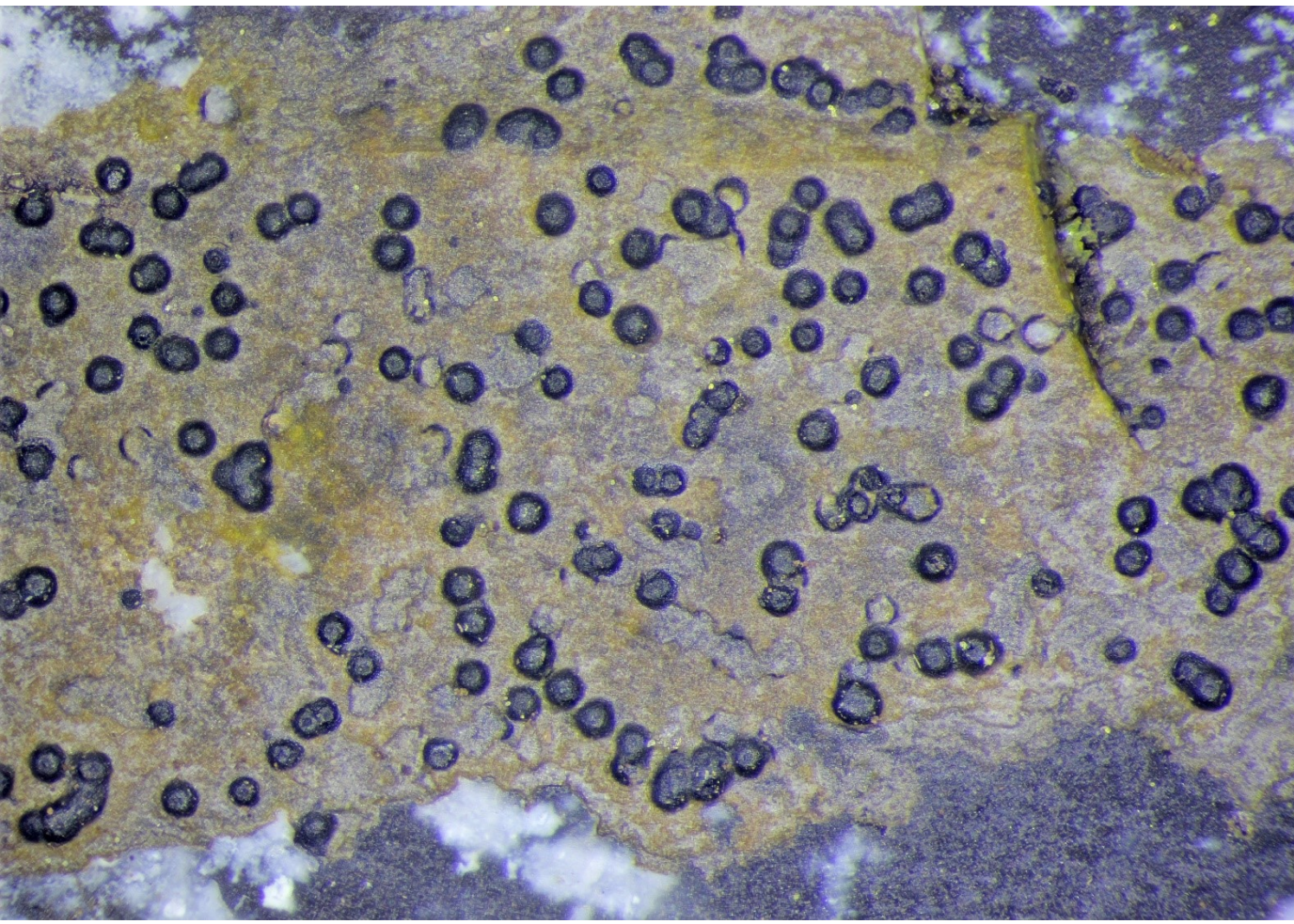
British Lichen Society

Revisions of British and Irish Lichens

Volume 4 **January 2021**



Ostropales: Porinaceae

Cover image: *Porina chlorotica*, on flint in chalk downland, Sheepleas, Surrey.

