bark. In contrast to *S. pinicola*, found on dead wood in unpolluted areas as well as in acidified habitats; local. Throughout Britain, rarely recorded from Ireland.

Compare with the much rarer *S. deplanata*.

Strangospora pinicola (A. Massal.) Körb. (1860) **LC**

Thallus wide-spreading, thin, evanescent, minutely warted, or rather thick, ± delimited, granular-warted, pale to dark grey or grey-brown; thalline granules dispersed or contiguous, ± convex, irregular. Apothecia 0.2–0.5 mm

diam., often crowded or sometimes in groups of two or three, dark red-brown, brighter when wet, immersed, becoming sessile; exciple usually thin to almost absent, if well-developed the outer 12–15 µm is brownish with radiating hyphae and inner 12–15 µm colourless with parallel hyphae, I−; hymenium 55–65 µm tall, mainly colourless, the upper 12–20 µm and epithecium yellow-brown to brown, often with a reddish tinge, semi-transparent, not granular, K± red-brown, N+ pale brown or orange-brown; hypothecium 50–100 µm thick, colourless or pale straw, of small, compacted indistinct isodiametric cells; paraphyses 1.5–2 µm diam., densely anastomosed towards the base, often sparingly so above, indistinct in water, but visible in K. Asci 40–50 × 15–20 µm, *ca* 100-spored, broadly clavate; wall *ca* 3 µm thick at sides and 6-8 µm at the apex. Ascospores 1.5–2.5 µm diam. Pycnidia *ca* 50 µm diam., very rare, globose, ± colourless; conidia 3-4 × *ca* 1 µm, ellipsoidal. **BLS 1374**.



On bark of broad-leaved trees, especially *Sambucus* or *Fraxinus*, often by roadsides or in open situations, rarely on conifer wood; more frequent in polluted areas. Particularly E. & C. England including the London parks.

S. pinicola may be conspecific with *S. moriformis* as their differences seem to intergrade and may be due to the variation in habitats and substrata; the two species never occur together. See also *S. deplanata*.

GENERA NOT ASSIGNED TO FAMILIES OR ORDERS

BIATORIDIUM J. Lahm ex Körb. (1860)

Thallus crustose, finely granular or embedded in the substratum, greenish to grey, without a prothallus. **Phycobiont** chlorococcoid. **Ascomata** apothecia, biatorine, pale yellowish to brownish, flat to convex. **Exciple** well-developed. **Hypothecium** colourless to slightly brownish, with interwoven hyphae, I+ blue. **Epithecium** yellowish. **Paraphyses** seldom branched, tips often slightly thickened. **Asci** clavate, many-spored, multilayered, apical dome K/I+ blue, inner cap K/I+ intense blue, outer wall less intense blue. **Ascospores** aseptate, colourless, globose. **Conidiomata** not known. **Chemistry**: lichen substances not detected by TLC. **Ecology**: corticolous.

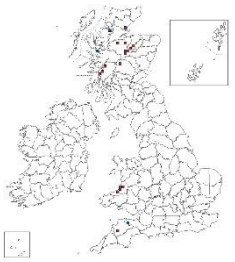
Biatoridium was re-established to accommodate the two multi-spored taxa below. The genus chiefly differs from *Biatorella* and *Strangospora* in possessing a clearly multilayered ascus, visible when observed by light microscopy. Its phylogenetic position is uncertain and appears not to be closely related to *Strangospora*. Miądlikowska *et al.* (2014) linked it with the Lichinomycetes, though there were insufficient taxa in their analysis to establish a firm relationship.

Literature:
Aptroot (2009b), Hafellner (1994a), Miądlikowska *et al.* (2014), Morse & Lendemer (2019).

1 Thallus whitish, usually inconspicuous and largely immersed in the bark; ascospores 4–4.5 (–5) µm diam.; apothecia white, pale yellow or pink; asci 50–55 × 20–22 µm ..... ***delitescens***
Thallus conspicuous, granular, green when wet; ascospores 3–3.5 µm diam.; apothecia yellowish, reddish yellow or pale pink to dull red-brown; asci 60–65 × 12–17 µm..... ***monasteriense***

Biatoridium delitescens (Arnold) Hafellner (1994) **VU**
Thallus pale or grey, sparse to absent, usually of scattered granules or largely immersed in the bark, occasionally minutely rimose. Apothecia 0.2–0.4 (–0.5) mm diam., convex, appressed, ± dispersed, white to pale yellow or pink-brown, translucent when wet; exciple poorly developed; epithecium indistinct, colourless, not granular;

hymenium (50–) 65–70 µm tall, colourless; hypothecium 35–65 µm tall, the hyphae 1.5 µm diam., yellowish-grey, becoming clearly visible in K, densely packed, I+ blue; paraphyses 1–1.5 µm diam., very distinct in a gel matrix, scarcely branched, ± flexuose. Asci 50–55 × 20–22 µm, 100 (–150)-spored, elongate-clavate; the wall 2–2.5 µm thick, rather uniform. Ascospores 4–4.5 (–5) µm diam. **BLS 1370**.

