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Umbilicariales

Cover image: *Umbilicaria proboscidea*, on an erratic boulder, Hvalfjördur, Iceland.

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. 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to compile new printed editions of the entire lichen biota of Britain and Ireland is extensive, and many parts are out-of-date even as they are published.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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Umbilicariales

including *Elixia* (Elixiaceae), *Fuscidea* (Fuscideaceae), *Hypocenomyce* and *Ophioparma* (Ophioparmaceae), *Ropalospora* (Ropalosporaceae) and *Lasallia*, *Umbilicaria* and *Xylopsora* (Umbilicariaceae)

by

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UMBILICARIALES J.C. Wei & Q.M. Zhou (2007)

ELIXIACEAE Lumbsch (1997)

Thallus crustose, indistinct or whitish, ecorticate and sorediate and then becoming tuberculate, or comprised of goniocysts, each with a blackish brown cap on the marginal surface. **Photobiont** chlorococcoid. **Apothecia** sessile, constricted at the base, roundish to angular, sometimes gyrose with inrolled margins. **Thalline margin** absent or incomplete. **True exciple** cupulate, pale green to dark brown, sometimes poorly developed. **Hymenial gel** I– or K/I+ pale blue. **Hamathecium** of paraphyses, septate, slightly branched and anastomosing, in some species slightly thickened and pigmented apically. **Asci** cylindrical to ± saccate, with the outer wall K/I+ blue, tholus variably developed, K/I+ pale blue, with an intensely K/I+ blue cap at the apex. **Ascospores** aseptate, colourless, without a perispore. **Conidiomata** unknown. **Chemistry**: protolichesterinic acid, or lichen products not detected by TLC.

The position of the Elixiaceae within the Umbilicariales was established by Bendiksby & Timdal (2013) and Miądlikowska *et al*. (2014). It currently contains two genera, *Elixia* and the austral *Meridionelia* (Lücking *et al.* 2017), although Bendiksby *et al*. (2018) showed that their phylogenetic relationship is uncertain.

Literature:
Bendiksby & Timdal (2013), Bendiksby *et al.* (2018), Kantvilas & Lumbsch (2009), Lücking et al. (2017), Lumbsch (1997), Miądlikowska *et al*. (2014).

ELIXIA Lumbsch (1997)

Thallus crustose, thin and areolate or indistinct and composed of goniocysts. **Soralia** and **isidia** absent. **Photobiont** chlorococcoid. **Apothecia** sessile, constricted at the base, at first narrowly elongate and lirellate to stellate, the disc sometimes later becoming exposed. **Thalline margin** absent. **True exciple** cupulate, dark brown to black and carbonaceous, extending above the disc, sometimes becoming inrolled. **Hamathecium** of septate paraphyses, unbranched or sparsely so, pigmented apically to form a brownish epithecium. **Asci** *Elixia*-type (see family description), 8-spored. **Ascospores** aseptate, colourless, without a perispore. **Conidiomata** unknown. **Chemistry**: lichen products not detected by TLC.

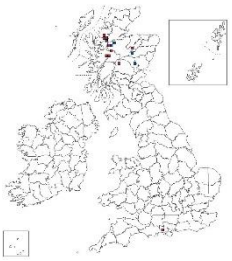
Two species are currently recognized (Spribille & Lumbsch 2010), though molecular data published by Bendiksby *et al*. (2018) suggests that species diversity might be greater.

Literature:
Bendiksby & Timdal (2013), Bendiksby *et al.* (2018), Coppins (2009), Lumbsch (1997), Spribille & Lumbsch (2010), Wedin et al. (2005).

Elixia flexella (Ach.) Lumbsch (1997) **NT**

Thallus crustose, indistinct, scattered on the substratum, composed of goniocysts with a cortex of isodiametric cells, each with a blackish brown cap on the marginal surface; photobiont chlorococcoid, cells 9–14 (–17) µm

diam. Apothecia numerous, sessile, black, not pruinose, constricted at the base, at first narrowly elongate (to 0.4 × 0.1–0.2 mm) with a slit-like disc, but soon angular or ± rounded, 0.16–0.6 mm diam., with an expanded or irregularly gyrose disc with an ± inrolled margin; true exciple cupulate, dark brown, to 60 µm thick; hypothecium brown; hymenium 35–50 µm high, colourless to yellowish, I+ pale blue; paraphyses 1–1.5 µm diam., septate, slightly branched and anastomosing, slightly thickened and pigmented apically. Asci clavate to subcylindrical, *Elixia*-type, 8-spored. Ascospores broadly ellipsoidal, colourless, non-septate, without a perispore, 5–8 × 3–4 (–4.5) µm. Pycnidia unknown. Lichen products not detected by TLC. **BLS 1209**.



On wood of stumps or standing trees (mainly *Pinus* and *Quercus*), usually on ± vertical surfaces, in old woodlands (esp. native pinewoods); rare. C. & E. Scotland (Highlands).

Differs from *Ptychographa xylographoides* [Baeomycetales: Xylographaceae] in the more rounded apothecia and smaller ascospores. Sometimes confused with aseptate-spored members of the non-lichenized genus *Durella* which, however, have an I– hymenium.

FUSCIDEACEAE Hafellner (1984)

Thallus crustose, often strongly areolate, often with a dark prothallus, sometimes with soralia. Photobiont chlorococcoid algae. Ascomata apothecia, ± immersed to sessile, thalline margin absent or inconspicuous to well-developed, the disc red- to dark brown or black. Hamathecium of sparsely to richly branched paraphyses, the apices often pigmented. Asci with a thin external and internal K/I+ dark blue cap, surrounded by a thick K/I+ pale blue, gelatinous apical cap but a K/I– apical tube in the tholus, 8- or multi-spored. Ascospores aseptate (rarely 1-septate), hyaline or pale brown, sometimes bean-shaped or constricted in the central portion.

The Fuscideaceae contains four genera according to Lücking *et al*. (2017), but of those, recent molecular work has excluded *Orphniospora* from the family (Zahradníková 2017) and it is treated in this volume as of uncertain affinity. *Fuscidea* is thus the only genus of the *Fuscideaceae* known to occur in Great Britain and Ireland. The family occupies an outlying clade within the Umbilicariales (Miądlikowska *et al.* 2014), which includes the Ophioparmaceae and Ropalosporaceae as well as the Umbilicariaceae itself.

British collections of *Lecidea hypopta* Ach. have been shown not to be conspecific with the type collection of that species and have been referred to *Lecanora phaeostigma* (Körb.) Almq. In her PhD dissertation, Zahradníková (2017) showed in her molecular phylogeny that this species occupied a position between *Fuscidea* and *Ropalospora* as sibling to *Fuscidea* and child of *Ropalospora.* She further suggested the generic name *Printzeniella* for this species but as this name has not been formally described, the species is not treated here pending further investigation.

FUSCIDEA V. Wirth & Vězda (1972)

Thallus crustose, rimose-cracked or areolate; dark prothallus commonly present so thalli often form mosaics. **Upper cortex** undifferentiated, sometimes with a layer of brownish surface cells. **Lower cortex** absent. **Photobiont** chlorococcoid (*Apatococcus* fide Zahradníková *et al.* 2017); at least partly in clusters of 2-4 daughter cells resulting from binary fission, often not round but asymmetrical with

one flattened side. **Medulla** rarely I+ blue. **Ascomata** apothecia, immersed to sessile; disc red- to black-brown, always brownish when wet, never black. **Thalline margin** absent, at most a poorly developed pseudothalline margin may be present in some species. **True exciple** ± distinct, persistent or occluded, concolorous with the disc or paler; inner part colourless or pale brownish; outer part brown or dark brown. **Epithecium** brown. **Hymenium** colourless or sometimes pale brownish, I–. **Hypothecium** colourless or pale straw; hyphae erect. **Hamathecium** of paraphyses, unbranched or branched, sometimes richly so, especially at the apices, weakly conglutinated in water, becoming ± free in K, a brown pigment surrounding the 1-2 uppermost cells; upper cell clavate. **Asci** 8-spored, subcylindrical to clavate, with a thin external and internal K/I+ dark blue cap, surrounded by a thick K/I+ pale blue gelatinous apical cap but a K/I– apical tube in the tholus (*Fuscidea*-type). **Ascospores** colourless, sometimes brown when old, ± spherical or usually ellipsoidal, rarely elongate, straight to curved or bean-shaped, aseptate or rarely 1-septate. **Conidiomata** pycnidia, immersed in thalline warts or becoming emergent; walls brown, K–, N–. **Conidia** cylindrical with obtuse apices, or ellipsoidal. **Chemistry**: orcinol *para*-depsides and tridepsides, also fumarprotocetraric, alectorialic and fatty acids. **Ecology**: characteristic of nutrient-deficient, acid siliceous rocks and acid-barked trees.

As it is currently circumscribed, *Fuscidea* is paraphyletic with the extralimital genus *Maronea* nested within it (Zahradníková 2017). Resolution of this phylogenetic *non sequitur* demands that either the two genera are placed in synonymy, or that *Fuscidea* is split into two genera. Neither of these options are palatable, at least without more detailed studies, and the traditional circumscription is adopted here.

Ropalospora is morphologically similar in many ways to *Fuscidea* but has multiseptate ascospores and a different exciple structure, and is now placed by most authors into its own family Ropalosporaceae.

Most species of *Fuscidea* can be recognized in the field by their flexuose reddish to very dark brown, not black (at least when wet), apothecia with a persistent true exciple. Many saxicolous, usually non-sorediate species (*F. cyathoides*, *F. intercincta*, *F. kochiana*, *F. lygaea*) will occasionally produce soredia.

Literature:

Fryday (2008), Fryday & Arcadia (2012), Fryday & Coppins (2012), Gilbert *et al*. (2009), Hertel & Rambold (1988), Inoue (1981a, b), Lendemer (2011), Lücking *et al.* (2017), Miądlikowska *et al*. (2014), Tønsberg (1992), Zahradníková (2017), Zahradníková *et al*. (2017, 2018).

