Revisions of British and Irish Lichens

British Lichen Society

Volume 50 **April 2025**

Miscellaneous Peltigerales

Cover image: *Placynthium nigrum*, on limestone rock, near Broadford, Skye, VC104 N Ebudes, Scotland.

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to compile new printed editions of the entire lichen biota of Britain and Ireland is extensive, and many parts are out-of-date even as they are published.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

including *Spilonema* (Coccocarpiaceae), *Tingiopsidium* (Koerberiaceae), *Massalongia* and *Polychidium* (Massalongiaceae), *Placynthium* (Placynthiaceae) and *Vahliella* (Vahliellaceae)

by

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This volume contains genera of the Peltigerales that have not been treated in earlier volumes of the *Revisions* series, i.e. the Collemataceae (vol. 2; Cannon *et al.* 2020), the Pannariaceae (vol. 9; Cannon *et al.* 2021a) and the Peltigeraceae (vol. 20; Cannon *et al*. 2021b). Some of those in this volume are poorly known and show morphological similarities to unrelated genera, so a key to the genera here and similar lichens is given here.

Key to minutely fruticose, placodioid or squamulose genera with cyanobacteria

1 Thallus minutely fruticose (but often prostrate) 2
Thallus squamulose or placodioid 10

2(1) On the seashore, usually intertidal (most often confused with red algae) ..... *Lichina* (Lichinaceae)
Terrestrial 3

3(2) Thalli markedly swelling when wetted; photobiont *Nostoc*
..... Collemataceae and *Lempholemma* (Lichinaceae)
Thalli not markedly swelling when wetted; photobiont *Nostoc* or other cyanobacteria 4

4(3) Photobiont *Gloeocapsa* 5
Photobiont otherwise 6

5(4) Branches thin, densely branched, often prostrate ..... *Lichinodium* (Lichinodiaceae)
Branches thick, in dense, mostly upright clusters ..... *Synalissa* (Lichinaceae)

6(4) Photobiont *Stigonema* (at least in GBI species) 7
Photobiont otherwise 8

7(6) Blue-green rhizoidal hyphae mostly present; thallus filaments to 50 µm diam. ..... ***Spilonema***
No blue-green rhizoidal hyphae present; thallus filaments mostly >50 µm diam. .. *Ephebe* (Lichinaceae)

8(6) Photobiont *Nostoc* ..... ***Polychidium***
Photobiont *Scytonema* 9

9(8) Thallus corticate ..... *Leptogidium* (Pannariaceae)
Thallus not corticate ..... *Thermutis* (Lichinaceae)

10(1) Thallus placodioid 11
Thallus crustose to squamulose or minutely foliose 12

11(10) Photobiont *Scytonema*; thallus very thin; ascospores multiseptate ..... ***Tingiopsidium***
Photobiont *Nostoc*; thallus thicker; ascospores aseptate ..... Pannariaceae, especially *Pectenia*

12(11) Ascospores septate 13
Ascospores aseptate 15

13(12) Thallus with pruina or with bluish parts; ascospores multiseptate; photobiont *Dichothrix*
or Scytonemataceae ..... ***Placynthium***
Thallus not pruinose; photobiont *Nostoc* 14

14(13) Ascospores 1- to 2-septate; thallus minutely foliose, not gelatinous ..... ***Massalongia***
Ascospores multiseptate; thallus crustose to squamulose, ± gelatinous ..... *Arctomia* (Arctomiaceae)

15(12) Ascospores without a distinct epispore ..... ***Vahliella***
Ascospores mostly with a conspicious warted epispore ..... Pannariaceae

COCCOCARPIACEAE Henssen (1986)

Thallus fruticose or foliose, with colourless or greenish rhizines. **Photobiont** cyanobacteria. **Hyphae** thick, running longitudinally, in foliose forms with an upper and lower cortex of isodiametric cells, and a hyphal medulla. **Ascomata** apothecia, sessile, convex or flat, brown or black, lecideine. **Hymenium** gelatinous, brown or black-violet in the upper part. **Exciple** ± well-developed, cellular, colourless or pigmented; subhymenial layer hemispherical, of isodiametric cells. **Hypothecium** not well-developed. **Hamathecium** of thick-walled, rigid, paraphyses, branched, septate, terminal cells thickened or constricted. **Asci** thick-walled, apical dome KI+ blue, 8-spored. **Ascospores** aseptate, colourless, thin-walled, globose or ovoid. **Conidiomata** pycnidia, sessile or sunken, brown or black. **Conidiophores** short-celled and branched. **Conidia** short, rod-shaped. **Ecology**: on moist rock, and epiphytic on bark and leaves.

The family contains three genera (Lücking *et al.* 2017), *Coccocarpia* Pers., *Peltularia* R. Sant. and *Spilonema* Bornet; only the last occurs in our region. The Coccocarpiaceae resides within the Collematineae clade of the Peltigerales (Spribille & Muggia 2012), with the Collemataceae, Pannariaceae and Placynthiaceae.

Literature:
Henssen (1963a), Lücking *et al*. (2017), Spribille & Muggia (2012), Spribille *et al*. (2014), Wedin *et al.* (2009).

SPILONEMA Bornet (1856)

Thallus filamentous or minutely shrubby, black; filaments consisting of photobiont strands surrounded by an irregular network of periclinal hyphae (pseudoparenchyma); filaments attached to the substrate by blue-green, rhizine-like hyphae, N+ purple-red. **Photobiont** *Stigonema* (British) or *Scytonema* (non-British). **Ascomata** apothecia, lateral on filaments, sessile, brown to black, convex to globose, internally with green or violaceous, N+ red pigments. **Thalline margin** absent. **Exciple** thin, soon excluded, of radiating pseudoparenchymatous cells. **Hymenium** blue-green to violet, I+ blue. **Hypothecium** pseudoparenchymatous. **Hamathecium** of stout branched septate paraphyses with pointed apices. **Asci** 8-spored, cylindrical, apical dome K/I+ blue. **Ascospores** aseptate, narrowly ellipsoidal, thin-walled, colourless. **Conidiomata** pycnidia, lateral, sessile, convex to globose, black; wall green-black, N+ red. **Conidiogenous cells** short, catenate. **Conidia** bacilliform, aseptate, colourless. **Chemistry**: no lichen substances reported by TLC. **Ecology**: on damp siliceous rocks; non-European species also on bark, plant detritus, mosses, etc.