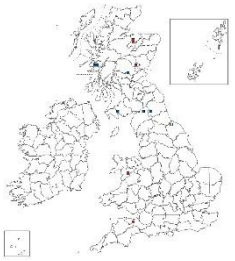


On bark of *Corylus* and *Populus tremula*, and rarely *Fraxinus*; rare. S.W. England (Devon, Somerset), Wales (Cardiganshire), Scotland (N. and W. Highlands).

This very inconspicuous species is distinguished by the pale apothecia, which become completely translucent when wet.

Biatoridium monasteriense J. Lahm ex Körb. (1860) **EN**

Thallus wide-spreading, pale grey-green when dry, bright green when moist, scurfy, effuse, continuous, minutely areolate. Apothecia 0.2–0.5 mm diam., yellowish, reddish yellow or pale pink to dull red-brown, translucent and paler when wet, flat to convex, partly immersed in the thallus when young, becoming sessile, numerous, scattered or contiguous; thalline margin pale, thin, granular, soon excluded; exciple rarely distinct, occasionally to 12 µm thick, increasing to 17 µm at the margin; epithecium translucent, pale red-brown, the colour contained within the apical cells of the paraphyses; hymenium 60–85 µm tall, colourless or pale straw yellow; hypothecium 25–85 µm tall, of densely packed fine hyphae, colourless or pale yellowish brown; paraphyses 1.5 µm diam. towards the base, swelling to 4-5 µm diam. at the clavate apices, separating and clearly visible in K. Asci 60–65 × 12–17 µm, narrowly clavate, the walls 1 µm thick, increasing to 2–5 µm thick at the apex, 100–150 (–200)-spored. Ascospores 3–3.5 µm diam. **BLS 0182**.



On trunks of broad-leaved trees, particularly *Ulmus*, *Fraxinus* and *Sambucus*, in sheltered habitats; rare. S.W. England (Somerset), N. England (Cleveland, Cumbria, Yorkshire), N. Wales (Merionethshire), S.W. & E.C. Scotland (Galloway, Moray, Perthshire, W. Inverness, Mull).

MYCOGLAENA Höhn. (1909)

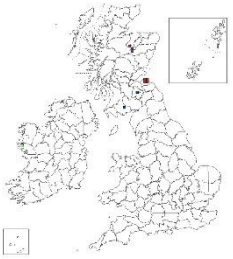
Thallus on bark, immersed, inconspicuous, probably non-lichenized. **Photobiont** evidently absent. **Ascomata** perithecium-like, 0.2–0.4 mm diam., circular or broadly elliptical in outline, flattened, greenish black but often with a thin whitish border. **Involucrellum** present, bright green, K–, N+ red, composed of dark hyphae mixed with bark cells. **Exciple** not distinct. **Hamathecium** of paraphyses to 1 µm thick, unbranched or sparingly branched and anastomosed; hymenial gel I–. **Asci** ± cylindrical, with a ± truncate apex, K/I–, the apex usually thickened internally but without an ocular chamber, 8-spored. **Ascospores** transversely septate or muriform, ovoid-fusiform or clavate, colourless; perispore not apparent. **Conidiomata** pycnidia, resembling ascomata but much smaller. **Conidia** bacilliform. **Chemistry**: lichen substances not detected by TLC. **Ecology**: on smooth bark of trees and shrubs.

Distinguished from *Arthopyrenia* and *Julella* by the bright green, N+ red ascoma wall. No sequences are available, and its position within the Ascomycota is not clear.

Literature:
Coppins (2009b), Harris (1973), Holm & Holm (1991).