1 Soralia present; apothecia often absent 2
Soralia absent; apothecia present 9

2(1) Soralia Pd+ orange or red; UV± yellow 3
Soralia Pd–; UV+ bluish white 5

3(2) Thallus areolate; soralia numerous; apothecia usually absent 4
Thallus rimose-cracked; soralia sparse; apothecia usually present ..... ***cyathoides***

4(3) Soralia C+ red; Pd+ yellow-orange; UV± yellowish; on rocks ..... ***praeruptorum***
Soralia C–; Pd+ rust-red; UV–; on trees ..... ***arboricola***

5(2) On trees 6
On rocks 7

6(5) Thallus relatively large (to 20–30 mm diam.), emarginate; often fertile ..... ***lightfootii***
Thallus small (to 10 mm diam.), often rosette-forming; very rarely fertile ..... ***pusilla***

7(5) Areoles discrete and scattered to locally contiguous, flat to weakly convex, 0.2–2.5 mm diam., prothallus conspicuous, black, visible amongst the areoles; ascomata rare ..... ***gothoburgensis***
Areoles contiguous or fused, strongly convex; prothallus only visible as a border surrounding the thallus 8

8(7) Soralia cream-coloured, ± convex and conspicuous; apothecia rare; usually on shaded rocks .... ***recensa***
Soralia blue-grey, punctiform and inconspicuous; ascomata frequent; on exposed rocks..... ***oceanica***

9(1) Medulla Pd–, UV± bluish white; ascospores usually not curved (see *F. recensa*) 10
Medulla Pd+ red, UV–; ascospores bean-shaped ..... ***cyathoides***

10(9) Apothecia ± immersed 11
Apothecia becoming sessile 12

11(10) Apothecia angular to irregularly rounded; exciple cupulate, extending below the hymenium; asci at several levels within apothecia ..... ***kochiana***
Apothecia circular, with an annular exciple, surrounded by a pale grey-white zone; asci at one level within apothecia; very rarely sorediate ..... ***intercincta***

12(10) True exciple persistent; divaricatic acid present at least in the apothecia, UV± bluish white 13
True exciple becoming excluded; thallus without divaricatic acid, UV– ..... ***lygaea***

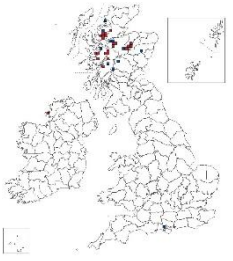
13(12) Medulla UV+ bluish white..... 14
Medulla UV–; apothecia flexuose, 0.5–2 mm diam.; true exciple brown, often with some unpigmented parts ..... ***austera***

14(13) Apothecia regularly rounded, 0.3–1.0 mm diam.; prothallus only conspicuous at the edge..... 15
Apothecia usually flexuose, sometimes umbonate; prothallus visible between areoles 16

15(14) Ascospores aseptate, broadly ellipsoidal; thallus pale grey-brown to dark grey; areoles irregular .. ***mollis***
Ascospores 1-septate, narrowly ellipsoidal; thallus pale to brownish grey; areoles ± rounded..... ***recensa***

16(15) Areoles discrete and scattered to locally contiguous, 0.2–2.5 mm diam.; ascomata rare .. ***gothoburgensis***
Areoles always contiguous, 0.15–0.4 mm diam.; ascomata frequent..... ***oceanica***

Fuscidea arboricola Coppins & Tønsberg (1992) **Nb**

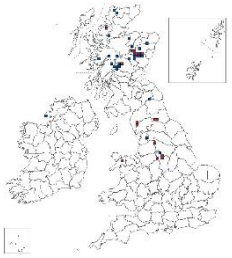


Thallus areolate or minutely warted; areoles 0.2–0.3 mm diam., green-brown, rarely greyish, discrete or locally contiguous, circular to irregularly rounded, convex; soralia present, 0.2–0.5 mm diam., pale yellow-green, at times brown-tinged, at first discrete and delimited at the edges, often becoming confluent and coalescing towards the centre of the thallus, ± rounded; prothallus usually distinct, brown, of radiating hyphae, visible between areoles and as a border surrounding the thallus. Apothecia to 0.8 mm diam., very rare, sessile, rounded; disc dark brown-black, ± flat; true exciple often becoming flexuose, of radiating hyphae firmly conglutinated and with colourless crystals dissolving in K; hypothecium I+ faintly blue. Ascospores 7–9 × 4–5 µm, ± cylindrical with obtuse apices, aseptate or 1-septate, with a median constriction. Soralia and exciple C–, K+ brownish yellow, Pd+ red, UV– (fumarprotocetraric and ± protocetraric acids). **BLS 1701**.

On the bark of old *Pinus*, rarely on *Betula*; rare. N. Scotland, one record from Ireland.

Like *F. lightfootii* which, however, has a different chemistry (Pd–, UV+ bright bluish white) and occurs on less acid bark. Can resemble sterile *Lecanora conizaeoides* but has a conspicuous brown prothallus. *Ropalospora viridis* is similar but the soralia are frequently confluent and are Pd–, UV+ white. *Cliostomum flavidulum* is also Pd+ red but the bright yellow-green soredia are diffuse and never discrete.

Fuscidea austera (Nyl.) P. James (1980) **NT**

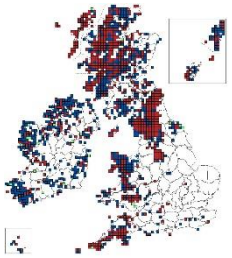


Thallus pale grey to chocolate-brown, rimose-cracked; areoles 0.2–0.5 mm diam., contiguous, thin, uniform to somewhat irregular, slightly convex or tuberculate; prothallus black, ± delimiting the thallus. Apothecia 0.5–2 mm diam., sessile, rounded to flexuose, discrete or aggregated; disc dull black-brown, becoming reddish brown when wet, flat, at times ± sparingly pruinose; true exciple brown, often paler than the disc, at times partly piebald, persistent, becoming ± strongly tuberculate-lobate. Ascospores (6–) 9–11 (–12) × 6.5–8 (–9) µm, broadly ellipsoidal, aseptate. Pycnidia *ca* 0.15 mm diam., black-brown around the ostiole. Thallus C–, K–, KC–, Pd–, UV+ bluish white (divaricatic acid confined to apothecia). **BLS 0514**.

On sheltered vertical siliceous rocks, forming extensive mosaics; local. N. Scotland (Highlands), Wales (Snowdonia), rare in England where it favours the Millstone Grit.

Distinguished by the large, sessile, often aggregated apothecia with flexuous margins, which take on a distinctive red-brown hue when moistened. A morph with discrete and non-pruinose apothecia has been named *F. taeniarum* (Malme) V. Wirth & Vězda (1972), but intergrades with typical *F. austera*.

Fuscidea cyathoides (Ach.) V. Wirth & Vězda (1972) **LC**



Thallus very variable, pale grey-fawn to dark grey (sometimes greenish in corticolous populations), usually with a ± strong brown tinge, rimose-cracked, rarely sorediate; areoles irregular, flat or in part uneven-convex, to 0.6 mm diam.; prothallus dark brown or black, often mosaic-forming. Apothecia to 1.5 mm diam., immersed and surrounded by a pale cuff-like annular exciple, or sessile, rounded to strongly flexuose, occasionally tuberculate; disc brown-black, flat or ± convex; true exciple concolorous with or often paler than the disc, persistent or ± disappearing. Epithecium brown; hymenium pale or faintly brownish; hypothecium colourless. Ascospores 9.5–13 (–14) × 5–5.5 (–6) µm, kidney bean-shaped, brownish when mature. Pycnidia often abundant, brown, immersed to emergent with a thin, ragged thalline rim; conidia 2.5–4.5 × *ca* 1 µm. Thallus K+ brownish yellow, Pd+ rust-red, UV– (fumarprotocetraric acid). **BLS 0515**.

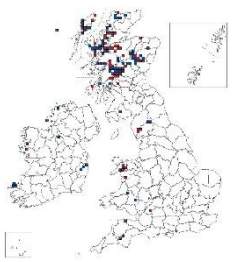
On coarse-grained nutrient-deficient siliceous rocks, stabilized shingle etc., frequently forming extensive mosaics, rarely on bark; often abundant. Throughout Britain, rare in the Midlands and E. Anglia, very rare in S.E. England where it occurs on flints.

A very variable species, especially in the colour and thickness of the thallus. It is characterized by the bean-shaped spores and the presence of fumarprotocetraric acid (Pd+ rust-red).

There is a single report of a lichenicolous *Phaeosporobolus* species (*Lichenostigma* anamorph).

Fuscidea cyathoides var. *sorediata* (H. Magn.) Poelt (1978) is distinguished from var. *cyathoides* by the presence of a few discrete, irregularly distributed convex ± rounded pale yellow-brown to greenish soralia, 0.4–2 mm diam. It occasionally occurs with var. *cyathoides*, and was not accepted as a separate taxon by Zahradníková *et al*. (2017). *F. cyathoides* var. *corticola* (Fr.) Kalb (1976) appears to be merely *F. cyathoides* on bark and was also not accepted by those authors, although it has a thicker thallus and restricted distribution; it may be found on *Betula* and *Alnus* in boggy sites in W. Scotland. *F. kochiana* and *F. mollis* have thicker thalli, are Pd– and contain divaricatic acid (UV+) in the medulla. The apothecia of *F. kochiana* are immersed.

Fuscidea gothoburgensis (H. Magn.) V. Wirth & Vězda (1972) **Nb**



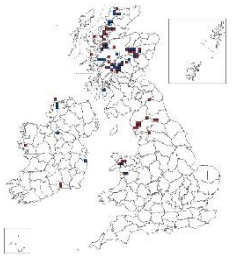
Thallus whitish, pale grey to grey-brown, areolate, sorediate; areoles 0.2–2.5 mm diam., discrete and scattered to locally contiguous, rounded to irregular, flat to slightly convex, ± cracked; soralia 0.2–0.4 mm diam., usually concolorous with the thallus, sometimes greenish white, rounded, erose or delimited by a thin elevated thallus margin, or effuse; prothallus black, well-developed, between areoles and bordering the thallus. Apothecia 0.3–1.7 mm diam., rare, sessile, at times flexuose; disc dull black-brown, flat to convex, at times with an umbo; true exciple black or concolorous with the thallus, thin, distinct, persistent. Ascospores 7.5–11 × 5–7 µm, broadly ellipsoidal, aseptate. Medulla and soralia UV+ bluish white (divaricatic acid). **BLS 0518**.

On vertical ± sheltered siliceous rocks, often beneath overhangs; very local in England, Wales & Ireland, frequent in the Scottish Highlands.

An unidentified *Stigmidium* sp. has been reported on this host from the Scottish Highlands and the English Lake District; a similar species occurs on *F. intercincta*.

Very variable; characterized by the dispersed or clustered sorediate areoles on a black prothallus and the UV+ blue medulla and soralia. A distinctive morph with large greyish, erose soralia and rounded, ± discrete clusters of areoles on a black prothallus has been named by some continental authors as forma *maculosa* (H. Magn.) Poelt (1981); it intergrades with typical *F. gothoburgensis*.

Fuscidea intercincta (Nyl.) Poelt (1978) **Nb**



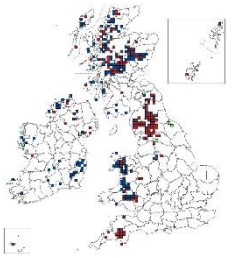
Thallus pale to dark grey-brown, continuous, rather thick, cracked; areoles to 0.6 mm diam., irregular, flat to convex, sometimes pruinose; prothallus black to brown-black, delimiting and ± in patches within the thallus. Apothecia often numerous, 0.3–0.5 (–0.6) mm diam., discrete or crowded, immersed or somewhat emergent, sessile, usually rounded, sometimes irregular; a pseudo-thalline margin concolorous with the thallus or darker is sometimes present; true exciple brown-black, thick, often white on the inner rim and forming a pale halo around the disk; disc black when dry, dark brown when wet, flat to slightly convex, matt, rarely gnarled. Ascospores 9.5–13 × 6.5–8 µm, colourless, broadly ellipsoidal. Medulla UV+ bluish white (divaricatic acid). **BLS 0519**.