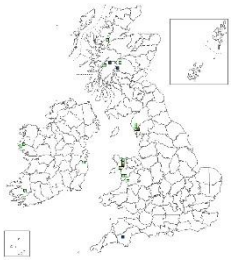
Distinguished from *Ephebe* (Lichinaceae) by the narrow filaments with blue-green rhizoidal hyphae. *Thermutis* (Lichinaceae) has *Scytonema* as photobiont (chloroplasts I−), while *Cystocoleus* (Cystocoleaceae) and *Racodium* (Racodiaceae) have *Trentepohlia* (chloroplasts I+ blue-black).

Literature:
Henssen (1963a), Fletcher *et al.* (2009), Spribille *et al*. (2014).

1 Thallus of prostrate, interwoven filaments, mat-like; apothecia conspicuous, singly on individual filaments on mat surface; hypothecium colourless ..... ***paradoxum***
Thallus of erect filaments, button-like; apothecia hidden between filaments; hypothecium dark violaceous ..... ***revertens***

Spilonema paradoxum Bornet (1856) **NT**
Thallus filamentous, dark olive to black, mat-forming, to 2 cm diam., filaments to 0.05 mm wide and 4 mm long, with basal blue-green rhizines; mycobiont hyphae 4-7 µm diam.; photobiont *Stigonema*, cells 9–16 × 9–12.5 µm.

Apothecia rare, to 1 mm diam., each borne laterally on a filament at the surface of the mat; convex-globular, exciple often excluded and indistinct; hymenium 55–60 µm tall, blue-green or violaceous above; hypothecium 200–240 µm tall, colourless; paraphyses 2–2.5 µm diam. Asci 40–50 × 7–9 µm. Ascospores 7–9 × 2.5–3.5 µm. Pycnidia globose, to 0.2 mm diam.; conidia 2.5–4 × *ca* 1 µm. **BLS 1335**.

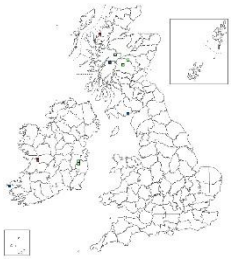


On damp, exposed siliceous rocks; few modern records; rare. S.W. and N.W. England (Devon, Lake District), N. Wales, Scotland (Argyll, Perthshire), Ireland.

The thallus resembles a minute *Lichina confinis* or *Synalissa* species. Distinguished from *Ephebe* by the blue-green rhizoids and the finer filaments.

Spilonema revertens Nyl. (1865) **Nb**

Thallus minutely shrubby, erect, forming compact, button-like cushions 5–15 mm diam. and 0.3–6 mm high, with erect, branching filaments to 0.06 mm diam., with basal, blue-green rhizoidal hyphae, hyphae 4–7 µm diam.; photobiont *Stigonema*, cells 10–20 × 9–14.5 µm. Apothecia very rare, inconspicuous, to 0.5 mm diam., each borne singly and laterally on a filament, embedded within the thallus cushion; exciple violaceous; hymenium 45–55 µm tall, blue-green or partly violaceous above; hypothecium 100–180 µm tall, dark violaceous. Ascospores 7–9 (–11) × 2.5–3.5 (–6) µm. Pycnidia wart-like, to 0.2 mm diam.; conidia *ca* 2.5 × 1 µm. **BLS 1336**.



On damp siliceous rocks; rare. Scotland (Argyll, Perthshire, Galloway), W. Ireland.

Usually sterile, distinguished from *S. paradoxum* by the minute cushion-forming habit with erect filaments. *Thermutis velutina* contains *Scytonema* and is more weakly lichenized; when fertile the apothecia have a distinct exciple.

KOERBERIACEAE T. Sprib. & Muggia (2012)

Thallus small-squamulose to medium-sized placodioid, strongly dorsiventral, bearing longitudinal furrows or lines on the upper surface that radiate from the thallus centre. **Photobiont** cyanobacteria, *Nostoc* or Scytonemataceae, bundled in rows beneath the upper cortex. **Ascomata** apothecia, laminal, round, hemiangiocarpic in development, with a persistent lecanorine margin. **Exciple** rudimentary. **Asci** cylindrical, with or without an amyloid tube within the tholus. **Ascospores** 8 to many per ascus, aseptate to multiseptate, ellipsoidal to acicular. **Conidiomata** pycnidia, immersed, flask-shaped. **Conidia** bacilliform. **Chemistry**: no lichen substances detected by TLC.

The description above is derived from that in Spribille & Muggia (2012). The family was introduced to contain three genera, *Koerberia*, *Steinera* and *Tingiopsidium* (as *Vestergenopsis*). Only the last-named genus occurs in Britain and Ireland. *Steinera* was removed from the family and included within the Arctomiaceae (Arctomiales) by Ertz *et al*. (2017).

Literature:

Ertz *et al.* (2017), Hafellner & Spribille (2016), Spribille & Muggia (2012).

TINGIOPSIDIUM Werner (1939)

Thallus placodioid, forming rosettes; lobes stellate-radiating, closely appressed. **Isidia** present or absent. **Upper cortex** not distinctly differentiated; hyphae short-celled in the upper part of the thallus, periclinally orientated in parallel along the length of the lobes, looser and with more elongated cells

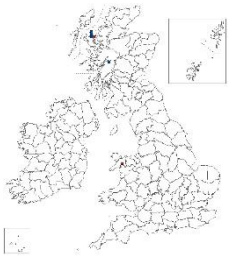
in a lower medullary zone. **Lower cortex** absent, underside pale. **Photobiont** *Scytonema*; cells in chains. **Ascomata** apothecia, sessile. **Thalline margin** present, concolorous with the thallus, entirely paraplectenchymatous, with included photobiont cells. **Exciple** much reduced, inconspicuous. **Epithecium** red-brown. **Hymenium** colourless to pale brown, I+ blue. **Hypothecium** pale yellow-brown, of interwoven hyphae. **Hamathecium** of paraphyses, unbranched or rarely forked towards the apices, ± conglutinated, upper cells enlarged, ± moniliform. **Asci** (8-) 12- to 16-spored, clavate, without a K/I+ blue tholus. **Ascospores** colourless, aseptate, sometimes with plasma bridges, ellipsoidal to subglobose. **Conidiomata** pycnidia, immersed in the thallus, walls colourless. **Conidia** bacilliform. **Chemistry**: lichen products not detected by TLC. **Ecology**: saxicolous.

The radiating, stellate thallus with grooved and striate lobes and coarse, ± flattened nodules are diagnostic. These, along with the photobiont (*Scytonema*, not *Nostoc*) and multi-spored asci, serve to distinguish it from genera of the Pannariaceae (e.g. *Fuscopannaria, Pannaria, Parmeliella*). It is distinguished from *Placynthium* spp. (e.g. *P. pannariellum*) by its pale lower surface, multi-spored asci and aseptate spores.