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to compile new printed editions of the entire lichen biota of Britain and Ireland is extensive, and many parts are out-of-date even as they are published.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

Downloads can be obtained from the British Lichen Society website at
https://www.britishlichensociety.org.uk/content/lgbi3

ISSN 2634-7768

Revisions of British and Irish Lichens **vol. 4**

Ostropales: Porinaceae

including the genus *Porina*

by

Alan Orange
Department of Natural Sciences, National Museum of Wales, Cardiff CF10 3NP, UK; email alanbiosurveys@outlook.com
Paul Cannon
Royal Botanic Gardens, Kew, Surrey TW9 3AB, UK
Jiří Malíček
Institute of Botany, Czech Academy of Sciences, Zámek 1, CZ-252 43 Průhonice, Czech Republic
Neil Sanderson
3 Green Close, Woodlands, Southampton, Hampshire, SO40 7HU, UK
Brian Coppins
Royal Botanic Garden, Inverleith Row, Edinburgh EH3 5LR, UK
Janet Simkin
School of Natural and Environmental Sciences, Newcastle University, Newcastle upon Tyne NE1 7RU, UK

This publication can be cited as:
Orange, A., Cannon, P., Malíček, J., Sanderson, N., Coppins, B. & Simkin, J. (2021). Ostropales: Porinaceae, including the genus *Porina*. *Revisions of British and Irish Lichens* **4**: 1-12.

PORINACEAE Walt. Watson (1929)

Thallus corticolous, saxicolous or foliicolous, crustose or rarely squamulose. **Photobiont** *Trentepohlia* or *Phycopeltis*-like. **Ascomata** perithecia, often brightly coloured, immersed to sessile, applanate to subglobose; exciple composed of hyphal tissue. **Involucrellum** absent to well-developed, sometimes carbonaceous. Hymenial gel I–, KI–. **Hamathecium** composed of narrow ± unbranched true paraphyses. **Asci** cylindrical to obclavate, thin-walled, not fissitunicate, I–, KI–, usually with a refractive ring in the tip, mostly 8-spored. **Ascospores** transversely septate to muriform, colourless. **Conidiomata** pycnidia, immersed to adnate, rounded. **Conidia** ellipsoid to filiform, non-septate, colorless.

As currently circumscribed (Lücking *et al*. 2016) the family contains six genera and about 360 species, most of which are tropical in distribution. Following Hafellner & Kalb (1995) and Lücking (2008), those authors accepted *Pseudosagedia* and *Segestria* as distinct from *Porina* based on pigments in the ascomatal wall, with the former containing "*Pseudosagedia*-violet" and the latter with yellow-orange pigments. However, there is no clear molecular support for this action, and more research into generic limits is needed for this family. In this account, therefore, only the single genus *Porina* is accepted.

Literature

Baloch & Grube (2006), Baloch *et al*. (2010), Hafellner & Kalb (1995), Lücking (2008), Lücking *et al*. (2016), McCarthy & Malcolm (1997), Nelsen *et al*. (2014).

PORINA Ach. (1809)