On moist, often steeply inclined siliceous rocks in the uplands; rare. Scotland, with outlying populations in Cumbria and the N. Pennines, N. Wales & Ireland.

Distinguished by the small, often numerous apothecia with a pale thin halo-like margin and a thicker, dark true exciple and disc. The ascomata superficially resemble those of *Schismatomma graphidioides* and *Pseudoschismatomma rufescens*.

A morph named *F. atlantica* (H. Magn.) P. James & Poelt (1981) has irregularly rounded apothecia, a thin, indistinct thalline margin, and a thin thallus; it appears to be of no taxonomic significance. A specimen from N. Wales (Llanberis) has numerous crowded or scattered fleck-like yellowish white soralia 0.1–0.3 mm diam. but the apothecia resemble *F. intercincta* in all aspects; similar material has been recognized as *F. oculata* Oberholl. & V. Wirth according to Fryday & Coppins (2012).

Fuscidea kochiana (Hepp) V. Wirth & Vězda (1972) **LC**



Thallus pale to medium grey, sometimes tinged brown, thick, deeply cracked; areoles 0.5–2.5 mm diam., coarse, irregular, flat; prothallus usually well-developed, brown-black, broadly delimiting the thallus. Apothecia usually numerous, to 3 mm diam., ± immersed; disc brown-black, flat, usually irregular and ± angular; true exciple excluded, pale brown, narrow, with an epinecral layer. Asci commonly at varying levels in the apothecium. Ascospores 8–11 × 5–7 µm, broadly ellipsoidal, becoming red-brown. Medulla UV+ bluish white (divaricatic acid). **BLS 0520**.

On exposed, coarse-grained siliceous and sandstone rocks and boulders in the uplands; locally frequent. Throughout northern and western Britain and Ireland.

Differs from *Fuscidea cyathoides* in the more deeply immersed apothecia lacking a raised exciple, the thicker thallus, rounded and not bean-shaped ascospores, asci developing at varying levels in the hymenium and the UV+ blue-white medulla.

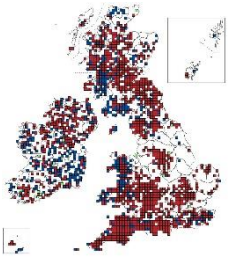
There is a single report on this host of the plurivorous *Marchandiomyces corallinus* (Roberge) Diederich & D. Hawksw. (1990).

Fuscidea lightfootii (Sm.) Coppins & P. James (1978) **LC**

Thallus bright olive to dull grey-green or suffused brownish, finely to coarsely verrucose-areolate, occasionally ± papillate, the strongly convex areoles to 0.32 mm diam.; usually sorediate; soralia pale or yellowish green, becoming confluent, often bursting from the apices of areoles, granular, sometimes farinose; soredia 15–30 (–40) µm; prothallus pale grey to dark brown. Apothecia 0.5–1 mm diam., frequent, dark grey-brown to black, shining; true exciple paler or concolorous, flexuose, irregular or sublobate, at times surrounded by thalline granules and appearing to have a thalline margin. Ascospores 8–11 × 3.5–4.5 µm, ± cylindrical with obtuse ends, constricted in the mid portion. Thallus UV+ bluish white (divaricatic acid). **BLS 0521**.

On ± horizontal boughs and twigs, particularly of *Fraxinus* and *Salix*, formerly commonest near boggy sites

and overhanging streams and rivers but now widespread in drier habitats, also on worked timber and siliceous stonework; locally abundant. Once restricted to N. & W. Britain and Ireland, now common and spreading rapidly in the lowlands.



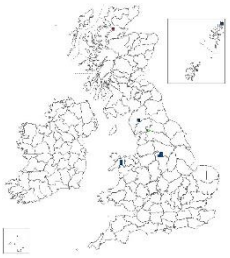
Variably sorediate; the thallus also varies from coarse papilla-like granules to ± continuously small cracked-areolate.

Fuscidea pusilla has sterile thalli forming small rosettes (mostly <10 mm diam.) with efflorescent, soon confluent soralia. It has recently been confirmed as a distinct species using molecular data (Zahradníková *et al.* 2018), but is not reliably distinguished from young sterile colonies of *F. lightfootii* by morphological characteristics.

Additionally, *F. lightfootii* resembles *F. arboricola* which, however, is Pd+ red (fumarprotocetraric acid) and has a different ascospore shape; the shape in *F. lightfootii* is diagnostic. The soredia of *Ropalospora viridis* are finer, granules 0.02–0.07 mm diam. and the areoles smaller, *ca* 0.2 mm diam.

Occasionally parasitized by the *Phaeosporobolus* anamorphs of *Lichenostigma* spp. referable to *L.* cf. *alpinum* and *L.* cf. *chlaroterae*. Also reported is the plurivorous *Marchandiomyces corallinus*.

Fuscidea lygaea (Ach.) V. Wirth & Vězda (1972) **LC**

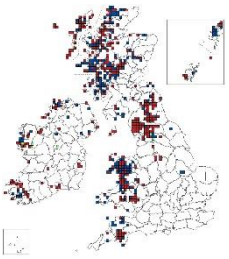


Thallus pale to dark grey-brown or dark brown, often with a purplish tinge, thin, continuous or ± incompletely rimose-cracked; areoles to 0.7 mm diam., often smaller, irregular, flat; prothallus dark brown to black, narrow, bordering the thallus. Apothecia 0.2–0.6 mm diam., emergent to adpressed, sessile, black, rounded; disc flat to markedly convex; true exciple at first thin, soon occluded, usually indistinct. Ascospores 5–9.5 × 5–6.5 µm, spherical to broadly ellipsoidal. Lichen products not detected by TLC. **BLS 0527**.

On hard siliceous rocks; often common in upland areas of Britain and Ireland.

There is considerable variation in the thickness of thalli and the cracking of the upper surface. The species is characterized by the thin, rather even, sometimes minutely areolate, often purple-tinted thallus with convex, immarginate apothecia. The rounded ascospores distinguish it from poorly-developed specimens of *F. cyathoides* with which it often grows.

Fuscidea mollis (Wahlenb.) V. Wirth & Vězda (1972) **Nb**

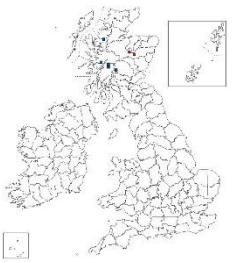


Thallus pale grey-brown to dark grey, deeply and regularly cracked, thick; areoles 0.3–1 mm wide, irregular, flat; prothallus dark brown-black, delimiting. Apothecia 0.3–1 mm diam., sessile, rounded to slightly flexuose, discrete; disc black, flat to slightly convex; true exciple black, elevated. Ascospores 8–9.5 × 5.5–6.5 µm, broadly ellipsoidal. Medulla UV+ bluish white (divaricatic acid). **BLS 0523**.

On damp serpentine rocks in the Shetland Islands, volcanic rocks in Snowdonia & Cumbria, also Millstone Grit in the S. Pennines; rare.

Resembling *Fuscidea cyathoides*, but distinguished by the presence of divaricatic acid (UV+) and the Pd– thallus reaction. Miądlikowska *et al.* (2014) found that *F. mollis* occupied a position outside of the main *Fuscidea* clade and suggested that a separate genus should be established, but more research is needed to justify this action.

Fuscidea oceanica Fryday & Coppins (2012) **NE**

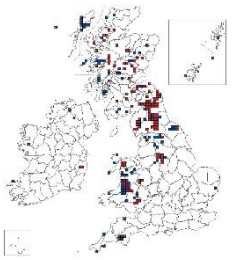


Thallus whitish, pale grey or rarely brown, areolate, sorediate; areoles 0.15–0.4 mm diam., contiguous, rounded to irregular, ± flat; soralia 0.1–0.2 mm diam., inconspicuous, punctiform, arising from the centre of areoles or rarely from cracks in the thallus and then stellate; soredia blue-grey; prothallus black, well-developed, between areoles and bordering the thallus. Apothecia 0.5–1.0 mm diam., frequent, initially ± immersed but soon becoming sessile, becoming flexuose; disc dull black-brown, flat to convex, at times with an umbo; true exciple colourless with dark brown outer cells, thin, distinct, persistent. Ascospores 7–9 × 5–6 µm, broadly ellipsoidal, colourless, aseptate. Medulla and soralia UV+ bluish white (divaricatic acid). **BLS 2568**.

On exposed acidic rocks, locally common and sometimes dominant in the N.W. Highlands, occasional in other parts of Scotland.

Fuscidea oceanica is the only sorediate member of the genus occurring in Britain that is also usually fertile, though the soredia are very small and inconspicuous, and easily overlooked in the field. This species may then be mistaken for other non-sorediate members of the genus (e.g. *F. lygaea*).

Fuscidea praeruptorum (Du Rietz & H. Magn.) V. Wirth & Vězda (1972) **LC**

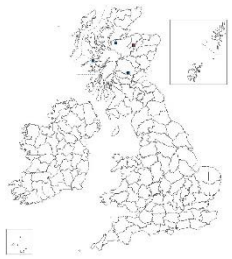


Thallus pale to dark brown, areolate; areoles to 0.4 mm diam., contiguous to discrete, often thin, uneven and delimited by a black prothallus, rounded, tuberculate; soralia 0.2–0.5 mm diam., at first pale greenish or ochre- or cream-coloured, punctiform and rounded, soon becoming brownish and ± confluent. Apothecia to 0.8 mm diam., very rare, sessile, black; disc slightly convex; true exciple narrow. Ascospores 9.5–12 × 3–4 µm, kidney bean-shaped. Soralia Pd+ yellow, KC+ red, C+ red, UV+ faintly yellowish (alectorialic acid). **BLS 0525**.

On ± vertical shaded siliceous rocks including gravestones, often under overhangs, in uplands; easily overlooked. Throughout Britain but rare in Ireland and south and central England..

The thallus is coarsely and unevenly verrucose, with rather small, irregular, C+ red soralia; in dried collections becoming pinkish in time due to the presence of alectorialic acid. *Ropalospora hibernica* is similar and C+ red but the soralia are pale yellow-ochre, somewhat erose and Pd–. Can be confused with *F. recensa*, with which it often co-occurs, but that species has C–, UV+ bluish white soralia.

Fuscidea pusilla Tønsberg (1992) **NE**

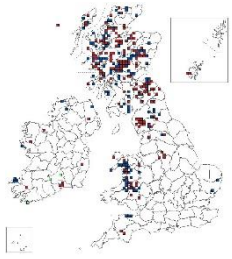


Closely similar to *F. lightfootii* but rarely fertile and with small rosette-like thalli (to *ca* 10 mm diam.) with efflorescent soralia that soon become confluent. **BLS 1867**.