1 Ascospores muriform; on canopy twigs of *Pinus*.....***acuminans***
Ascospores 3-septate; on *Myrica* (rarely other woody species) .....***myricae***

Mycoglaena acuminans (Nyl.) Vain. (1921) **NE**

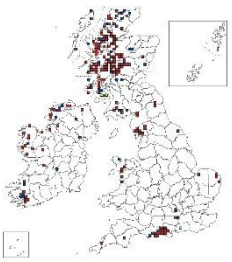


Thallus absent, perithecia on indistinct whitish spots on the periderm. Involucrellum 0.2–0.5 mm diam., shallowly domed, dark bluish to black, glossy, the ostiole indistinct. Asci 80–95 × 17–20 µm. Ascospores 28–31 (–38) × 7–9 (–10) µm, clavate and attenuated towards the base, muriform with 7–10 transverse septa and all but the lowest 1–2 (–4) cells with 1–3 longitudinal septa. Pycnidia not seen. **BLS 0785**.

On young, canopy twigs of *Pinus*; rare or overlooked. Scotland (E. Lothian, Kirkudbrightshire, Peebleshire, Cairngorms).

Probably much overlooked as it seems to be mostly confined to the upper canopy.

Mycoglaena myricae (Nyl.) R.C. Harris (1973) **LC**



Involucrellum 0.2–0.3 mm diam., composed of a network of 2–3 layers of freely branched and anastomosing, rather coarse hyphae with blue-green walls, the outermost compressed cell layers of the periderm forming a greyish halo around the involucrellum. Ascomata rather flattened, mostly 0.2–0.25 mm diam. and 60–70 µm high. Asci ± cylindrical, 50–75 × 10-15 µm, shortly stipitate. Ascospores 16–20 × 4.5–7 µm, ellipsoidal-fusiform to ovoid-fusiform, the ends often pointed, 3-septate, the second cell ± enlarged, constricted at septa, colourless. Pycnidia 40–60 µm diam.; conidia 4.5–5 (–5.7) × *ca* 0.8 µm. **BLS 1278**.

Very common on woody stems of *Myrica gale*, rarely recorded on other hosts, e.g. *Alnus*, *Betula*, *Sorbus*. N. & W. Britain, New Forest, scattered elsewhere and probably in all but the smallest relic populations of *Myrica*; widespread in Ireland.

ORPHNIOSPORA Körb. (1874)

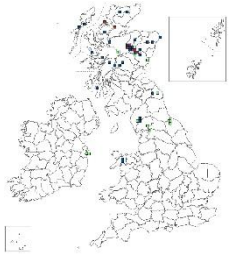
Thallus crustose, areolate. **Prothallus** blackish. **Photobiont** chlorococcoid. **Ascomata** apothecia, black, sometimes with faint rusty or ochraceous pruina. **Thalline margin** absent. **Exciple** and **hypothecium** dark brownish. **Hymenium** colourless or I+ pale blue. **Hamathecium** of unbranched or sparingly branched and anastomosed paraphyses, apices without pigmented caps. **Asci** clavate, 8-spored; apical dome narrow, not or weakly I+ blue but ascus apex with a strongly K/I+ blue, rather diffuse cap. **Ascospores** colourless or dark olive-brown, ellipsoidal, thick-walled, aseptate or with an indistinct septum. **Conidiomata** pycnidia, immersed. Conidiophores cylindrical, the conidiogenous loci apical or lateral below septa. **Conidia** bacilliform, aseptate, colourless. **Chemistry**: no lichen products detected by TLC. **Ecology**: on hard, siliceous rocks.

Orphniospora was included in the Fuscideaceae by Lücking *et al*. (2017a), but molecular work has excluded it from the family (Zahradníková 2017). Its correct placement is not clear, but it may belong within the Lecideales. *Fuscidea* differs in the pale hypothecium and absence of any green or purple pigments.

Literature:

Hafellner (1984), Hertel & Rambold (1988), Lücking *et al*. (2017a), Zahradníková (2017).

Orphniospora moriopsis (A. Massal.) D. Hawksw. (1982) **Nb**



Thallus brownish black; areoles 0.3–1 mm diam., angular or rounded, rough, flat to convex; outer cells of cortex greenish, N+ red; medulla brownish, I+ blue-violet; photobiont cells 7–12 (–15) µm diam. Apothecia 0.4–1 mm diam., at first immersed (later becoming ± sessile); margin (exciple) at first shallow but later excluded and inconspicuous; epithecium olive-green, K+ green intensifying, N+ red, sometimes often with additional brownish, K+ purplish pigment; hymenium 80–110 µm tall, colourless or pale brownish, K+ purplish; hypothecium dark brown, K+ purplish tinge; paraphyses 1.5–2 µm diam., the apices slightly widening to 3–4 µm diam.