Thallus crustose, immersed to superficial. **Cortex** absent or present. **Epinecral layer** sometimes present. **Medulla** ill-defined. **Isidia** sometimes present, also (rarely) soralia. **Photobiont** *Trentepohlia* or (mostly in foliicolous species) *Phycopeltis*. **Ascomata** perithecioid, immersed in the thallus or prominently protruding, or forming pits in limestone. **Exciple** with or without dark pigment. **Involucrellum** present, composed of thick-walled ± elongate cells, sometimes containing numerous photobiont cells or crystals. **Hamathecium** of paraphyses, rarely branched, periphyses present or absent. **Hymenial gel** I–, K/I–. **Asci** clavate-cylindrical, wall thin throughout, functionally unitunicate (dehiscence by rupture of the apex, with no extruded inner layers), I–, K/I–; apex either truncate and containing a refractive ring which stains with Congo Red, or rounded (to somewhat tapering) and without a ring. **Ascospores** 3- to many-transversely septate, rarely with 1-3 longitudinal septa, colourless, narrowly ellipsoidal to acicular, smooth, often with a perispore, usually irregularly biseriate in the ascus. **Conidiomata** pycnidia, frequent. **Conidia** aseptate, cylindric-ellipsoidal to rod-shaped or rarely filiform. **Chemistry:** acetone-soluble secondary products absent; at least four acetone-insoluble pigments present, including a yellow to orange, K+ orange or dark orange, HCl+ yellow to orange pigment (Porina-yellow; the dominant pigment in involucrellum of *P. ahlesiana, P. lectissima, P. leptalea, P. rhodostoma* and *P. rosei*, and found in at least the upper exciple of *P. aenea, P. coralloidea, P. curnowii, P. guentheri, P. interjungens* and others), and a range of dark pigments which need more study; these often occur mixed together and are difficult to distinguish; the most distinctive is purple-violet to purple, K+ dark bluish grey, HCl+ purple to red-purple. **Ecology:** on siliceous or calcareous rock, often in damp habitats; also on bark, evergreen leaves (mainly in tropics), rarely on soil (and then usually overgrowing bryophytes).

Attempts have been made to subdivide the genus using features of the ascus apex, the presence or absence of periphyses, the presence or absence of isidia and the type of pigment present in the

involucrellum and exciple, but these features correlate poorly, even in the European species and the units which have been distinguished intergrade with each other. Species previously classified under *Zamenhofia* Clauz. & Roux (1985) are now treated in *Porina*.

Strigula species are superficially similar in the field, but differ in the thickened ascus apex and presence of macroconidia; they are included in a distinct order of lichens by Lücking *et al.* (2016).

Literature

Ertz *et al.* (2019), McCarthy (2000), Orange (2013, 2015), Orange *et al*. (2009, 2020), Sérusiaux *et al*. (2007).

1 Isidia or soralia present, perithecia present or absent 2
Isidia and soralia absent, perithecia present 8

2(1) Thallus with bright orange soralia; on bark of scrub-trees, or on shaded rock ..... ***multipuncta***
Thallus with isidia, soralia not present, though isidia can be confluent in soralia-like masses 3

3(2) Thallus dull dark grey, isidia mostly simple and tapering to the apex, which is formed of pale elongate hyphae ..... ***coralloidea***
Thallus cream to grey-green or orange, isidia simple or usually becoming branched, apex similar to the rest of the isidium, not formed of elongate hyphae 4

4(3) Isidia with a papillose surface formed by projecting fungal cells (microscope needed), often large, to 0.5 mm high and the branches 50–80 µm diam. ..... ***atlantica***
Isidia with a more or less smooth surface, fungal cells sometimes irregularly rounded but not strongly projecting 5

5(4) Isidia with a distinct cortex of fungal cells, slender, the individual branches 15–50 µm diam. ***6***
Isidia with only a thin and indistinct cortex of fungal cells, coarser, the individual branches 30–100 µm diam. 7

6(5) Isidia 15–27 µm diam. with a clear cortex of irregular rounded cells around a single algal filament, matt, mainly bright orange, greenish in deep shade ..... ***rosei***
Isidia 20–55µm diam. with a compact clear cortex several cells thick around up to four algal strands, shiny, mainly green, becoming ochre-orange in well-lit situations ..... ***Coenogonium confusum***

7(5) Isidia poorly-defined, forming granular-isidiate patches, disintegrating into granules in water mounts ..... ***collina***
Isidia usually discrete, sometimes in nodular-coralloid mats, retaining some trace of branching in water mounts ..... ***hibernica***