On acid bark, typically of *Pinus* and *Betula*, especially on young trees with flaking bark. Sequenced collections from Britain and Ireland came from England (Devon) and Ireland (Kildare, Waterford). Records from Scotland need confirmation.

Although *F. pusilla* is not reliably distinguishable from young non-fruiting colonies of *F. lightfootii*, the two species are not closely related (Zahradníková 2017) and molecular data are needed for definite identification. Zahradníková *et al.* (2018) consider that the observed difference in thallus size between the two species may be related to the age of trees from which the material sequenced was obtained.

Fuscidea recensa (Stirt.) Hertel, V. Wirth & Vězda (1972) **LC**



Thallus pale grey or brownish grey, areolate; areoles 0.1–0.5 mm diam., usually contiguous, discrete, rounded and uneven-convex or tuberculate; soralia 0.2–0.7 mm diam., at first whitish, soon becoming brownish and confluent, uneven, sometimes convex; prothallus dark brown, thin, ± visible between the areoles and delimiting the thallus. Apothecia 0.4–0.8 mm diam., infrequent, sessile, black, rounded; disc flat to slightly convex; true exciple thin, conspicuous. Ascospores 9.5–12 × 3.5–4 µm, ellipsoidal, ± curved. Medulla and soralia UV+ bluish white (divaricatic and ± nordivaricatic acids). **BLS 0526**.

On hard, often ± vertical siliceous rocks and stonework, more rarely on trees; easily overlooked. Common in upland Britain, infrequently recorded from Ireland.

This usually sterile species is identified by the rather uneven crowded greyish soralia with all reactions negative and UV+ blue medulla and soralia (divaricatic acid). It can be mistaken for *Lecidella scabra* in the field; that species has a K+ yellow cortex and C+ orange soredia. See also *F. praeruptorum*.

OPHIOPARMACEAE R.W. Rogers & Hafellner (1988)

Thallus squamulose or crustose. **Soralia** absent, or developing from squamule margins, **isidia** absent. **Photobiont** chlorococcoid. **Ascomata** apothecia, sessile, red to black, sometimes pruinose, flat, with a ± flexuose margin. **Thalline margin** present or absent. **True exciple** raised, persistent or becoming excluded. **Hymenium** I+ blue. **Hamathecium** of paraphyses, septate, sparingly branched, weakly conglutinate. **Asci** 8-spored, clavate to cylindrical; apical dome K/I+ blue, with a well-developed tholus containing an amyloid flank, often poorly differentiated, *Biatora*-type. **Ascospores** colourless, aseptate, ellipsoidal-fusiform, or elongate, multiseptate and helically coiled within the ascus. **Conidiomata** pycnidia, sessile or immersed, globose-to ovoid, the wall black or colourless. **Conidia** bacilliform, colourless. **Chemistry**: orcinol depsides (particularly lecanoric acid), sometimes haemoventosin, and unidentified substances. **Ecology**: on acid wood or bark and siliceous rock.

As currently circumscribed, the Ophioparmaceae contains three genera that are highly divergent in gross morphological terms, *Hypocenomyce* (in a restricted sense compared with that in Purvis & James 2009), *Ophioparma* and the extralimital *Boreoplaca* (Timdal 1994, Bendiksby & Timdal 2013, Lücking *et al.* 2017). Characters in common between *Hypocenomyce* and *Ophioparma* are few, apart from the ascus structure and the association with chlorococcoid algae. However, their chemistry is similar in many respects and their phylogenetic affinity has been demonstrated in several studies (e.g. Bendiksby & Timdal 2013, Miadlikowska et al. 2014).

Literature:
Bendiksby & Timdal (2013), Lücking *et al*. (2017), Miadlikowska *et al*. (2014), Purvis & James (2009), Timdal (1984, 1994), Wolseley & James (2009).

1 Thallus squamulose, grey-green to olivaceous or dark brown; ascomata black, thalline margin absent ..... ***Hypocenomyce***
Thallus crustose, pale grey or yellowish; ascomata bright red, thalline margin usually well-developed..... ***Ophioparma***

HYPOCENOMYCE M. Choisy (1951)

Thallus squamulose, pale grey to dark brown. **Upper cortex** with a well-developed epinecral layer, above a layer of randomly arranged or anticlinally orientated hyphae. **Lower cortex** absent. **Soredia** developing from squamule margins. **Photobiont** chlorococcoid. **Medulla**, when present, of loosely interwoven, randomly orientated, ± thin-walled hyphae. **Ascomata** apothecia, sessile, black, often pruinose, flat, with a ± flexuose margin. **Thalline margin** absent. **True exciple** raised, persistent or becoming excluded, of radiating hyphae, colourless to dark brown in the inner part, the rim green or brown. **Epithecium** brown-green. **Hymenium** I+ blue. **Hypothecium** brown. **Hamathecium** of paraphyses, septate, sparingly branched, weakly conglutinate. **Asci** 8-spored, clavate to cylindrical; apical dome K/I+ blue, with a well-developed tholus containing an amyloid flank, often poorly differentiated, *Biatora*-type. **Ascospores** colourless, aseptate, ellipsoidal-fusiform. **Conidiomata** pycnidia, sessile, globose to ovoid, black. **Conidia** bacilliform, colourless. **Chemistry**: orcinol depsides (particularly lecanoric acid) and unidentified substances. **Ecology**: on acid wood or bark, rarely on rocks and walls.

In the account of *Hypocenomyce* in the second edition of *Lichens of Great Britain and Ireland* (Purvis & James 2009), which followed the work of Timdal (1984), four species were included. However, Bendiksby & Timdal (2013) showed that the genus in its traditional circumscription is highly polyphyletic, and of the British and Irish species only *H. scalaris* remains. *H. anthracophila*

was transferred to the genus *Carbonicola*, assigned to the monogeneric family Carbonicolaceae (Lecanorales), and *H. caradocensis* and *H. friesii* to *Xylopsora* (Umbilicariaceae). All are included in the key below.

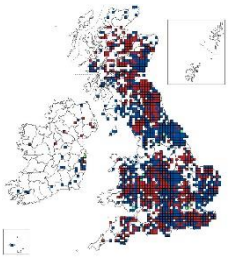
Of other superficially similar genera, *Pycnora* (transferred to the new family Pycnoraceae by Bendiksby & Timdal 2013) is distinguished by its crustose thallus, *Lecanora*-type ascus, and presence of alectorialic acid.

1 Squamules C– 2
Squamules C+ red ..... ***Hypocenomyce scalaris***

2 (1) Squamules appressed, bullate or irregularly ascending; thallus Pd– ; apothecia flat, black, marginate ..... (***Xylopsora***) 3
Squamules ascending, sorediate; thallus Pd+ red; apothecia strongly convex, brown, immarginate ..... ***Carbonicola anthracophila***

3 (2) Squamules bullate or irregularly ascending, dull; ascospores fusiform-ellipsoidal, aseptate or 1(-3)-septate ..... ***Xylopsora caradocensis***
Squamules normally appressed, ± shiny; ascospores ellipsoidal, aseptate ..... ***Xylopsora friesii***

Hypocenomyce scalaris (Ach. ex Lilj.) M. Choisy (1951) **LC**



Thallus squamulose; squamules to 1.2 (–2) mm diam., ascending, remaining discrete, often overlapping, the margin slightly upturned, entire or crenulate with lip-shaped, farinose soralia; upper surface greyish green, olive-brown or dark brown, dull; lower surface white-sorediate along the margin, yellowish brown or greenish. Apothecia to 1.5 (–2.5) mm diam., infrequent, attached marginally to the base of the squamules, flat and marginate, the margin often flexuose, black with bluish white pruina; epithecium greenish, N+ reddish. Ascospores 7–8 × 3–4 µm, narrowly ellipsoidal to fusiform, aseptate. Thallus C+ red, K–, KC+ red, Pd–; medulla and soralia UV+ white (lecanoric acid and unidentified substances). **BLS 0578**.

On acid bark and wood, also occasionally on siliceous rocks, including gravestones and brick; common. Throughout Britain, scattered in Ireland.

Characterized by the ascending, usually overlapping, marginally sorediate, C+ red squamules, which vary from greyish green to dark brown and which may have an entire or crenulate margin. Fertile specimens are usually only sparingly sorediate.

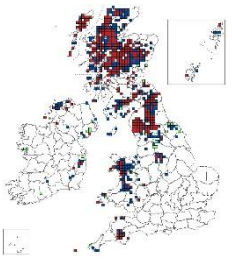
Often infested by the blackening lichenicolous fungus *Clypeococcum hypocenomycis* D. Hawksw. (1980). *Chaenothecopsis parasitaster* (Bagl. & Carestia) D. Hawksw. (1978), usually found on *Cladonia* spp., has been found on *H. scalaris* in the Rothiemurchus native pinewood. Also reported are the plurivorous *Lichenoconium erodens* M.S. Christ. & D. Hawksw. (1977) and *Marchandiomyces corallinus*. In addition is a '*Phoma*' sp. with colourless conidia 6–7 × 2.3–2.5 µm in size; the possibility that this could be the anamorph of *Clypeococcum hypocenomycis* needs to be explored.

OPHIOPARMA Norman (1852)

Thallus crustose, corticate. **Photobiont** trebouxioid. **Ascomata** apothecia, to 2 mm diam., round or somewhat irregular, sessile, the disc bright red. **Thalline margin** present or absent. **True exciple** thick, concolorous with the disc. **Hamathecium** of paraphyses, slightly thickened at the tip, rarely branched or anastomosed. **Asci** 8-spored, clavate, with a shallow, uniformly K/I + blue apical dome,

lacking a distinct ocular chamber or apical cushion. **Ascospores** ± helically arranged in the ascus, narrowly fusiform, transversely multiseptate, colourless. **Conidiomata** pycnidia, immersed, visible as black dots; wall colourless except for a dark green (K–, N+ red) zone around the ostiole. **Conidiogenous cells** arranged in chains, sometimes branched, subcylindrical, proliferating percurrently. **Conidia** rod-shaped, aseptate, colourless. **Chemistry**: haemoventosin, orcinol depsides, aliphatic acids, and occasionally depsidones and terpenes. **Ecology**: on well-lit bark or wood and siliceous rock.