Literature:
Fryday *et al.* (2009), Hafellner & Spribille (2016).

Tingiopsidium elaeinum (Wahlenb. ex Ach.) Hafellner & T.Sprib. (2016) **VU D2**

Vestergrenopsis elaeina (Wahlenb. ex Ach.) Gyeln. (1940)



Thallus typically 2–4 (–8) cm diam., olive-brown, lobes 0.2–0.4 mm broad, widening to *ca* 0.8 mm at the apices, elongate, fan-like, flat, longitudinally grooved; upper surface striate, matt, nodulose-uneven towards the centre, nodules 0.2–0.3 mm diam., coarse, at first globose to cylindrical, becoming ± flattened, erect or decumbent, conspicuous, at times forming small simple or branched secondary overlapping lobules. Apothecia not frequent in British material, to 0.8 mm diam., scattered, rounded; disc black-brown, matt. Ascospores 7–10 × 4–6 µm. **BLS 1822**.

On damp igneous rocks, although often on drier buttresses; very rare. W. Scotland (Skye, Glen Coe), N. Wales (Snowdonia).

T. isidiatum (Degel.) E. Dahl (1950), the isidiate counterpart of *T. elaeinum*, is not yet known from Britain and Ireland and should be sought in similar habitats; it has a similar thallus but has numerous finger-like isidia to 1 µm long and 0.1 mm diam., ± thickly dispersed in central areas of thallus and is rarely fertile.

MASSALONGIACEAE Wedin, P.M. Jørgensen & E. Wiklund (2007)

Thallus small, foliose or minutely shrubby; lobes small, squamulose or elongate, forming terete filaments. **Upper cortex** pseudoparenchymatous, rarely undifferentiated. **Lower surface** (where differentiated) of densely interwoven hyphae. **Soredia** absent, isidia and folioles sometimes present. **Photobiont** *Nostoc*. **Ascomata** apothecia, erumpent from the thallus, laminal or marginal. **Thalline margin** absent. **Exciple** present. **Hymenium** red-brown above, colourless below, I+ blue. **Hamathecium** of coherent paraphyses, septate, unbranched, ± swollen and brown at the apices. **Asci** cylindrical, 8-spored, the apical cap K/I+ blue, without a darker-staining apical plug. **Ascospores** colourless, ellipsoidal to fusiform, transversely septate, ± attenuated at the apices. **Conidiomata** pycnidia, brown above, paler below. **Conidia** bacilliform or slightly dumb-bell shaped. **Chemistry**: lichen products not detected by TLC.

The Massalongiaceae contains three genera, of which *Massalongia* and *Polychidium* are recorded

from Britain and Ireland. Their inter-relationships were studied by Wedin *et al*. (2007, 2009), and Muggia *et al*. (2011) remodelled *Polychidium* by excluding *P. dendriscum* and allies, now placed in *Leptogidium* within the Pannariaceae.

Literature:
Henssen (1963a, b), Muggia *et al*. (2011), Wedin *et al*. (2007, 2009).

1 Thallus small, foliose to squamulose, rosette-forming ..... ***Massalongia***
Thallus minutely fruticose to filamentous ..... ***Polychidium***

MASSALONGIA Körb. (1855)

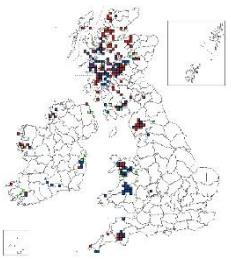
Thallus small, foliose; lobes small, squamulose or elongate, forming rosettes, ± isidiate at the margins. **Lower surface** of densely interwoven hyphae. **Soredia** absent, isidia and folioles present. **Upper cortex** pseudoparenchymatous. **Lower cortex** not developed but with densely interwoven, longitudinally orientated hyphae. **Photobiont** *Nostoc*. **Medulla** of loosely interwoven hyphae. **Ascomata** apothecia, laminal or marginal. **Exciple** present. **Hymenium** red-brown above, K–, colourless below, I+ blue. **Hamathecium** of coherent paraphyses, septate, unbranched, ± swollen and brown at the apices. **Asci** cylindrical, 8-spored, *Fuscidea*-type, apical cap K/I+ blue, without a darker-staining apical plug. **Ascospores** colourless, ellipsoidal to fusiform, 1(-3)-septate, sometimes constricted at the septa, ± attenuated at the apices. **Conidiomata** pycnidia, brown above, paler below. **Conidia** bacilliform or slightly dumb-bell shaped. **Chemistry**: lichen products not detected by TLC. **Ecology**: on acidic rock or among mosses.

Two other genera present in Britain and Ireland, *Placynthium* and *Tingiopsidium*, also have small squamules but the photobiont is a member of *Rivulariaceae* or *Scytonemataceae* rather than *Nostoc*. Some species of *Fuscopannaria, Parmeliella* and *Vahliella* superficially resemble *Massalongia* but their ascospores are aseptate.

Only one species occurs in Britain and Ireland.

Literature:
Benfield & Purvis (2009), Henssen (1963b), Jørgensen *et al.* (2019).

Massalongia carnosa (Dicks.) Körb. (1855) **LC**



Thallus scattered or aggregated, often forming rosettes 1–3 cm diam.; lobes flattened, rounded or elongate, to 10 mm long, 0.5–1.5 mm wide, horizontal or ± ascending, irregularly branched and overlapping; upper surface sandy- to red-brown when dry, brown to dark green when wet, matt, margins irregularly divided, lobes nodulose or with coarse globose or fine ± branched cylindrical isidia; lower surface brown or buff with sparse brown rhizines at the base of the lobes. Apothecia rare, to 2 mm diam., ± stalked; disc flat, red- to dark brown with a smooth, paler margin; exciple 100–135 µm thick, of ± rounded cells, the marginal cells with short hairs; hymenium (45–) 60–70 µm tall; paraphyses 3–5 (–6) µm diam., apices red-brown. Ascospores (16–) 18–24 (–30) × (4.5–) 6–7.5 (–8.5) µm, 1(-2)-septate. Pycnidia very rare, to 0.6 mm diam.; conidia dumb-bell shaped, 4–7 (–9) × *ca* 1 µm. **BLS 0861**.

Amongst mosses on acidic boulders and outcrops, often in or by clean streams and rivers, more rarely on mosses on damp peaty soil; rather rare and local. W. Britain, extending more easterly in Scotland, Ireland.