8(1) Growing on soil, plant remains, or on bryophytes over rock; perithecia black, involucrellum with dark (purple, brown or grey) pigment, ascospores 3- to 5-septate 9
Growing on rock or bark; if on bryophytes over rock then perithecia yellow or pinkish, involucrellum yellow to orange, or ascospores with 7 or more septa 10

9(8) Ascospores 3-septate ..... ***mammillosa***
Ascospores 3- to 5-septate ..... ***sudetica***

10(8) Ascospores 3(-5)-septate 11
Ascospores (3-) 6- to 16 (-17)-septate 19

11(10) Involucrellum in section predominantly yellow to orange, K+ darker orange to orange-red (Porina-yellow); dark pigments in shades of purple, brown and grey absent 12
Involucrellum in section with dark pigments (shades of purple, brown or grey); but yellow to orange pigments often present as well 14

12(11) Isidia present; on bark or rarely on bryophytes over rock ..... ***rosei***
Isidia absent; on bark or on rock 13

13(12) Perithecia 0.1-0.3 mm diam. (measured *in situ*), ascospores 14.5–23 × 3.5–5 µm ..... ***leptalea***
Perithecia 0.22-0.5 mm diam., ascospores (21·5–) 22–31 × 4·5–6·5 µm ..... ***lectissima***

14(11) Soralia present (exciple brown, yellow within) ..... ***multipuncta***
Soralia absent 15

15(14) Involucrellum containing much Porina-yellow (best seen in K), dark pigment confined to a thin layer near the surface of the involucrellum or near the ostiole; on siliceous rocks in streams ..... ***rivalis***
Involucrellum with Porina-yellow absent or confined to an area near the ostiole, dark pigments predominating 16

16(15) Involucrellum brown with a purplish, dull violet or bluish grey tinge, K+ dulling (no blue tints); on bark or siliceous rock 17
Involucrellum at least in part dull purple, K+ dull blue to dark blue-grey; on bark, slightly calcareous rocks or on limestone 18
(Rarely *P. byssophila* lacks a K+ bluish pigment, but the thallus is better developed and often paler than *P. chlorotica*, and it prefers calcareous rock)

17(16) On bark ..... ***aenea***
On siliceous rock ..... ***chlorotica***

18(16) Thallus endolithic, perithecia often immersed in pits in rock ..... ***linearis***
Thallus superficial, well-developed, perithecia not in pits; sometimes on bark ..... ***byssophila***

19(10) Involucrellum in section yellow to orange (Porina-yellow), without additional dark pigments 20
Involucrellum with purple, grey or brown pigments, sometimes locally with Porina-yellow as well 22

20(19) Isidia present; ascus without a ring structure in the apex, ascospores 6- to 10-septate, 56–66 × 11–14 µm; on bark ..... ***atlantica***
Isidia absent 21

21(20) Ascospores (6-) 7-septate, 30–50 (–70) × 6–9 (–15) µm; ascus with a ring structure in the apex ***ahlesiana***
Ascospores 7- to 14-septate, 40–90 × 8–12 µm; ascus without a ring structure ..... ***effilata***

22(19) Ascospores (5-) 9- to 16 (-17)-septate 23
Ascospores (3-)7(-9)-septate 24

23(22) Thallus dull dark grey, isidia mostly unbranched, narrowed to the apex; ascospores (5-) 9- to 11 (-12)-septate, (35–) 40–57 (–63) × (5–) 8–13 (–15) µm ..... ***coralloidea***
Thallus grey-green to pale orange, isidia unbranched or becoming branched, often forming granular-coralloid mats; ascospores (7–) 12– to 16 (–17)-septate, (55–) 60–90 (–95) × 5–7 (–8) µm ..... ***hibernica***

24(22) Ascospores with a proportion containing 1-2(-3) longitudinal septa 25
Ascospores all without longitudinal septa 26