Ophioparma ventosa (L.) Norman (1853) **LC**



Thallus in large conspicuous patches, thick, verrucose-warted, areolate, sometimes ± shallowly papillate, pale to mid grey or ± intensely suffused sulphur yellow; prothallus distinct, pale, sometimes fimbriate. Apothecia 0.4–2.5 mm diam., frequent, rounded or irregular, occasionally becoming sublobulate; thalline margin ± well-developed, extending under the apothecium, rugose; true exciple level with or slightly raised above the disc, ± concolorous with the disc or paler; disc flat or slightly convex, matt, blood-red; hymenium 60–70 µm tall, merging by vertically aligned hyphae into a massive hypothecium; epithecium, hymenium, hypothecium and true exciple ± mottled-granular orange-red; epithecium K+ indigo-blue turning to patchily violet-blue; hymenium, hypothecium and true exciple K+ blue becoming intense magenta-pink to fiery orange-red; paraphyses aseptate, rarely branched, *ca* 1 µm diam.; apices not or little swollen. Asci 50–60 × 18–20 µm. Ascospores (30–) 40–50 (–55) × 4.5–5 µm, cylindric-fusiform, indistinctly 3- to 7-septate, curved, the ends acute. Pycnidia black, frequent; conidia 7–10 × *ca* 1 µm. Medulla C–, K+ yellow-orange, KC+ yellow-orange, Pd+ yellow-orange, UV± glaucous white (divaricatic, thamnolic and ± usnic acids); the apothecia and parts of the medulla contain haemoventosin, an orange-red, K+ blue pigment. **BLS 0556**.

On well-lit nutrient-poor, especially coarse-grained, hard siliceous rocks and scree in exposed situations, montane. S.W. England (Devon, Dartmoor), N. England, Wales, Scotland (Highlands), apparently rare in Ireland except the north and east.

A very distinctive species with a coarse thallus and orange-red-brown, flat apothecia. The considerable variation in the intensity of the UV+ glaucous test of the medulla reflects the amount of divaricatic acid present. The races with and without usnic acid may often occur side by side, as do those of *Haematomma ochroleucum* which also has bright red apothecial discs, but the thallus in that species is leprose to farinose.

Reported lichenicolous fungi are *Muellerella ventosicola* (Mudd) D. Hawksw. (2003), *Polycoccum ventosicola* Zhurb. (2007), *Taeniolella pertusariicola* D. Hawksw. & H. Mayrhofer (1990) and the plurivorous *Marchandiomyces corallinus*.

Ophioparma lapponica (Räsänen) Hafellner & R.W. Rogers (1988) [syn. *Haematomma lapponica* Räsänen (1931)] is similar but has smaller (12–21 × 3–5 µm) ascospores, the cortex K– and medulla Pd–, K– (without thamnolic acid). Recorded last century from N. Scotland (Argyll, Ben Cruachan), but that specimen possibly originated from outside of Britain. The species is arctic-alpine and circumpolar in the N. Hemisphere.

ROPALOSPORACEAE Hafellner (1984)

The Ropalosporaceae contains a single genus, so the description below is also that of the family. It was included in the Umbilicariales by Miądlikowska *et al.* (2014) and Lücking *et al.* (2017), as the most basal lineage within the clade, although a preliminary phylogeny by Zahradníková (2017) suggested that it should be included within the Fuscideaceae.

Literature:

Ekman (1993), Fryday & Coppins (2012), Lendemer (2011), Lücking *et al.* (2017), Miądlikowska *et al.* (2014), Purvis *et al.* (2009), Tønsberg (1992), Zahradníková (2017).

ROPALOSPORA A. Massal. (1860)

Thallus crustose, pale grey-green to dark brown; prothallus dark brown, sorediate in many species. **Photobiont** green. **Apothecia** lecideine, brown-black to black. **Exciple** composed largely of narrow hyphae, which are evenly thickened and have at least some lumina three to several times as long as wide. **Ascus** containing 8–30 or more ascospores; clavate, ± swollen at the apex, with a tholus comprising an inner amyloid zone, an outer amyloid zone and a less amyloid zone between; surrounded by a slightly amyloid gelatinous matrix. **Ascospores** acicular, multiseptate. **Conidia** bacilliform. **Chemistry:** perlatolic acid, gyrophoric acid, atranorin, usnic acid, parietin, fatty acids. **Ecology**: on siliceous rock or on bark.

Similar in ascus features to *Fuscidea*, which differs in the aseptate (rarely 1-septate) ascospores, unevenly thickened excipular hyphae with cylindrical or ellipsoidal lumina and asci that tend to taper above.

1 Thallus on bark, grey-green; soralia C–, UV+ white (perlatolic acid) ..... ***viridis***
Thallus on siliceous rock 2

2(1) Thallus C+ red, UV+ white (gyrophoric acid, fatty acids); sorediate ..... ***hibernica***
Thallus C–, UV– (unidentified substances); sorediate or not ..... ***lugubris***

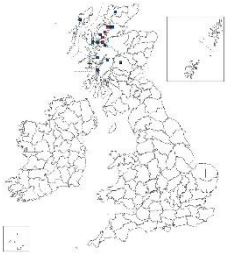
Ropalospora hibernica (P. James & Poelt) Tønsberg (1993) **Nb**

Thallus pale grey-green to dark chocolate-brown, areolate, sorediate; areoles to 1 mm diam., discrete and thinly dispersed or contiguous, often becoming confluent, irregularly rounded, flat to weakly convex; soralia 0.2–0.3 mm diam., pale ochre yellow to pale yellow-green, discrete or confluent, mostly irregularly rounded, weakly concave to flat; soredia farinose; prothallus dark brown, K+ fuscous brown, N–, discontinuous, irregular, forming somewhat glossy bands between or at the edge of the thallus. Apothecia (unknown in Britain and Ireland) brownish black. Ascospores acicular, *ca* 40 × 2.5–3 µm. Cortex and soralia C+ red, KC+ red, Pd−, UV+ bluish white (gyrophoric acid, fatty acids). **BLS 1755**.

On vertical siliceous rock, often in crevices and gullies. W. Wales, W. Scotland, S.W. Ireland.

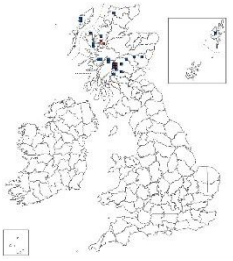
Distinguished by the pale yellow-ochre, somewhat erose soralia and the C+ red reaction. *Fuscidea praeruptorum* is also C+ red, but differs in the Pd+ vivid yellow reaction.

Ropalospora lugubris (Sommerf.) Poelt (1980) **Nb**



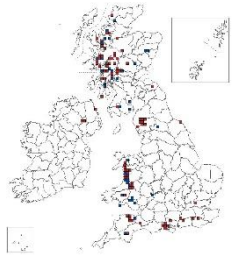
Thallus thick, dull grey-brown to blackish-brown, often purple-tinged, cracked-areolate; areoles flat to convex, sometimes rugose. Apothecia usually present, 0.5–1.5 mm diam., sessile, black, discrete or often crowded; disc matt, flat to convex; exciple thick, concolorous with the disc, in section dark brown at the margin, brownish with dark brown spots within; hypothecium pale straw to red-brown. Ascospores narrowly clavate, attenuated at the lower end with a long "tail", sometimes slightly curved, 6- to 7-septate, 17–48 × 4–7 µm. Conidiomata pycnidia, frequent, dark brown to black, 200–300 µm diam., immersed in the thallus; conidia bacilliform, 6–8 × *ca* 0.8 mm. Thallus C–, K–, Pd–, UV– (two or more unidentified substances, sometimes including terpenoids; ± atranorin and ± parietin also reported from outside Britain). **BLS 0522**.

On exposed vertical siliceous rock outcrops; rare. N. Wales, N. England, C. & N.W. Scotland (Argyll, E. Ross, Mid Perth).



A sorediate morph (with apothecia very rarely formed) has been recognized as **Ropalospora lugubris** forma **sorediata** Fryday & Coppins (2012) [**BLS 0293**]; map right. The soralia are discrete or sometimes confluent in clusters to 3 mm diam. The soredia are initially dark and granular or coralloid, 100–500 µm diam., later breaking open or abrading to reveal smaller cream-coloured soredia 60–80 µm diam. This morph appears to be more common and widespread than the non-sorediate form.

Ropalospora viridis (Tønsberg) Tønsberg (1992) **Nb**



Thallus greyish green, areoles discrete or contiguous, convex, to 0.2 mm diam., prothallus whitish or brown, indistinct or distinct; soralia arising from the apices of the areoles, green to yellow-green, irregularly rounded, often becoming confluent and then forming a more or less extensive cracked crust; soredia fine, granules 20–70 µm diam. Apothecia very rare; black, 0.2–0.4 mm diam., margin persistent, disc flat; exciple brown in the outer part, pale brown within, K± fuscous brown; epithecium brown, with similar pigment to the exciple; paraphyses weakly conglutinated, becoming free in microscope sections and in K. Asci containing 12–16 ascospores. Ascospores 5- to 6-septate, clavate, attenuated at the base, 22–31 (–44) × (1.7–) 2–2.5 (–3.7) µm. Thallus C–, K–, Pd–, UV+ white (perlatolic acid as major substance, with hyperlatolic, isohyperlatolic and superlatolic acids). The thallus usually fluoresces more strongly than the soralia. **BLS 1624**.

On acid bark in woodland, recorded from numerous woody plants including *Abies*, *Betula*, *Corylus*, *Quercus*, *Rhododendron* and *Sorbus*; frequent. S. and S.W. England, Wales, N. England, Scotland; rarely recorded from Ireland.

Fuscidea pusilla is also UV+ white but with the soredia fluorescing strongly. It usually has a smaller thallus and contains divaricatic acid (TLC). Sorediate morphs of *Fuscidea lightfootii* have coarser and more strongly convex areoles (up to 0.32 mm diam.) and the thallus contains divaricatic acid. *F. arboricola* has soralia which are never confluent and which are Pd+ red (fumarprotocetraric acid).

UMBILICARIACEAE Chevall. (1826)

Thallus large, foliose, usually lobed with a central point of attachment and sometimes with rhizoids, or squamulose and ± adnate. **Photobiont** chlorococcoid. **Ascomata** apothecia, sessile or slightly stipitate, marginate, usually gyrose or with a central umbo, black. **Thalline margin** absent, **true exciple** usually persistent. **Hamathecium** of sparingly branched paraphyses, sometimes swollen at the apices. **Asci** cylindric-clavate, with an apical amyloid cap and a small amyloid tholus containing a non-amyloid central plug (*Umbilicaria* type), 1- to 8-spored. **Ascospores** colourless and aseptate, becoming brown and muriform in some species. **Conidiomata** pycnidia, immersed in the thallus, sometimes multilocular. **Conidia** bacilliform to cylindrical, sometimes curved. **Thalloconidia** formed from the lower surface of the thallus in some species. **Ecology**: on siliceous rocks in montane regions, or on bark and lignum.

In Britain and Ireland, the *Umbilicariaceae* comprises three components, the familiar large foliose genera *Lasallia* and *Umbilicaria*, and *Xylopsora* (included within *Hypocenomyce* by Purvis & James (2009). This last genus has squamulose thalli and is widely divergent in morphological terms, but is clearly related to the others based on phylogeny. All have black lecideine ± gyrose apothecia (Bendiksby & Timdal 2013, Miądlikowska *et al.* 2014, Lücking *et al.* 2017).