Distinguished by the small matt brown squamules, often with nodular or cylindrical marginal isidia and by the 1-septate spores; fertile specimens may lack isidia. At high altitudes sterile specimens can be confused with *Fuscopannaria praetermissa* (Pannariaceae). See also *Arctomia delicatula* (Artcomiales: Arctomiaceae).

POLYCHIDIUM (Ach.) Gray (1821)

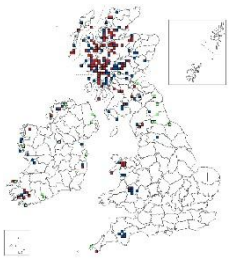
Thallus shrubby, of ± dichotomously branched, ± terete filaments forming small interwoven, domed or straggling masses. **Cortex** well-developed, cellular, one to several cells thick, surrounding a central medullary strand of hyphae with rounded walls. **Photobiont** *Nostoc*. **Ascomata** apothecia, mostly lateral, brown, with a sunken disc. **Thalline margin** absent. **Exciple** present. **Hamathecium** of paraphyses, unbranched, septate; apices capitate. **Asci** 8-spored, broadly cylindrical; apices thickened, K/I+ blue. **Ascospores** 1- to 2-celled, colourless, ellipsoidal to fusiform, thin- or thick-walled. **Conidiomata** pycnidia, brown, lateral. **Conidiogenous cells** generally short. **Conidia** bacilliform. **Chemistry**: lichen products not detected by TLC. **Ecology**: on various, often moist or periodically inundated or flushed substrata.

Very similar morphologically to *Leptogidium* (Pannariaceae) which also has a minutely fruticose to filamentous thallus, but in that genus the cells of the hyphal strands are epidermoid in appearance and the photobiont is *Scytonema* rather than *Nostoc.* Dwarf, fruticose species of *Leptogium* with corticate lobes are generally wrinkled. *Ephebe* has ecorticate lobes that are frequently appressed.

A single species occurs in our area.

Literature:
Gilbert *et al*. (2009), Henssen (1963a), Muggia *et al*. (2011).

Polychidium muscicola (Sw.) Gray (1821) **Nb**



Thallus of slender filaments, sparsely to richly and divergently branched, brown-black, sometimes greyish in shade, with shining, often nodulose apices; forming small loosely interwoven decumbent to cushion-like masses and strands; filaments (50–) 60–120 (–130) µm diam., becoming progressively narrowed towards the apices; cortex one to three cells thick; cells ± rounded, 4–7 µm diam., the wall somewhat thickened, colourless or brown; photobiont *Nostoc*, not in obvious chains. Apothecia occasional, lateral, to 2 mm diam.; disc red-brown, brighter when wet; margin paler. Ascospores 22–29 × 5–7 µm, 1-septate, fusiform, sometimes becoming pale red-brown. Conidia 1.5–3.5 × *ca* 1 µm, bacilliform. **BLS 1166**.

Amongst mosses on moist siliceous rocks and boulders, often in and near streams or seepage tracks, occasionally on the ground, sometimes also at the base of mossy trees, especially *Fraxinus*; chiefly in uplands, rather local. N. & W. Britain and Ireland.

Resembles *Ephebe* in the loosely woven, dark filaments but is more red-brown, not olive-black and of a firmer texture, forming a coarser, more ascending thallus with large apothecia (not perithecia-like). In W. Scotland, *Vezdaea stipitata* has been found overgrowing thalli of *P. muscicola* on *Fraxinus excelsior*.

PLACYNTHIACEAE E. Dahl (1950)

Thallus crustose to squamulose, filamentous or minutely fruticose, with the mycobiont and photobiont evenly intermixed. **Photobiont** cyanobacterial, mostly *Dichothrix* or *Scytonema*. **Ascomata** apothecia, on the upper surface, sessile, dark, in most genera without a well-developed thalline margin. **Exciple** concolorous with or paler than the disc. **Hymenium** strongly gelatinous, I+ blue. **Asci** with a thickened apex, usually with a I+ dark blue apical ring, an ocular chamber and a I+ outer gelatinized coat. **Ascospores** aseptate or transversely septate, ellipsoidal to fusiform, colourless. **Anamorphs** pycnidial, with bacilliform to dumb-bell shaped conidia.

The Placynthiaceae contains three genera (Lücking *et al*. 2017), of which only one occurs in Britain and Ireland. According to Miadlikowska *et al.* (2014) the family is most closely related to the Massalongiaceae.

PLACYNTHIUM (Ach.) Gray (1821)

Thallus closely attached, often rosette-shaped, grey, brown, olive or blackish, sometimes densely grey- or bluish-pruinose; margin variable, of distinct radiating, flattened to convex lobes, or stellate, spreading squamules, or without lobes, central area ± continuous to markedly areolate. **Prothallus** absent, or well-developed in some species, forming an extended conspicuous blue-black margin. **Lower surface** and associated rhizine-like hyphae dark blue-green. **Isidia** often densely present. **Photobiont** cyanobacterial, generally *Dichothrix* but sometimes other species in the Rivulariaceae or Scytonemataceae, with a yellow, reddish or brown colour, dispersed and not layered. **Ascomata** apothecia. **Exciple** and disc dark brown to black, often shining, exciple opaque, black, tinged brown or purple. **Hymenium** blue or green, in the upper part often tinged brown or violet, I+ blue. **Hypothecium** brownish or red-brown. **Hamathecium** of paraphyses, septate, unbranched or sparingly branched near the tips, apical cells pointed, thickened or not different in shape. **Asci** (4-) 8-spored, cylindrical, *Peltigera*-type. **Ascospores** (0-) 2-4 (-7)-septate (submuriform in one non-British species), broadly ellipsoidal to fusiform, often poorly developed, colourless. **Conidiomata** pycnidia, partly immersed, with dark ostioles. **Conidiophores** branched. **Conidia** bacilliform or dumb-bell-shaped. **Chemistry**: lichen products not detected by TLC, dark blue and purplish pigments occur in the apothecia. **Ecology**: on rocks, frequently in damp situations but some species on dry, exposed limestone, very rarely on compacted soil or bark.

Immature thalli, poorly developed material and collections with a poor thallus margin are frequently impossible to name. Shrunken and deformed spores are frequent. Most species show considerable variation in colour and morphology. *Massalongia* and *Vestergrenopsis* also have small squamules with a cyanobacterial photobiont but the undersurface is pale not blue-green and the apothecial disc is brown not black. The photobiont in *Massalongia* is *Nostoc*. *Vestergrenopsis* differs in having 12 to 16 aseptate ascospores per ascus.

Collolechia, with a thick crustose rather then squamulose thallus and elongate multiseptate spores, was treated as a separate genus by James & Jørgensen (2009) but was shown to be nested within *Placynthium* by Košuthová *et al.* (2016).