Ascospores 12–18 × 6.5–10 µm, dark olive-brown. Conidia 3–4 × *ca* 1 µm. **BLS 0969**.

On hard, siliceous montane rocks; rare. N. England, N. Wales (Snowdonia), Scotland.

The very dark thallus on a well-developed black prothallus is distinctive but easily mistaken in the field for *Schaereria fuscocinerea*, which has colourless aseptate ascospores.

Orphniospora moriopsis var. **brunnea** (A.L. Sm.) D. Hawksw. (1982) [**BLS 0970**] has markedly convex, more dispersed areoles with pale brown apices. It is only known from a single recent collection, from Scotland (Cairngorms, Beinn a' Bhuird).

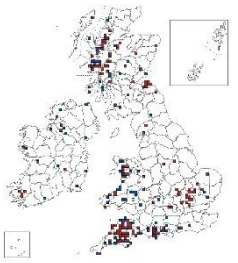
PICCOLIA A. Massal. (1856)

Thallus crustose, thin, ± continuous or areolate, without a well-defined margin. **Prothallus** absent. **Photobiont** chlorococcoid. **Ascomata** apothecia, biatorine or lecideine, convex, colourless, yellow to red or whitish pruinose. **Exciple** persistent (in some tropical species), of parallel brownish ochre-coloured to colourless hyphae. **Hymenium** colourless, I+ deep blue. **Hypothecium** colourless or pale grey-yellow, often cloudy-oily. **Hamathecium** of paraphyses, branched and ± anastomosed in a gelatinous matrix, the apices free, usually unbranched, ± vertical and unthickened. **Asci** clavate, with a K/I+ gelatinous outer layer and a young I+ blue, later I– apical dome, becoming I– at maturity, multispored. **Ascospores** globose, aseptate, thin-walled, colourless. **Conidiomata** pycnidia, small, globose, colourless to red or yellow. **Conidia** globose. **Chemistry**: no lichen substances detected by TLC. Anthraquinone pigments occur in the apothecia in all species. **Ecology**: on bark or mosses.

The genus *Piccolia* is mainly tropical in distribution, and its phylogenetic position is uncertain. *Biatorella* has asci with a K/I+ gelatinous outer layer and an I– apical dome. *Biatoridium* has a multilayered, K/I+ blue apical dome. *Strangospora* has asci with a strongly thickened, K/I+ blue wall, particularly at the apex, without a gelatinous outer layer and a strongly K/I+ blue apical dome. All these genera lack the red or yellow anthraquinone that is usually present in the epithecium in *Piccolia* species.

Literature:
Aptroot (2009c), Hafellner (1995, 2004), Van den Broeck *et al.* (2013).

Piccolia ochrophora (Nyl.) Hafellner (2004) **LC**



Thallus pale grey, immersed or effuse, ± minutely granular. Apothecia 0.1–0.5 mm diam., appressed to sessile, pale ochre to deep orange-red, the surface roughened, ± densely orange-pruinose, convex, mainly scattered; exciple 10–20 µm tall, red-orange-brown-yellow, I+ blue; hymenium 75–85 (–125) µm high, pale red-orange-yellow, the upper 15–30 µm together with the epithecium densely granular, the granules minute, golden yellow or ochre, K+ dissolving, scarlet-red or purple; hypothecium 50–150 µm, ± ochre coloured, pale beneath, I+ blue; paraphyses 1–1.5 µm diam., anastomosed, hardly visible in water but clearly visible in K; apices 3–3.5 µm diam. Asci 55–60 × (15–) 20–25 µm, 100- to 200-spored, swollen-clavate or ovoid; upper wall 2.5–3.5 µm thick. Ascospores 4–4.5 µm diam. Apothecia K+ scarlet- or purplish red. **BLS 1373**.

Overgrowing mosses or on bark of broad-leaved trees (especially *Fraxinus* and *Sambucus*), in well-wooded sites or occasionally wayside trees in sheltered sites; local. S.W. Britain and Ireland, with some eastern occurrences.

The apothecia are sometimes confused with small tufts of free-living *Trentepohlia*, which are similar in colour and texture. The apothecia are very brittle and are easily broken when touched with a dissecting needle.