References:

Bendiksby & Timdal (2013), Bendiksby *et al.* (2018), Davydov & Massson (2022), Davydov *et al*. (2017, 2020), Elix (2006), Hestmark (1990, 2004), Krzewicka (2004), Llano (1950), Lücking *et al*. (2017), Miądlikowska *et al*. (2014), Timdal (1984).

1 Thallus large, foliose, attached to the substrate at a single point 2
Thallus squamulose, not marginate, broadly attached ..... ***Xylopsora***

2(1) Thallus surface with distinctive coarse oval pustules; isidia black, coralloid; very rarely fertile.....***Lasallia***
Thallus surface without coarse pustules, surface smooth, wrinkled or ridged, sometimes cracked; soredia, phyllidia or thalloconidia sometimes present, or often fertile..... ***Umbilicaria***

LASALLIA Mérat (1821)

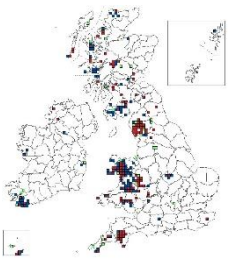
Thallus foliose, single-lobed, plate-like, dorsiventral, attached by a stout, ± central stalk. **Upper surface** densely pustulate, the pustules raised, convex, rounded or oval in outline. **Lower surface** with broad excavate depressions corresponding to pustules on the upper surface; without rhizines. **Isidia** present. **Upper cortex** composed of isodiametric cells, with an epinecral layer. **Lower cortex** composed of thick-walled conglutinate cells. **Photobiont** chlorococcoid. **Ascomata** apothecia, sessile or ± stalked. **Thalline margin** absent. **True exciple** present, persistent. **Disc** black, flat, smooth to roughened. **Asci** 1(-2)-spored, *Umbilicaria*-type. **Ascospores** muriform, pale to dark brown. **Conidiomata** pycnidia, immersed, with a pale brown wall. **Conidia** bacilliform. **Chemistry**: gyrophoric acid, papulosin, anthraquinones. **Ecology**: on siliceous rock, boulders, cliffs and walls in sun and shade.

Umbilicaria differs in having a non-pustulate thallus, 8-spored asci, and smaller, aseptate or sparingly muriform ascospores. Sterile specimens of *Lasallia* or *Umbilicaria* with a lower surface of rhizines or black thalloconidia, an upper surface or margin with isidia, erose sorediate areas or cilia, and detectable lichen products in the medulla using spot tests or TLC, distinguish these species from *Dermatocarpon* (Verrucariaceae). Only one species is present in Britain and Ireland.

Lasallia clusters within *Umbilicaria* s.l. according to molecular studies by Davydov & Masson (2022); see discussion under *Umbilicaria* below.

References:
Davydov & Masson (2022). Davydov *et al.* (2010), Hitch & Purvis (2009a), Llano (1950).

Lasallia pustulata (L.) Mérat (1821) **LC**



Thallus 3–6 cm diam. (sometimes in aggregations to 25 cm diam.), dull black-brown, often densely white and ± scabrid-pruinose when dry, green-brown when wet. Upper surface strongly bullate with conspicuous crowded convex oval pustules, especially towards the centre of the thallus, flattening towards the margins which become ± eroded, lacerated and rarely perforated. Isidia coralloid (occasionally absent), forming in black tufts around holes, tears and cracks in the thallus. Lower surface grey, brown or black, roughened. Apothecia very rare, 1–3 mm diam.; disc black, smooth; margin (true exciple) smooth or partially isidiate; epithecium black-brown, undulating; hymenium *ca* 100 µm deep; hypothecium to 160 µm thick, dark brown. Paraphyses unbranched or branched, with enlarged apical cells. Asci 90–100 × *ca* 45 µm, usually containing a single ascospore. Ascospores (28–) 45–70 × (18–) 23–34 µm, becoming muriform and brown. Pycnidia 150–180 µm diam., immersed, with a brown wall of isodiametric cells; conidia 2.5–3 × *ca* 1 µm. Thalloconidia absent. Medulla C+ red, K–, KC+ red, Pd–, UV– (gyrophoric acid). **BLS 0591**.

On nutrient- and often mineral-rich siliceous rocks, standing stones, birds' perching rocks and boulders, sometimes forming spectacular swards with large numbers of thalli in nutrient-enriched seepage tracks on steep rock faces and dry stone walls; widespread but rather local. W. & N. Britain (Dartmoor, Lake District, Welsh Marches, N. Wales, Scotland), extending to E. England (very rare); in Ireland mainly in the S.W., but also Antrim, Galway and Wicklow.

A very distinctive species characterized by the conspicuously coarsely pustulate upper surface with ± numerous coralloid clusters of black isidia. Locally called rock tripe.

UMBILICARIA Hoffm. (1789)

Thallus foliose, sometimes multi-lobed, dorsiventral, attached at a single point by a central or excentric stalk, soft, pliable and somewhat leathery when wet, often brittle when dry. **Upper surface** pale grey-brown to black, smooth to rimose-warted, sometimes folded or reticulate-ridged with a raised central area, margins sinuous, entire or incised, rhizinate or not. **Lower surface** smooth or rimose-warted, sometimes pitted, rarely lamellar, black or pale brown-pink; rhizinomorphs present or absent, not attaching the thallus to the substratum. **Isidia** and **soredia** occasionally present. **Upper cortex** overlain by a broad amorphous evanescent epinecral layer in some species. **Photobiont** chlorococcoid, forming a continuous layer or discontinuous in colonies. **Medulla** loose or compact, not always clearly differentiated from the lower cortex. **Ascomata** apothecia, ± irregular, immersed, sessile or stalked; disc black, flat or convex, mostly gyrose, ring-like or radiating, occasionally smooth, with or without a central protruding umbo of sterile tissue. **Thalline margin** persistent, thick, black or with a dark brown margin; absent in some cases. **Hymenium** 60–90 µm thick. **Hamathecium** of ± branched septate paraphyses, hyaline or brown, with a ± swollen and pigmented terminal cell. **Hypothecium** thick, brown or blackish. **Asci** 8-spored, elongate-clavate, thick-walled, apical dome K/I+ blue, *Umbilicaria*-type. **Ascospores** ellipsoidal, aseptate and colourless, or muriform and then becoming brown. **Conidiomata** pycnidia, uni- or multi-loculate. **Conidiophores** sometimes branched, conidiogenous loci terminal or lateral and immediately below septa. **Conidia** shortly cylindrical or slightly bent. **Thalloconidia** present in non-isidiate, non-sorediate, rarely fruiting species, originating from the lower cortex or on rhizinomorphs, single-celled or of several cells. **Chemistry**: orcinol, β-orcinol depsides or tridepsides, β-orcinol depsidones and fatty acids. **Ecology**: on hard, exposed, siliceous rocks, water-seepage cracks, near water, or on nutrient-enriched montane boulders.

Lasallia differs in the strongly pustulate thallus and clusters of black isidia, as well as having 1- or 2-spored asci with large muriform ascospores. *Dermatocarpon* species have superficially similar thalli but differ in having perithecia rather than apothecia. In *Umbilicaria* it is important to collect young as well as older thalli, as the latter may have lost certain diagnostic features due to their ageing and abrasion.

Miądlikowska *et al.* (2014) found that *Umbilicaria* sequences formed two clades, one of which also included *Lasallia*, and that arrangement was supported by molecular research from Davydov & Masson (1922). Adopting a classification dictated by the phylogeny would mean either that *Lasallia* is merged with *Umbilicaria*, or that several species currently accepted within *Umbilicaria* would need to be transferred to *Lasallia*. British and Irish species in this position include *U. deusta*, *U. hyperborea* and *U. proboscidea*. As their tree is not entirely congruent with that of Bendiksby *et al.* (2018), the traditional arrangement is retained for the present.

References:

Bendiksby *et al.* (2018), Davey (2015), Davydov & Masson (2022), Davydov *et al.* (2017, 2020), Hestmark (1990, 2004), Hitch & Purvis (2009b), Krzewicka (2004), Llano (1950), Miądlikowska *et al.* (2014), Woods & Coppins (2012).

1 Upper surface with scattered or crowded, rounded to flattened isidia ..... ***deusta***
Upper surface without isidia 2

2(1) Soredia (sometimes sparse) or coarse granules present on thallus margins 3
Soredia and coarse granules absent 4

3(2) Rhizinomorphs abundant, pale to dark brown; lower surface ± scabrid, pale brown to black ..... ***hirsuta***
Rhizinomorphs sparse, dark or absent; lower surface markedly rimose-warted, dark brown to black ..... ***grisea***

4(2) Lower surface without rhizinomorphs 5
Lower surface with abundant rhizinomorphs, scattered or forming a dense black felt 10

5(4) Upper surface wrinkled or coarsely rimose-warted 6
Upper surface ± smooth or minutely rimose, sometimes with a prominent, ± ridged central area 7

6(5) Lower surface black; thalloconidia present, single-celled ..... ***nylanderiana***
Lower surface brown-black; thalloconidia absent ..... ***hyperborea***

7(5) Upper surface red-brown, smooth, without a central raised ridged area, multi-lobed ..... ***polyphylla***
Upper surface grey-brown to black, sometimes roughened with a raised, sharply ridged central area ... 8

8(7) With abundant dark marginal cilia ..... ***cylindrica***
Marginal cilia absent 9

9(8) Thallus perforate or lacerate towards the margins; lower surface with scattered irregular lamellae ..... ***torrefacta***
Thallus not perforate or lacerate towards margins; lamellae absent on lower surface ..... ***proboscidea***

10(4) Upper surface red-brown, shining; lower surface densely felted with short, jet-black rhizinomorphs ..... ***polyrrhiza***
Upper surface grey to grey-brown; lower surface not densely black-felted 11

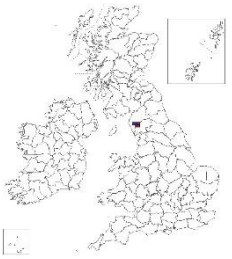
11(10) Apothecia mostly abundant, smooth with a protruding central sterile umbo; thallus single-lobed 12
Apothecia absent or gyrose; thallus single- or multi-lobed 13

12(11) Lower surface mostly dark brown to blackish, coarsely rimose-warted ..... ***spodochroa***
Lower surface pale grey, often pinkish, smooth or slightly rimose-warted ..... ***crustulosa***

13(11) Thallus perforate or lacerate towards the margins; lower surface with scattered irregular lamellae ..... ***torrefacta***
Thallus not perforate or lacerate towards margins; lamellae absent on lower surface 14

14(13) Marginal cilia present; central areas of thallus not ridged and pruinose ..... ***cylindrica***
Marginal cilia absent; central areas of thallus ± ridged and pruinose ..... ***proboscidea***

Umbilicaria crustulosa (Ach.) Frey (1931) **VU (D2)**



Thallus 3–5 (–8) cm diam., single-lobed; upper surface pale to dark grey, sometimes with a brown or pink tinge, mostly smooth, at times minutely rimose, ± pruinose and partly folded towards the centre; lower surface usually pale grey-white, tinged pink, smooth, with densely packed mostly brown-black rhizinomorphs. Apothecia to 5 mm diam., frequent, smooth with a central protruding umbo of sterile tissue; proliferating with new hymenia overgrowing the old. Ascospores initially colourless and aseptate, becoming brown and muriform, 18–24 × 11–21 µm. Pycnidia prominent as black dots on the upper surface of the thallus. Thalloconidia absent. Thallus C+ red, K–, KC+ red, Pd– (gyrophoric acid). **BLS 1445**.