Literature:
Burgaz (2010), Czeika & Czeika (2007), Gilbert & James (2009), Henssen (1963c), James & Jørgensen (2009), Košuthová *et al.* (2016, 2024), McCarthy & Kantvilas (2014).

1 Thallus without marginal lobes, often ± pruinose, cortex loosely organized; asci with an apical amyloid ring-structure ..... ***caesium***
Thallus with marginal lobes or somewhat indistinct squamules, pruinose or not, squamules somewhat indistinct, cortex cellular; asci with an apical amyloid cap 2

2(1) Margin of thallus, at least in part, with distinct minute to medium-sized radially extended marginal lobes 3
Margin of thallus without distinct radially extended lobes but may be composed of minutely lobed squamules 9

3(2) Thallus robust; marginal lobes 0.5–1 mm wide, conspicuous, ± flattened, fan-shaped or ± closely parallel; on moist acid rocks and seepage tracks 4
Thallus more delicate; marginal lobes 0.05–0.2 mm wide, ± inconspicuous, flattened, convex or terete to thread-like, often irregularly orientated; on ± basic rocks, often dry limestones 5

4(3) Marginal lobes ± flattened, appressed, *Phaeophyscia*-like, grey to brown, inner part of thallus with ± flattened decumbent squamule-like isidia or folioles; prothallus usually not well-developed ..... ***flabellosum***
Marginal lobes ± convex to terete, *Vestergrenopsis*-like, dark olive to blackish, inner part with ± terete erect irregular finger-like or coralloid isidia; prothallus usually distinct, blue-black or black ..... ***pannariellum***

5(3) Thallus dying away at the centre, forming distinct radiating rings or arcs ..... ***subradiatum***
Thallus not dying at the centre to form rings or arcs 6

6(5) Thallus pruinose 7
Thallus not pruinose 8

7(6) Marginal lobes flatly appressed, central parts with flat, imbricate, tightly packed squamules; ascospores 3- to 7-septate ..... ***garovaglioi***
Marginal lobes not appressed, central parts of repeatedly branched lobules, appearing isidiate; ascospores 1-septate ..... ***hungaricum***

8(6) Marginal lobes short, thread-like, convex, ± shining; thallus centre densely granular-isidiate; ascospores (11.5–) 15–19 (–21) × (4.5–) 5.5–7 µm, (1-)3-septate ..... ***asperellum***
Marginal lobes flattened to convex, transverse-segmented, finger-like, fimbriate, olive to blackish, matt; thallus centre unevenly nodulose; ascospores (10–) 13–15 × 5–6.5 µm, 1-septate ..... ***lismorense***

9(2) Ascospores (7–) 9–18 (–22) × 3.5–8 (–9) µm, (0-)3-septate, ellipsoidal or elongate-ellipsoidal 10
Ascospores 30–45 × 4–5 µm, 3- to 5-septate, elongate-acicular ..... ***dolichoterum***

10(9) Ascospores narrowly ellipsoidal, (3.5–) 4–5 (–6) µm diam.; thallus dark, ± uniform in colour or ± glaucous-grey-pruinose, not mottled; prothallus often very distinct at the margin 11
Ascospores broadly ellipsoidal, (5.5–) 6–8 (–9) µm wide, 0- or 1-septate; thallus minutely mottled grey-white and blue-black; prothallus indistinct at the margin ..... ***tantaleum***

11(10) Ascospores persistently 1-septate; thallus granular-isidioid to areolate, prothallus poorly developed .. 12
Ascospores (1-) 3-septate; thallus dark, squamulose, nodular; prothallus well-developed, blue-black ..... ***nigrum***

12(11) Thallus granular-isidioid, cracked-areolate, ± white-pruinose, the areoles flat ..... ***tremniacum***
Thallus composed of isolated areoles with raised crenulate margins ..... ***anemoideum***

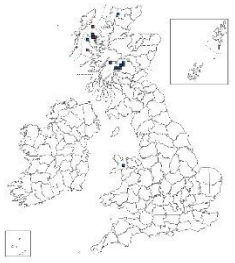
Placynthium anemoideum (Servít) Gyeln. (1938) **DD**

Similar to *P. nigrum* but a prothallus is absent or inconspicuous, and the thallus is soon divided into numerous discrete areoles, 0.8–1.2 mm diam., with raised, crenulate margins. Apothecia numerous, small (*ca* 0.3 mm diam.); ascospores 1-septate, broadly ellipsoidal, 9–10 × 5–6 µm. **BLS 2522**.

Known from two collections from the 1950s on limestone pebbles by the coast (South Wales, Glamorgan).

P. tremniacum has a coralloid-granular, usually cracked-areolate and white-pruinose thallus, but is otherwise similar to *P. anemoideum*. Neither species has been sequenced.

Placynthium asperellum (Ach.) Trevis. (1869) **NT**



Thallus to 2 cm diam., rosette-like, dark olive to black, shining; lobes very narrow, ± canaliculate, 1.5–2 × 0.05–0.2 mm, ± decumbent and not or weakly radiating at the margin, the centre becoming densely and continuously granular or isidiate and forming coarse, thick areoles 1-2 mm diam., which may themselves develop an independent border of narrow lobes; older portions develop isidia which are nodular, granular-coralloid, or ± erect extended-cylindrical and finger-like; prothallus seldom visible. Apothecia frequent, concolorous with the thallus, ± immersed to sessile; epithecium blue-green-black; hypothecium ± reddish brown, K± intensified. Asci

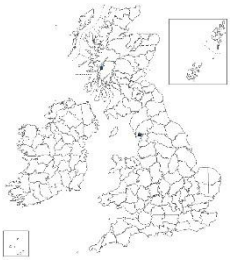
(4-) 8-spored. Ascospores (11.5–) 15–19 (–21) × (4.5–) 5.5–7 µm, (1-) 3-septate, ellipsoidal or slightly clavate, ± constricted at the septa. Pycnidia occasional; conidia dumb-bell-shaped, 5–8 × *ca* 1 µm. **BLS 1134**.

On moist mica-schist; very local. C. & N. Scotland (Breadalbanes, Isle of Skye, Ben Hope), N. Wales (Snowdonia).

The very narrow shining canaliculate marginal lobes forming a small, rosette-like thallus with a granular-isidiate, areolate centre are diagnostic. British collections are not typical in that they lack any extended marginal lobes. *Parmeliella triptophylla*, which sometimes grows on damp rocks, has flattened lobes and *Nostoc* as photobiont. See also *P. dolichoterum*.