PSAMMINA Sacc. & M. Rousseau (1890)

Thallus sometimes superficial, ± discrete, usually absent (lichenicolous or saprotrophic). **Photobiont** chlorococcoid where present. **Mycelium** ± immersed, ± colourless to brown. **Ascomata** unknown. **Conidiomata** sporodochia, loosely arranged or in a depression, possibly also acervular, either gelatinous or dry-spored. **Conidiophores** in tufts, unbranched and ± clearly differentiated, somewhat larger than the vegetative hyphae, ± colourless to brown. **Conidiogenous cells** monoblastic, cylindrical, not clearly delimited from the conidiophores. **Conidia** repeatedly branched in two or three dimensions, solitary, dry, acrogenous, colourless to pale brown singly but distinctly brown in mass. Arms two-dimensional, palmately branched, aseptate or three-dimensional with single arms up to 80 in number, 0- to 15-septate. **Chemistry**: not known. **Ecology**: lichen-forming, lichenicolous, algicolous or saprotrophic on plant material.

Most of the species are lichenicolous or saprotrophs, and the genus is likely to be polyphyletic (Van der Kolk *et al*. 2024), and the lichenicolous species (at least) seem to belong to the Capnodiales.

Literature:
Earland-Bennett (2009), Earland-Bennett & Hawksworth (2005), Van der Kolk *et al*. (2020, 2024).

1 Conidia with < 20 arms (branches) 2
Conidia with > 20 arms 3

2(1) Arms aseptate, 8–12 × 2–2.5 µm; species lichenized ..... ***palmata***
Arms septate, 21–27 × 2.5–3.5 µm; species lichenicolous on *Lobaria pulmonaria* ..... ***lobariae***

3(1) Arms at least mostly >15 µm long and < 4 µm diam., not inflated at the apex 4
Arms 10–15 × 3.5–6.0 µm, and inflated at the apex; algicolous and lichenicolous ..... ***inflata***

4(3) Arms < 50 µm long 5
Arms 50–80 × 2.5–4.0 µm, 6–8-septate; algicolous and lichenicolous ..... ***filamentosa***

5(4) Arms 21–40 × 3.0–4.0 µm, curved, especially at the base, giving the conidia a coiled appearance, the apex rounded, 3–7-septate; colonies of discrete, often agglomerated conidia ..... ***stipitata***
Arms < 3.0 µm diam., or < 25 µm long and less than 3-septate; straight or only slightly curved, giving the conidia a spiny appearance; with black, gelatinous sporodochia or acervuli 6

6(5) Arms mostly 0–2-septate, 15–25 × 2–4 µm; algicolous and lichenicolous ..... ***simplex***
Arms 3–6-septate, 12–25 × 2–2.5 µm, saprotrophic on *Ammophila* and *Juncus* ..... ***bommerae***

Psammina bommerae Sacc. & M. Rousseau (1890) **NE**
Thallus absent (saprotrophic on plant tissues). Mycelium immersed, colourless. Conidiomata to 120 µm diam., acervular or stromatic, subepidermal, pale brown, composed of colourless to pale brown intertwined hyphae. Conidiophores irregularly branched, elongate; conidiogenous cells small, cylindrical to doliiform, formed as short lateral branches on the conidiophores. Conidia to 45 µm diam., composed of many (more than 30) 3–6-septate arms 12–25 × 2–2.5 µm in size, radiating from a central cluster of short branched cells.

On dead leaves of grasses (*Ammophila arenaria*, *Dactylis glomerata*, *Phragmites australis*) and *Juncus effusus*, scattered throughout England and Wales with a single record from Scotland (Fife). Ceratinly under-recorded.

The description has been largely adapted from Sutton (1980), and the species contrasted with lichenicolous taxa by Van der Kolk *et al*. (2024).

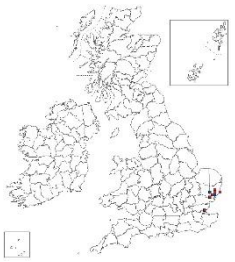
Psammina filamentosa Van der Kolk & Earl.-Benn. (2020) **NE**
Thallus absent (lichenicolous). Colonies dispersed, dark brown to black, appearing slightly granular or almost smooth, 100–200 µm diam.; mycelium immersed in the host tissue, consisting of brown, branched torulose hyphae, 2.5–3.5 µm diam. Conidiomata absent. Conidiophores arising in small sporodochial groups, erect,

straight, unbranched, smooth-walled, septate, 30–50 × 3.0–3.5 µm. Conidiogenous cells monoblastic, terminal, cylindrical, not clearly delimited from the conidiophores, 10–15 × 2.5–3.5 µm. Conidia arising singly, 120–160 µm diam. when lightly squashed, dry, multiseptate, palmate, pale brown, with 70–100 arms; the arms curved at the base, becoming straighter and sometimes slightly attenuated towards the apex, sometimes unevenly thickened, pale brown, smooth-walled, 6–8-septate, 50–80 (–100) × 2.5–4.0 µm.