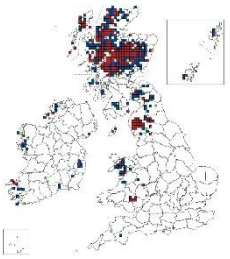
On ± vertical siliceous rocks; frequent when present but with a very restricted distribution. N.W. England (Lake District, distribution centred on Langdale).

Characterized by the grey, ± smooth thalli which often have ± smooth apothecia with a central protruding umbo of sterile tissue. *U. spodochroa* has a rough, dark brown-black lower surface and the upper surface is usually almost white to pale brown.

Umbilicaria cylindrica (L.) Delise ex Duby (1830) **LC**

Thallus 2–5 (–10) cm diam., single- or multi-lobed, lobes rounded, ± wavy and contorted with long (to 5 mm) branched black marginal cilia; upper surface pale to dark grey, sometimes tinged brown, smooth or wrinkled, the

centre often slightly ridged, folded and ± white-pruinose; lower surface rather smooth, grey-white, often tinged pink-brown towards the centre with sparse or densely packed rhizinomorphs, especially towards the margins. Apothecia frequent, 2–4 mm diam., with a black gyrose disc. Ascospores colourless, aseptate, 9–15 × 3–9 µm. Thalloconidia absent. Medulla C–, K± yellow→red, KC–, Pd± orange (± norstictic acid). **BLS 1446**.

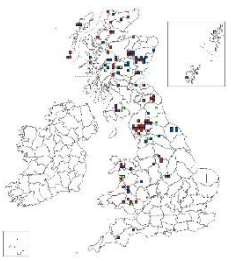


On siliceous rocks in exposed well-lit sites, predominantly montane; locally abundant. N. England (Lake District, Cheviots), C. to N. Wales, throughout Highland Scotland, scattered in Ireland (particularly Connemara).

Very variable, with sparse to abundant marginal cilia or rhizinomorphs. Morphs with coarsely toothed or lacerate margins occur.

Umbilicaria deusta (L.) Baumg. (1790) **Nb**

Thallus 2–4 (–8) cm diam., single- to multi-lobed, margins often downwardly recurved, rounded and entire or variously lacerate; upper surface brown-black with abundant, irregularly scattered or clustered cylindrical branched or flattened isidia; lower surface brown-black, with deep depressions; rhizinomorphs absent. Apothecia rare in British material, sessile or slightly depressed, 0.5–1.5 mm diam., disc gyrose. Ascospores colourless, aseptate, 8–15 × 4–8 µm. Thalloconidia absent. Medulla C+ red, K–, KC+ red, Pd– (gyrophoric acid). **BLS 1447**.

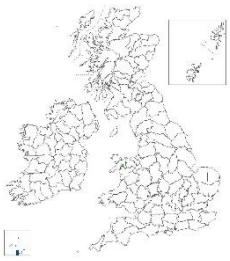


On siliceous rocks, often near water, mostly in upland regions; widespread but local. England (N. England, Peak District, Leicestershire), Wales, Scotland. In Ireland, only recorded from Cuilcagh Mountain, Fermanagh.

Characterized by the downwardly recurved thallus margin, ± flattened isidia on the upper surface and (usually) absence of apothecia.

Umbilicaria grisea Hoffm. (1796) **NE**

Thallus 1–5 (–8) cm diam., single-lobed, flat or undulating, lobe margins rounded or lacerate, upper surface pale grey, often tinged brown, white towards the centre, distinctly rimose, pruinose or scabrid, becoming sorediate at the margins; lower surface dark brown-black, markedly rimose-warted; rhizinomorphs very sparse or absent. Apothecia rare in British material, discs 0.5–1.5 mm diam., gyrose. Ascospores aseptate, colourless, (12–) 14–16 (–18) × 7.5–8.5 (–10) µm. Thalloconidia absent. Medulla C+ red. K–, KC+ red, Pd– (gyrophoric acid). **BLS 1448**.

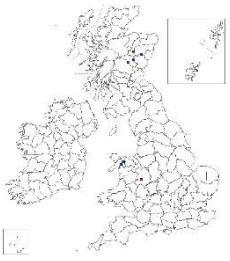


In water-seepage tracks on siliceous coastal rocks; very rare and declining at its only two known sites (Davey 2015). Its conservation status was not evaluated by Woods & Coppins (2012) but it would probably be assessed as Critically Endangered. Channel Islands (Jersey).

Similar to *U. hirsuta* but usually thicker and more rigid and the lower surface is markedly rimose-warted, dark brown-black and the rhizinomorphs sparse or absent. It could easily be overlooked for *Dermatocarpon miniatum*.

Umbilicaria hirsuta (Sw. ex Westr.) Hoffm. (1794) **NT**

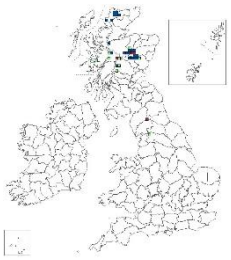
Thallus 2–5 cm diam., single-lobed or in small clusters, lobe margins often downwardly recurved, rounded or lacerate; upper surface grey or brownish grey, scabrid, finely rimose, becoming sorediate (sometimes sparsely so) or lobulate at the margins; lower surface pale brown to black, usually darker towards the centre, smooth or slightly rimose-warted with numerous brown-black rhizinomorphs. Apothecia rare in British material, 0.5–2 mm diam., slightly sunken or raised above the thallus surface, flat to weakly or strongly gyrose, sometimes surrounded by soralia. Ascospores colourless, aseptate, 10–13 × 3–7 (–8) µm. Thalloconidia absent. Medulla C+ red, K–, KC+ red, Pd– (gyrophoric acid). **BLS 1449**.



On siliceous rock-faces and slate roofs, sometimes in crevices and water-seepage channels; very local but sometimes in large quantities when present. Scottish Highlands and N. Wales (Snowdonia) and England (Shropshire, Devon).

Similar to *U. grisea*, but the lower surface is typically covered with numerous rhizinomorphs, it is less strongly rimose below, and is thinner and less rigid.

Umbilicaria hyperborea (Ach.) Hoffm. (1796) **Nb**

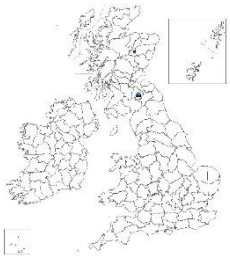


Thallus 2–4 (–6) cm diam., single-lobed, rather thin, margins rounded or lacerate; upper surface grey- to dark brown, sometimes paler towards the centre, coarsely wrinkled and folded or warted-granular, except towards the margins which are often smooth or rimose; lower surface uniformly brown-black, smooth or occasionally dimpled; rhizinomorphs mostly absent or very sparse. Apothecia 1–2 mm diam., sessile, frequent, gyrose; exciple with a black outer zone, disc black; paraphyses slightly swollen. Ascospores aseptate, colourless, 7–20 × 3–8 µm. Thalloconidia absent. Medulla C+ red, K–, KC+ red, Pd– (gyrophoric acid). **BLS 1450**.

On siliceous boulders on mountains, usually above 850 m; local. N. Scotland (Highlands), with a single site in Cumbria.

Characterized by the coarsely wrinkled lobes, the dark brown upper surface and uniformly brown-black lower surface. *U. arctica* (Ach.) Nyl. (1859) is similar but the thallus is thick (to 1.1 mm), rigid and the lower surface is grey-brown or pink and distinctly darker around the holdfast. Although recorded last century from granitic rocks in Scotland (Grampian mountains) and S.W. Ireland, the material probably originated from outside of Britain. For differences see also *U. nylanderiana*.

Umbilicaria nylanderiana (Zahlbr.) H. Magn. (1937) **Nb**

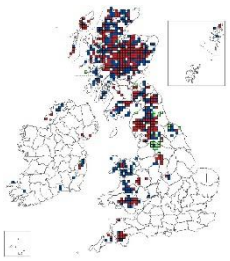


Thallus 2–5 cm diam., single-lobed, with a central umbo and lacerate margins; lower surface very dark to black all over, rhizinomorphs absent. Apothecia not observed in British material, 1–2 mm diam., disc gyrose. Ascospores colourless, aseptate, 7–14 × 5–7 µm. Thalloconidia (4–) 6–9 (–11) × (4–) 5–6 (–11) µm, single-celled, developing over the whole lower surface. Medulla C+ red, K–, KC+ red, Pd– (gyrophoric acid). **BLS 1578**.

On cliff faces and stone walls; very rare. S.E. Scotland (Selkirk) and Aberdeenshire (Braemar).

Like *U. hyperborea*, but differs in the very dark lower surface, the smaller ascospores and the single-celled thalloconidia. *U. polyphylla* can look similar when not multilobed, but that species has multi-celled thalloconidia, 9–28 µm in diam.

Umbilicaria polyphylla (L.) Baumg. (1790) **LC**

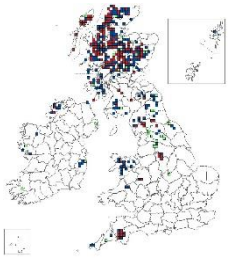


Thallus 2–4 (–10) cm diam., multi-lobed, rather thin, convex, undulating; lobe margins ascending, wavy, irregularly lacerate; upper surface dark brown to almost black, smooth, ± shining; lower surface black, smooth, without rhizinomorphs. Apothecia very rare, disc black, 0.5–1.5 mm diam., gyrose; exciple thick, with a black outer zone; paraphyses richly branched. Ascospores colourless, aseptate, 12–19 × 4–8 µm. Thalloconidia present, multiseptate with 6–10 cells, ± spherical to broadly ellipsoidal, 9–28 × 9–24 µm., frequently over most of the lower surface or sometimes patchy, also may be present on the exciple. Medulla C+ red, K–, KC+ red, Pd– (gyrophoric acid). **BLS 1451**.

On ± nutrient-enriched siliceous boulders, outcrops and stonework in exposed, well-lit sites in montane situations; locally abundant. Upland Britain, extending locally to C. England (Leicestershire); scattered in Ireland.

The most SO_2-tolerant species of the genus. Unlobed specimens can resemble *U. nylanderiana*, but that species has single-celled thalloconidia, 4–11 µm diam.