Placynthium caesium (Fr.) Jatta (1900) **Nb**

Collolechia caesia (Fr.) A. Massal. (1854)

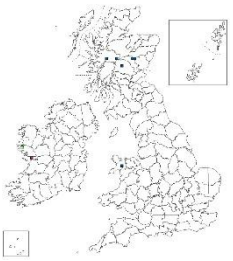


Thallus crustose, uneven, knobbly-cracked, marginal lobes absent or poorly defined, <2 cm diam., *ca* 1 mm thick, surface fragile, without a proper cortex, scurfy or ± densely pale bluish-pruinose (calcium oxalate crystals); prothallus absent; photobiont scytonemoid. Apothecia rare, <0.5 mm diam., black, with a distinct exciple that becomes excluded; hymenium I+ blue. Asci with an amyloid ring structure in the apex, 8-spored. Ascospores colourless, 3- to 6-septate, fusiform (18–) 25–35 (–53) × 4–7 µm. No substances detected by TLC but calcium oxalate crystals are visible in microscopical sections. **BLS 2435**.

On calcareous rock in cool, shaded habitats, usually north-facing calcareous overhangs or caves; rare but probably overlooked. S.W. Scotland (Lismore Island), N. England (Westmorland).

Differs from other species of *Placynthium* in the hyphal rather than cellular organization of the thallus, the absence of marginal lobes, fusiform ascospores and the presence of an apical amyloid ring in the ascus.

Placynthium dolichoterum (Nyl.) Trevis. (1869) **Nb**

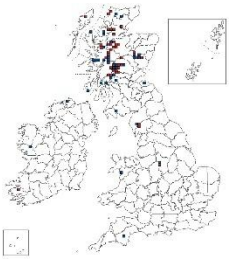


Thallus squamulose-crustose without distinct marginal lobes, brown to black-brown; surface strongly areolate, the surface of the areoles with ± conspicuous low rounded granular-isidiate papillae; prothallus poorly developed. Apothecia frequent, 0.3–0.6 mm diam.; disc concave, flat to convex, ± shiny. Ascospores 25–50 × 4–5 µm, 3- to 5-septate, fusiform-vermicular, mostly straight. **BLS 1141**.

On well-lit montane limestone and mica schist, often overgrowing moss; very rare. N. Scotland (Perth, Ben Lawers; W. Inverness, Ben Alder), Snowdonia, W. Ireland.

The 3- to 5-septate, fusiform to worm-like ascospores serve to distinguish *P. dolichoterum* from *P. asperellum* and *P. nigrum*; otherwise these three species cannot be readily separated in the field.

Placynthium flabellosum (Tuck.) Zahlbr. (1925) **Nb**



Thallus to 4 cm diam., of rosettes or parts of rosettes, shiny bluish grey, dull grey, brown or olive, dark green when wet; conspicuously divided at the border into very narrow, flattened, *Phaeophyscia*-like lobes, to 3 × 0.3–0.5 mm, the apices to 1 mm wide, narrowly fan-shaped, flat, closely attached, surface smooth to lightly striate; thallus centre ± densely covered by flat, grey-brown small scattered or ± contiguous, rarely overlapping, squamule-like isidia with notched or crenulate markings, sometimes forming coarse areoles 0.5–1 mm diam., which may become thickened (to 1–2 mm) due to repeated regeneration of lobes; prothallus inconspicuous. Apothecia unknown in Britain and Ireland, small (to 0.5 cm diam.), disc concave, brown with a paler exciple. Ascospores (13–) 15–18 (–20) × 4–6 µm, (2-) 3-septate. **BLS 1135**.

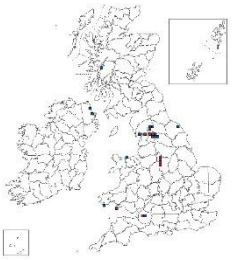
On acid rocks in mountain streams, by lake margins and associated with seepage tracks, frequently submerged; local. N. & W. Britain and Ireland.

The habitat, substantial dull grey-brown thallus with numerous conspicuous spreading closely attached *Phaeophyscia*-like marginal lobes and flattened, squamule-like, inner lobules or isidia, are distinctive. In habit, this species has a superficial resemblance to *Hyperphyscia adglutinata*.

Placynthium garovaglii (A. Massal.) Malme (1918) **Nb**

Thallus thick, small, seldom exceeding 2 cm diam., at least part of the margin obscurely lobed; prothallus not

visible; marginal lobes, when present, very slender, 0.1–0.3 × 0.5–1 mm, centre with uneven dense flat to convex nodular-scurfy squamules 0.1–0.4 mm diam., the entire thallus powdery with dense, bluish white pruina, dull grey-brown when wet; occasionally a blue-black prothallus is visible. Apothecia unknown in Britain and Ireland, 0.3–0.6 mm diam., black, ± sessile. Ascospores 23–53 × 4–6 µm, 3- to 7-septate, elongate-fusiform. **BLS 1136**.



Occurs in patches along fracture cracks on sheltered vertical to overhanging dry limestone rocks; rare. S.W. England (Somerset, Cheddar Gorge), Pennine limestones, Wales (Gower, Great Orme), Scotland, N.E. Ireland.

See also *P. hungaricum*. Specimens of *P. tremniacum* may be pruinose and are then difficult to distinguish from these two species.

Placynthium hungaricum Gyeln. (1939) **Nb**

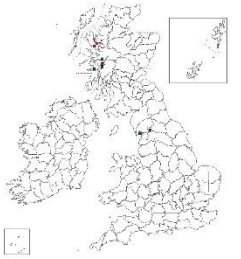
Thallus ± whitish grey-pruinose, prothallus inconspicuous, marginal lobes slightly overlapping, 1.0–1.5 × 0.1–0.2 mm, not appressed, central parts of repeatedly branched lobules, appearing isidioid. Hymenium 100–110 µm tall. Ascospores 12–20 × 4–6 µm, 1-septate. **BLS 2436**.

On calcareous rock; very rare. Wales (Great Orme, Llangollen) and possibly Derbyshire.

P. garovaglii has larger spores (23–53 µm long) with 3-7 septa and appressed, apparently isidiate lobes.

Placynthium lismorense (Cromb.) Vain. (1909) **Nb**

Thallus wide-spreading or in small, irregular patches, to 3 cm diam., thin, ± with delicate radiating flattened finger-like segmented marginal lobes, best seen in young thalli, olive-black; prothallus ± indistinct; marginal lobes 0.1 mm broad, convex; inner lobes similar, distinct, elongate, decumbent, unoriented, overlapping forming nodular areoles. Apothecia rare, 0.2–0.7 mm diam., with a thin shining exciple; epithecium grey-green to blue-black; hypothecium pale violet-brown. Ascospores (10–) 13–15 × 5–6.5 µm, 1-septate, broadly ellipsoidal, often ± curved. **BLS 1137**.