Growing over crusts of green algae on *Prunus padus*, and on degraded thalli of *Punctelia borreri*, England (E. Suffolk, S. Wiltshire). Pathogenic on other lichens (e.g. *Psilolechia lucida* and *Lecanora expallens*) in Europe.

The description has been adapted from Van der Kolk *et al*. (2020). The species is distinctive for its very long conidial arms (branches).

Psammina inflata Earl.-Benn. & D. Hawksw. (1999) **NE**



Thallus absent (lichenicolous). Colonies 100–250 µm diam., scattered or strongly aggregated in large groups, dark brown to black. Mycelium immersed, of colourless to pale brown torulose hyphae 2.5–4 µm diam. Conidiomata absent. Conidiophores superficial, loosely grouped together in small tufts, erect, ± straight or slightly flexuose, unbranched, smooth-walled, septate, often somewhat inflated between the septa, variable in length but mainly 20–35 (–40) × 3–5 µm. *Conidiogenous cells* monoblastic, terminal, cylindrical, not or poorly delimited from the conidiophores. *Conidia* 17–42 µm diam. (lightly squashed); arising singly, dry, acrogenous, multiseptate, palmate to cartwheel-like, pale brown, with about 30 arms (branches), individual arms curved and clavate, 1-2 (-3) septate, not or scarcely swollen between the septa but strongly inflated at the apex, smooth-walled, (8–) 10–15 (–17) × 3.5–6 (–6.5) µm.

On green coccoid algae and leprose lichens including *Lepraria incana*, England (Essex, Suffolk). Weakly pathogenic, on decolorized patches on the host lichen.

Easily distinguished from other species of *Psammina* by its conidia with short arms that are inflated towards the apices.

Psammina lobariae (Diederich & Etayo) Earl.-Benn. & D. Hawksw. (2005) **NE**

Pycnopsammina lobariae Diederich & Etayo (1995)

Thallus absent (lichenicolous). Conidiomata immersed in the host thallus, 80–120 (–170) µm diam., acervular in construction, opening via splitting of the upper wall with the entire contents becoming exposed, the wall colourless but brownish near the opening. Mycelium immersed, colourless. Conidiophores absent. Conidiogenous cells lining the inner wall, monoblastic, shortly ampulliform, 3–3.5 × 2–4 µm. Conidia colourless, smooth, with 5 to 10 separate, occasionally branched arms 21–27 × 2.5–3.5 um, 3- to 4-septate, radiating from an angular basal cell 5–6.5 × 3–4.5 um in size.

On thalli of *Lobaria pulmonaria*, Scotland (Kintyre) and S.W. Ireland.

Excluded from *Psammina* by Van der Kolk *et al*. (2024) due to the presence of immersed conidiomata, but its position is uncertain and the conidial structure is not clear (Earland-Bennett & Hawksworth 2005). The description has been taken largely from Etayo & Diederich (1995).

Psammina palmata Earl.-Benn. & D. Hawksw. (2005) **NE**

Thallus superficial, strongly convex, rounded to elongate in surface view, 0.1–0.2 mm diam., dark green to greenish brown and gelatinous when moist, when dry inconspicuous and appearing as diffuse brownish patches, arising singly and discrete, sometimes coalescing with other thalli to form more extensive nodular mats; outer surface of thalli brownish in section, composed of algal cells cemented by amorphous brownish polysaccharides and fungal hyphae; algal cells abundant, coccoid, 3–11 µm diam.; fungal hyphae brown, sparsely septate, with unevenly thickened walls, 3–4 µm diam. Conidiomata arising from the convex thallus, sporodochial, comprising compacted masses of conidiogenous structures and conidia; conidiophores erect, brown, smooth-walled, not clearly distinguished from the vegetative hyphae; conidiogenous cells elongate-cylindrical, brown, smooth-walled, often markedly swollen below and somewhat eccentrically ampulliform, 6–10 × 1.5–2.5 µm; conidia arising singly, apically, dry, aseptate or exceptionally with 1 or 2 basal septa at branching points, colourless, palmately branched in a single plane, overall (17–) 25–36 µm wide and 20–30 µm tall, mainly 2–3 dichotomously branched, finally with (9–) 12–16 (–20) arms; stem 1.5–2.5 µm broad; individual arms somewhat to clearly

constricted at the base, (1.5–) 2–2.5 (–3) µm diam., (4.5–) 8–12 (–15) µm long. **BLS 2434**.