Umbilicaria polyrrhiza (L.) Fr. (1825) **LC**



Thallus 2–5 (–10) cm diam., single- or multi-lobed, rather thick (to *ca* 0.4 mm); lobes undulating or flat, occasionally folded, the margins ± entire; upper surface dark brown, sometimes tinged red, smooth, with abundant erect marginal rhizinomorphs which may also arise from surface cracks; lower surface black, densely felted with black, often branched rhizinomorphs. Apothecia very rare, *ca* 2.5 mm diam., convex; disc black with radiating gyri from a central point; true exciple becoming excluded. Ascospores colourless, aseptate, 8–9 × 3.5–6 µm. Thalloconidia on the tips of the more marginal rhizinomorphs or rarely on the lower cortex, not seen on ascomata;

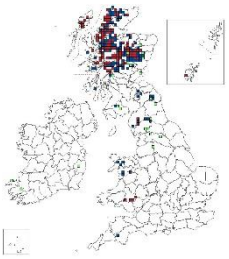
multiseptate, of 100–400 cells, ± spherical or irregularly angled, (20–) 40–80 (–175) × (16–) 40–60 (–95) µm. Medulla C+ red, K–, KC+ red, Pd– (gyrophoric acid). **BLS 1452**.

On ± nutrient-enriched, siliceous rocks in exposed, well-lit sites in montane situations; local. S.W. & N. England, C. to N. Wales, Scotland (throughout the Southern Uplands and Highlands), Ireland.

Easily distinguished by its reddish-brown thallus with copious rhizinomorphs that often completely cover the lower surface.

There are two records of the plurivorous *Marchandiomyces corallinus* on this host.

Umbilicaria proboscidea (L.) Schrad. (1794) **LC**

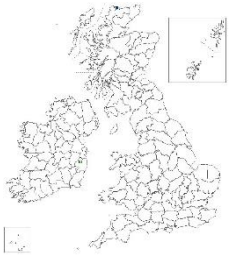


Thallus 2–4 (–8) cm diam., single-lobed, rather thin and fragile; upper surface grey- or dark brown-black, ± rugose, strongly wrinkled and reticulately ridged towards the centre which is often elevated with a central umbo and white-pruinose; lower surface pale brown-grey to dark brown, smooth, occasionally with sparse, scattered rhizinomorphs. Apothecia sessile, rather frequent, gyrose; disc black, asci with a prominent apical dome. Ascospores colourless, aseptate, 10–17 × 3.5–7 µm. Thalloconidia absent. Medulla C+ red, K+ yellow→red, KC+ red, Pd± yellow (gyrophoric and norstictic acids). **BLS 1453**.

On siliceous boulders in well-lit, exposed sites in montane situations; locally frequent. N. England, Wales, Scotland.

Characterized by the ridged, boss-like central umbo of the apothecium which is often pruinose.

Umbilicaria spodochroa (Ehrh. ex Hoffm.) DC. (1805) **EN (D)**

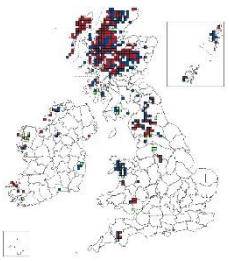


Thallus 2–5 cm diam., single-lobed; upper surface grey-brown, often whitish, smooth; lower surface mostly dark brown to black, never pink, rough, rimose-warted, with abundant branched dark brown-black rhizinomorphs. Apothecia 1–1.5 (–2) mm diam., frequent, particularly towards the margins of the thallus; disc black, smooth with a thick rim and a central protruding umbo of sterile tissue. Ascospores becoming brown, muriform, 20–30 (–36) × 11–19 µm. Thalloconidia absent. Thallus C+ red, K–, KC+ red, Pd– (gyrophoric acid). **BLS 1454**.

In water-seepage tracks on sheltered boulders close to a sea loch; known from only a single site in Britain and probably now extinct due to fish-farming activity. N. Scotland (Sutherland, Loch Eribol), S.E. Ireland (Wicklow, ?extinct).

Resembles *U. crustulosa*, which has a smooth, pale lower surface and a grey upper surface without a white tinge. Davidov *et al*. (2020) noted that the name *U. spodochroa* requires conservation as the type is referable to *U. hirsuta*.

Umbilicaria torrefacta (Lightf.) Schrad. (1794) **LC**



Thallus 2–6 cm diam., single-lobed, often crumpled, the margin often finely dissected and perforated by small holes (appearing lace-like), which may also occur (but less frequently) towards the centre of the thallus; upper surface brown, smooth or rimose-warted; lower surface pale brown to black, with irregular thin ± flattened lamellae which are often lacerate or perforate. Apothecia 0.5–2 mm diam., slightly immersed in thalline depressions, frequent, gyrose; disc black; paraphyses unbranched, brown-tipped. Ascospores colourless, aseptate, 7–16.5 × 5–10 µm. Thalloconidia absent. Medulla C+ red, K–, KC+ red, Pd– (gyrophoric and lecanoric acids) or K+ yellow, Pd+ orange (stictic acid). **BLS 1455**.

On ± nutrient-enriched siliceous boulders in exposed, well-lit sites in montane areas; often locally abundant. S.W. England (Dartmoor), Ireland, N. England, N. Wales and Brecon Beacons, upland Scotland.

The lace-like fringe to the lobes and the lacerate or perforate lamellae on the underside are diagnostic. Material examined from the Outer Hebrides has much larger ascospores than those described in earlier literature.

XYLOPSORA Bendiksby & Timdal (2013)

Thallus squamulose, appressed or irregularly bullate, greyish green to dark brown, dull to shiny, not pruinose. **Hypothallus** not distinguishable. **Isidia** and **soredia** absent. **Upper cortex** thick (to *ca* 50 µm), including a epinecral layer to *ca* 30 µm thick. **Apothecia** black, flat, persistently marginate, often gyrose, not pruinose, attached laminally to squamules. **Thalline margin** absent. **True exciple** composed of conglutinated, rather thin-walled hyphae with ellipsoidal to shortly cylindrical lumina, the inner part and rim blackish brown, the pigment K+ brown, partly dissolving, N−, lacking crystals. **Epithecium** brown, K−, N−. **Hypothecium** pale to dark brown. **Paraphyses** branched and anastomosed, weakly conglutinate, the apices not strongly differentiated. **Asci** clavate, with an apical amyloid cap and a small amyloid tholus containing a non-amyloid central plug, 8-spored. **Ascospores** colourless, aseptate or 1- (to 3-) septate, thin-walled. **Pycnidia** laminal, dark brown-walled, N−. **Conidia** narrowly ellipsoidal to shortly bacilliform, 2.5–5 × *ca* 1 µm. **Chemistry**: friesiic acid (major; also confriesiic acid as minor or trace; Elix 2006).

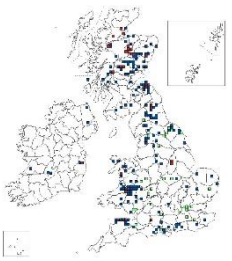
Segregated from the unrelated genus *Hypocenomyce* on both morphological and phylogenetic evidence by Bendiksby & Timdal (2013), confirming observations by Timdal (1984) that the constituent species of *Xylopsora* appeared to be closely related and distinct from other members of *Hypocenomyce*. Differential features include the ascus structure (similar to that in *Umbilicaria*), the anatomy of the exciple (the inner part colourless in *Hypocenomyce*) and the chemistry.

Literature:
Bendiksby & Timdal (2013), Bendiksby *et al*. (2018), Purvis & James (2009), Timdal (1984).

1 Squamules in bullate or irregularly ascending clusters, dull; ascospores aseptate or 1- (to 3-) septate; apothecia infrequent ..... ***caradocensis***
Squamules ± appressed, glossy; ascospores aseptate; apothecia common ..... ***friesii***

Xylopsora caradocensis (Leight. ex Nyl.) Bendiksby & Timdal (2013) **LC**

Hypocenomyce caradocensis (Leight. ex Nyl.) P. James & Gotth. Schneid. (1980)



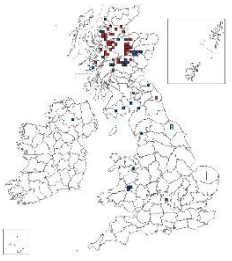
Thallus squamulose; squamules to 1 (–1.5) mm diam., round or irregular, often crowded, in bullate clusters or irregularly ascending, not sorediate, the margins crenulate; upper surface greyish green to dark brown, dull. Apothecia to 0.5 (–0.8) mm diam., infrequent, attached laminally to squamules, flat and marginate, ± gyrose, black, not pruinose; epithecium brown, K–. Ascospores 6.5–14 × 2–4 µm, 0- or 1- (to 3-) septate, narrowly ellipsoidal to fusiform. Pycnidia rare, the wall brown, K–, N–; conidia 2.5–4.5 × *ca* 1.2 µm, cylindric-ellipsoidal. Thallus C–, K–, KC–, Pd–; medulla UV+ white (unidentified substances). **BLS 0576**.

On bark and especially wood, tolerating atmospheric pollution and occasionally growing with *Lecanora conizaeoides*; occasional. Scattered throughout Britain and Ireland, more frequent in upland areas. Like *Lecanora conizaeoides*, it appears to be in decline in many areas with the reduction in sulphur dioxide pollution

Characterized by the bullate, frequently deformed and partly flattened squamules. Closely related to *X. friesii*; young, sterile specimens may be indeterminable, although older specimens are distinguished by the squamule shape, the dull upper surface and the larger, elongate and often septate ascospores.

Xylopsora friesii (Ach.) Bendiksby & Timdal (2013) **Nb**

Hypocenomyce friesii (Ach.) P. James & Gotth. Schneid. (1980)



Thallus squamulose; squamules to 1 (–1.5) mm diam., appressed or rarely ascending, discrete, flat or convex, not sorediate, the margins entire, crenulate or incised, not upturned; upper surface greyish-green to dark brown, glossy, the margin concolorous. Apothecia to 1 (–1.4) mm diam., normally abundant, attached laminally to squamules, gyrose, flat and marginate, black, not pruinose; epithecium brown, K–. Ascospores 4.5–7.5 × 2.5–3.5 µm, aseptate, ellipsoidal. Pycnidia frequent, the wall dark brown,

K–, N–; conidia 2.5–5 × *ca* 1 µm, bacilliform. Thallus C–, K–, KC–, Pd–; medulla UV+ white (unidentified substances). **BLS 0577**.

On coniferous bark and lignum (sometimes charred) in relict pine woodlands, also on lignum of old *Quercus* and *Crategus*; rare. Highland Scotland, with a few records in C. & N.E Wales and one in England (Oxfordshire).

In exposed sites squamules are dark brown, ± flat, with an entire margin; in more sheltered sites they are paler, convex, with a crenulate, deeply incised margin and may be difficult to distinguish from *H. caradocensis* when young.

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