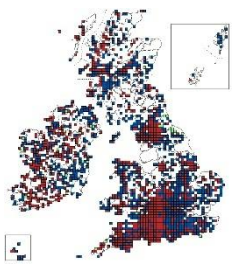


On hard Durness limestone and other calcareous rocks, often in seepage tracks; rare. W. Scotland (Mull, Lismore Island, Westerness), England (Cumbria).

This species is chiefly distinguished from *P. nigrum* by the more conspicuous, radiating marginal and distinct central lobes, the olivaceous tone and the absence of a well-developed, bluish black prothallus. The lobes in the inner part of the thallus are sometimes much reduced and indistinct, forming compacted thin smooth nodular ± scattered areoles; even so, the prothallus is not visible.

Placynthium nigrum (Huds.) Gray (1821) **LC**

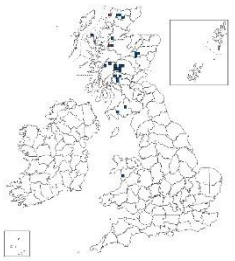
Thallus to 12 cm diam. (often smaller), wide-spreading, brown-black to jet black, ± grey-violet pruinose; prothallus blue-black, conspicuous, sometimes fimbriate; thallus of small crowded flat squamules 0.4–1.5 mm broad, with minutely lobed margins, scattered over the prothallus or more usually crowded forming areoles 1–2.5 mm diam., marginal squamules not enlarged; isidia often present, dense, granular to coralloid. Apothecia 0.5 (–1) mm diam.; exciple black, shining, often becoming flexuose; disc brown to black, concave, later flat or weakly convex; epithecium blue-green. Ascospores (7–) 9–18 (–22) × 3.5–5.5 (–6) µm, 1- to 3-septate, narrowly ellipsoidal. **BLS 1139**.



On a wide range of naturally occurring calcareous rocks, on alkaline memorials, stonework, also mortar, asbestos, concrete, compacted soil, shell-sand and siliceous substrata indirectly influenced by lime, prefers somewhat damp niches or surfaces slow in drying out; frequent. Throughout Britain and Ireland.

This abundant and very variable species is usually readily recognized by the dark thallus with a conspicuous, blue-black prothallus and rather uniform minutely squamulose surface; it is the only British species of the genus regularly occurring in man-made habitats.

Placynthium pannariellum (Nyl.) H. Magn. (1936) **NT**

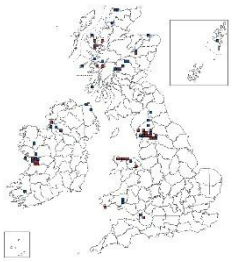


Thallus 1–5 cm diam., often forming wide-spreading regular patches as dark rosettes, often preceded by a conspicuous greenish-blue or bluish-black prothallus; margin strongly radiating, the lobes flat, convex, lightly grooved, their ends fan-shaped, ± branched, ± radiating, to 0.7–1 mm broad; central lobes smaller, fruticose, with numerous cylindrical coralloid ± flattened isidia, sometimes forming a thickened densely isidiate areolate crust, dull olive-brown, blackish-brown or black. Apothecia to 1 mm diam., dark brown. Ascospores 15–20 × 5–7 µm, (1-) 3-septate. **BLS 1140**.

On ± basic semi-inundated rocks in mountain streams and lakesides and in seepage tracks, also occasionally on mica schist soils; rare. In montane areas (Snowdonia, Lake District, Scottish Highlands).

The combination of distinct, radiating marginal convex lobes, conspicuous dark prothallus and the central areas of mature thalli with a cover of finger-like to flattened isidia is distinctive. This species closely resembles *Vestergrenopsis isidiata* (not yet reported for Britain).

Placynthium subradiatum (Nyl.) Arnold (1884) **Nb**

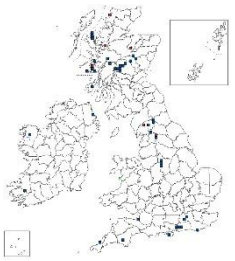


Thallus to 1.5 cm diam., with ± complete rosettes or marginal lobes forming hollow rings or narrow arcs, dying away from the centre, 2.5 cm × 3 mm, olive to dark brown, matt, sometimes sparingly bluish-white-pruinose; margin of flattened to ± unevenly convex, radiating or parallel, tightly packed lobes 2 × 0.05-0.2 mm in size, apices flat with crenate tips, dark olive-brown to blackish, tightly appressed; prothallus inconspicuous; isidia sparse when present, to 0.4 mm long, globose or subcylindrical, erect, irregular, scattered or crowded into ± discrete nodulose contorted areoles at the centre of the thallus; older areoles may become secondarily lobed and generate a new thallus within the original one. Apothecia very rare, to 0.5 mm diam. Ascospores (9–) 11–13 (–15) × (5–) 6–7 (–8) µm, 1-septate, ellipsoidal. **BLS 1142**.

Has a wide habitat range occurring on dry to irrigated, well-illuminated, hard, often vertical limestone cliffs; local. N. & W. Britain and Ireland, reaching as far south as Cheddar Gorge.

The dark, narrow ring to arc-like development of the thallus on dry limestone (often in drainage tracks) is characteristic. Specimens from moist habitats tend to lack pruina.

Placynthium tantaleum (Hepp) Hue (1906) **Nb**

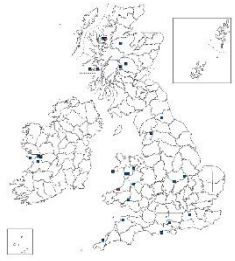


Thallus thick, to 3 cm diam., brownish-black, of minute papilla-like granules, 0.4–1.0 mm; surface sometimes reported as glossy, mottled, with minute grey-white spots on a blue-black surface (× 15), not pruinose; centre cracked-areolate, the areoles rather large, to 2 mm diam., on a distinctive blue-black hypothallus; prothallus margin reduced or absent. Apothecia rare, to 1 mm diam., black. Ascospores (9–) 10–13 (–20) × (5.5–) 6–8 (–9) µm, aseptate or 1-septate, ovoid to broadly ellipsoidal. **BLS 1143**.

On semi-irrigated to intermittently submerged ± basic rocks, including mortar, rarely on exposed roots of *Taxus*; rare. Scattered through Britain and Ireland.