On a decorticated fallen *Quercus* branch; only known from a single record. England (West Suffolk). Endemic.

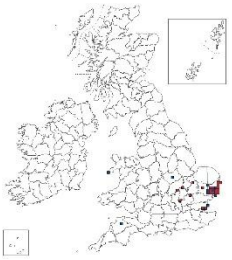
Distinguished by the relatively small conidia that are palmately branched (i.e. in two directions) rather than in three dimensions as in other species of *Psammina*, and by the lichenized rather than lichenicolous habit.

Psammina simplex Earl.-Benn. & D. Hawksw. (1999) **NE**

Thallus absent (lichenicolous). Colonies discrete, dispersed, dark brown to black; mycelium mostly immersed, localized, composed of brown torulose hyphae mainly 3–4 µm diam. Conidiophores aggregated into dot-like gelatinous sporodochia, erect, ± straight to flexuose, unbranched, smooth-walled or slightly roughened, septate, mainly 30–45 × 3–4 µm. Conidiogenous cells monoblastic, cylindrical, not or poorly delimited from the conidiophores. Conidia arising singly, dry, cartwheel-like, olivaceous brown in mass, comprising about 20–30 arms, overall 17–57 µm diam. (hardly squashed); individual arms straight, flexuose or slightly curved, 0–1 (–2) septate, not swollen between the septa nor at the apices which can be somewhat attenuated, ± colourless to pale olivaceous brown, smooth-walled, (7–) 15–25 (–29) × (1.5–) 2–4 µm. **BLS 2279**.

On algal crusts and lichens, including *Lecania cyrtella*, *Lecanora expallens*, *L. saligna*, *Lepraria incana* and *Scoliciosporum chlorococcum*; S. England (Dorset, Essex, Suffolk). Strongly pathogenic, killing and eventually completely destroying the host and then persisting directly on the bark or wood.

Psammina stipitata D. Hawksw. (1979) **NE**



Thallus absent (lichenicolous). Colonies discrete but sometimes becoming confluent and then appearing almost effuse, brown; mycelium mainly immersed, rather localised, composed of ± colourless to pale brown torulose hyphae mainly 3-4 µm diam., abundantly branched. Conidiomata (sporodochia) absent. Conidiophores arising singly or in small groups, erect, ± straight or slightly flexuose, unbranched, smooth-walled, septate, very variable in length but mainly 20–50 × 4–5 µm in size. Conidiogenous cells monoblastic, cylindrical, not or poorly delimited from the conidiophores. Conidia arising singly, overall 120–160 µm diam., clearly brown in mass, dry, multiseptate, palmate, consisting of about 50 arms, each arm 25–50 × 3–3.5 µm in size with 3–7 transverse septa, ± colourless to pale brown, smooth-walled or irregularly sparsely rugose, the arms straight or slightly arcuate, generally somewhat uneven in diameter and tending to be swollen between some septa. **BLS 2178**.

On algal crusts and lichens, including *Amandinea punctata*, *Anisomeridium polypori*, *Dendrographa decolorans*, *Lepraria incana* and *Phaeophyscia orbicularis*; widely distributed in S. England, also known from Wales (Caernarvonshire).

Considered to be the most common and widespread member of the genus by Van der Kolk *et al.* (2024). Compared to *Psammina simplex*, the conidial arms are typically broader, more curved and have a rounded apex.

WADEANA Coppins & P. James (1978)

Thallus immersed, ± inconspicuous; prothallus absent. **Photobiont** *Trentepohlia*. **Ascomata** apothecia, narrowly elongate (lirelliform), erumpent and becoming ± superficial, oval to elongate-elliptical in outline, black, the disc ± exposed, sometimes branched. **Exciple** ± raised, persistent, black-brown, slightly extended laterally at the base but not generally below the hypothecium, of compacted gelatinized hyphae with red-brown walls. **Epithecium** indistinct. **Hypothecium** pale to red-brown, this and all apothecial tissues tending to be red-brown, intensifying in N. **Hamathecium** of branched and occasionally anastomosed delicate paraphysoids, somewhat moniliform, swollen and red-brown at the tips; periphysoid filaments developing on the inside margin of the exciple, more

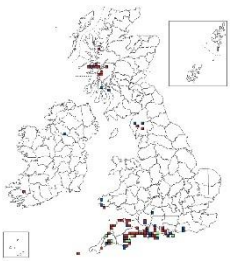
rarely at its upper margin. **Asci** clavate-ellipsoidal, rather evenly thin-walled, slightly thickened at the apex with a K/I+ deep blue cap, 100- to 200-spored. **Ascospores** ellipsoidal or ± globose, aseptate, colourless, smooth-walled. **Conidiomata** unknown. **Chemistry**: an unidentified xanthone in one species. **Ecology**: on rough bark of deciduous trees.