Differs from *P. nigrum* in the generally smaller thalli, broader ascospores, and reduced prothallus. The 'maculate' surface reported by some observers may be an artefact produced by trapped silt particles and preference for moister habitats, particularly water-slides.

Placynthium tremniacum (A. Massal.) Jatta (1900) **Nb**



Similar to *P. nigrum*, but the thallus is smaller (<3 cm diam.), formed entirely of small, shining brown, coralloid granules, generally ± cracked-areolate, ± white-pruinose or glaucous; margin not lobed; prothallus indistinct, not spreading beyond slightly enlarged, marginal areole-like squamules. Ascospores 9–16 × 4–6 µm, 1-septate. **BLS 1144**.

On damp, shaded, hard limestone rocks, occasionally on mortar; rare or overlooked. Scattered throughout Britain N. to W. Ross, and in Ireland (The Burren).

A species complex said to differ from *P. nigrum* in the ± white-pruinose thallus and the persistently 1- septate ascospores, but the relationship between the two taxa is in need of further investigation.

VAHLIELLACEAE Wedin, P.M. Jørg. & S. Ekman (2010)

The family only contains the single genus *Vahliella*, so the description below constitutes that of the family. It was found to occupy a clade sister to that including the Peltigeraceae and Massalongiaceae by Wedin *et al*. (2011).

VAHLIELLA P.M. Jørg. (2008)

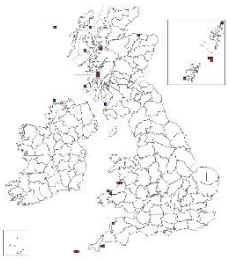
Thallus squamulose, often imbricate, mostly grey-brown above, cellular cortex distinct. **Hypothallus** blue-black, thin, variable. **Photobiont** usually clusters of *Nostoc*. **Medulla** thin, hyphae intricate, gradually merging into the hypothallus and hence without a lower cortex. **Soredia** very rare (not known in European collections), on the margins of the squamules. **Apothecia** found in most species, laminal, often proliferating and occurring in clusters, with brownish discs which eventually may be convex. **Thalline margin** variable, often suppressed and absent in some apothecia. **Exciple** also variably developed but always present, consisting of cells that are oblong in section. **Subhymenial layers** sometimes brownish, of intricately interwoven hyphae. **Hymenium** with the upper part brownish, the remainder colourless, reacting I+ blue-green rapidly changing to red-brown (hemiamyloid). **Paraphyses** unbranched, septate, with clavate pigmented apices. **Asci** clavate to subcylindrical, the thickened apex with a persistently I+ blue-green layer. **Ascospores** eight per ascus, colourless, aseptate, ellipsoidal, without a perispore, often with internal oil droplets which tend to adhere forming plasma-bridges which may appear as incipient septa, but which dissolve in K. **Conidomata** pycnidia. **Conidia** straight, bacilliform. **Chemistry**: all reactions are negative and no lichen substances detected by TLC. **Ecology**: terricolous, saxicolous and rarely corticolous.

Vahliella, though superficially similar to *Fuscopannaria*, does not belong in the Pannariaceae. Usually the apothecia have irregularly developed thalline margins, and the thallus lacks fatty acids and terpenoids. The best distinguishing character is the amyloid layer structure in the thickened ascus apices. In addition, all known species lack lichen acids and a well-developed epispore, unlike the majority of species in *Fuscopannaria*.

Literature:
Jørgensen (2008, 2009), Pérez-Vargas *et al*. (2014), Spribille & Muggia (2012), Wedin *et al*. (2011).

1 Thallus isidiate, dark grey; ascospores 15–25 (–30) × 6–8 µm.....***atlantica***
Thallus not isidiate, usually dark brownish grey to black; ascospores 15–17 × 5–6 µm..... ***leucophaea***

Vahliella atlantica (P.M. Jørg. & P. James) P.M. Jørg. (2008) **Nb**



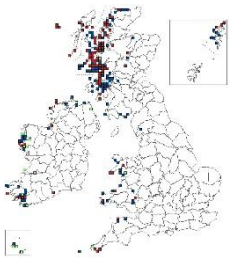
Thallus dark grey, spreading irregularly, forming a crust on the substrate, partly isidiate, in extreme cases becoming sub-fruticose, to 5 cm diam., 100–150 (–200) µm thick with a distinct upper cortex of short thick-walled cells in two or three layers; medulla loose, containing clusters of *Nostoc*, individual cells 4–5 µm diam., gradually merging into rhizohyphae below, lower cortex lacking. Apothecia to 2 mm diam., often proliferating; disc brown, finally convex, with a variable granular blue-grey thalline margin that often obscures the narrow (to 40 µm broad) cellular exciple. Hymenium 100–120 µm high, faintly brownish, composed of compacted, intricately interwoven hyphae. Asci with an apical amyloid layer and cap; ascospores colourless, aseptate, smooth-walled, ellipsoidal, 15–25 (–30) × 6–8 µm. Pycnidia unknown. No substances detected by TLC. **BLS 2432**.

On consolidated soil near the coast; locally common. W. and N. coasts of Britain and N. Ireland.

A species which was long confused with *Fuscopannaria nebulosa*, though with a darker blue-grey thallus that

does not dissolve in a pulverulent mass and larger spores, as well as different ascus tips. It is apparently closely related to *V. californica.*

Vahliella leucophaea (Vahl) P.M. Jørg. (2008) **LC**



Thallus crustose, of indented unevenly crenulate ± rounded appressed turgid squamules, to 2 mm diam., forming a rather thick, cracked-areolate crust; hypothallus usually obvious, black; squamules grey, grey-brown to black, discrete at the margin, often becoming ± imbricate at the centre, not enlarged at margins. Apothecia to 1 mm diam., frequent, often clustered; disc brown-black, rarely brownish in shade, ± convex; thalline margin often indistinct, sometimes unevenly developed on one side of an apothecium. Ascospores 15–17 × 5–6 µm, colourless, smooth, without a perispore, inner side of spore wall uneven. Lichen products not detected by TLC. **BLS 0977**.

On sheltered ± basic moist rocks, more rarely bases of trees in tree-lined sheltered coastal sites or lake-sides; local. W. and N. Britain and Ireland.

This is the most variable and widespread species of the genus, which occurs in several forms in need of further study. The hypothallus is often exceptionally well-developed, the squamules remain discrete and widely dispersed, and the thallus and apothecia are pale. In exposed sites, the hypothallus is much reduced, the dark brown squamules become imbricate and the apothecia are dark brown-black. The thalline margin is soon excluded and the species is then easily mistaken for a *Parmeliella*.

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