Existing molecular data are insufficient to establish a phylogenetic position, but the genus is possibly related to the Acarosporaceae. Separated from *Lithographa* (Baeomycetales: Xylographaceae) by the presence of periphysoid filaments, the exciple not being well developed under the hypothecium and the multispored asci, and from *Opegrapha* s.l. by the aseptate spores and non-fissitunicate asci. The red-brown colour (K+ dark brown) of the apothecial tissues is best studied in water mounts.

Literature:
Coppins & James (1978), Sanderson & Hawksworth (2009).

1 Apothecia 0.5–2.5 × 0.3–0.5 mm, usually distinctly elongate with attenuated ends; hymenium 100–120 µm tall; ascospores ellipsoidal, 5–8 × 3–4 µm ..... ***dendrographa***
Apothecia 0.25–0.8 × 0.2–0.3 mm, shortly elongate or oval with ± rounded ends; hymenium 50–60 µm tall; ascospores ± globose, 2–3 µm diam. ..... ***minuta***

Wadeana dendrographa (Nyl.) Coppins & P. James (1978) **NT IR**

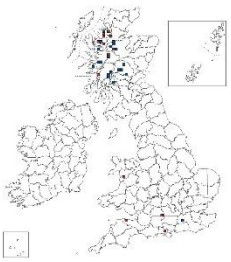


Apothecia 0.5–2.5 × 0.3–0.5 mm, distinctly elongate with attenuated or sometimes ± rounded ends, not or irregularly branched; prominent, the margin (exciple) glossy, 60–85 (–100) µm thick, swollen and persistent, lip-like; hymenium 100–120 µm tall. Asci 78–85 × 12–19 µm, 100- to 200-spored. Ascospores 5–8 × 3–4 µm, ellipsoidal. Thallus C–, K–, KC–, Pd–, UV± orange-yellow (an unidentified xanthone detected by TLC). **BLS 1524**.

On rough nutrient-rich bark of mature trees in little-disturbed, wayside and old woodland habitats, particularly on *Fraxinus* but also rarely *Quercus* and formerly *Ulmus* in S. England, often with *Cryptolechia carneolutea*; local. Extreme S. & S.W. England (Sussex to Cornwall), N.W. England (Cumbria), Wales (Pembrokeshire), W. Scotland (to Skye), S.W. and N. Ireland.

Superficially resembles *Alyxoria varia* but differing in the glossy margin to the apothecia (use hand lens) and the complete absence of pycnidia.

Wadeana minuta Coppins & P. James (1978) **NT IR**



Apothecia 0.25–0.8 × 0.2–0.3 mm, shortly elongate or oval, sometimes clustered, not or one-branched, with rounded ends; margin (exciple) smooth, ± glossy, persistent, 30–40 (–60) µm thick; hymenium 50–60 µm tall. Asci (35–) 40–45 × 12–18 µm, *ca* 100-spored. Ascospores 2–3 µm diam., ± globose. No lichen products detected by TLC. **BLS 1525**.

On rough bark of mature trees with nutrient-rich bark, particularly *Fraxinus*, *Quercus* and *Ulmus*; rare. S. England (Somerset, Surrey, Hampshire, Wiltshire), Wales (Brecon, Merioneth), W. Scotland (N. to W. Ross) and further east in Mid-Perthshire.

Usually distinguished (use hand lens) from similar-looking *Alyxoria* species (e.g. *A. culmigena*, *A. varia*) by the ± glossy margin to the apothecia. The small size of the apothecia with rounded ends helps distinguish from *W. dendrographa* in the field.

Nomenclature

Lichenothelia elongata (Nav.-Ros. & Hafellner) P.F. Cannon, **comb. nov.** **IF 904065**
Basionym: *Lichenostigma elongatum* Nav.-Ros. & Hafellner, as '*elongata*', *Mycotaxon* **57**: 213 (1996)
Typification: Holotype BCC (Lich), Giralt & Navarro-Rosinés, 14 Nov. 1987.

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