25(24) Ascospores (4-) 5- to 7-septate, 20.5–29 (–34.5) × (6–) 7–8 (–10) µm, 2.5–4.5 times as long as wide ..... ***interjungens***
Ascospores (5-) 7 (-8)-septate, (29-) 31.5–40 (–43.5) × (6–) 6.5–7 (–7.5) µm, (4–) 4.5–5.5 (–6) times as long as wide ..... ***lucens***

26(24) Ascospores 3- to 7-septate; involucrellum with some purple, K+ blue-grey pigment ..... ***byssophila***
Ascospores (5-) 7 (-9)-septate 27

27(26) Thallus mostly endolithic, on limestone ..... ***ginzbergeri***
Thallus superficial, usually well-developed 28

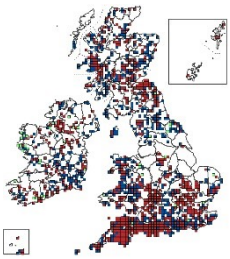
28(27) On bark, ascus with ring structure 29
On rock 30

29(28) Ascospores (3–) 4.5–5 (–5.5) µm diam. ..... ***borreri***
Ascospores 2.5–3.5 (–4) µm diam. ..... ***leptospora***

30(28) Ascospores narrow, 3–5 µm diam. ..... ***curnowii***
Ascospores wider, 5–10 µm diam. 31

31(30) Ascospores (4.5–) 5–6.5 µm diam., (4.5–) 5.5–8 (–9.5) times as long as wide; ascus without a ring structure ..... ***guentheri***
Ascospores (6–) 7–9(–10) µm diam., 4–5 (–5.5) times as long as wide; ascus with a ring structure ..... ***grandis***

Porina aenea (Wallr.) Zahlbr. (1922) **LC**

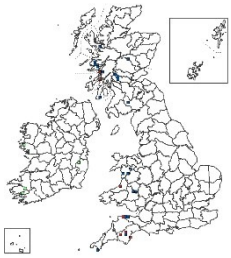


Thallus thin, smooth or locally cracked, deep red-brown to green-brown or dark brown. Perithecia black, 0.12–0.26 (–0.3) mm diam.; involucrellum purple-brown, dulling in K; exciple dark or colourless. Ascospores 3-septate, 13–20 (–24) × 3.5–5 µm. Conidia ellipsoidal, straight or more or less curved, *ca* 2 × 0.5 µm. **BLS 1168**.

On smooth bark on trunks and branches, including twigs, often on trees with bark of high pH (*Acer, Fraxinus*), but also frequent on bases of conifers in plantations; shade-tolerant, common in urban areas. Throughout Great Britain and Ireland.

Most collections have perithecia no more than 0.2 mm diam. Very similar to *P. chlorotica*, which usually grows on rock, but preliminary molecular work suggests that several species may be involved in the *P. aenea*/*P. chlorotica* group. Many records from trunks are probably actually *P. byssophila*, especially on base rich bark.

Porina ahlesiana (Körb.) Zahlbr. (1931) **NT**

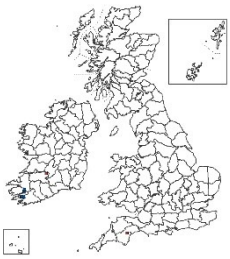


Thallus superficial, thin, greenish grey, pale yellow-grey or olivaceous, continuous or ± cracked. Perithecia pale orange-brown, translucent when wet, occasionally greyish at the base, 0.3–0.5 (–0.7) mm diam., one quarter to one half immersed in the thallus; involucrellum of thick-walled cells, containing numerous photobiont cells, yellow in section (Porina-yellow); exciple yellow. Ascus apex truncate, with a ring structure. Ascospores (6-) 7-septate, 30–50 (–70) × 6–9 (–15) µm. Pycnidia pale grey-pink, inconspicuous; conidia 6–7 × *ca* 0.5 µm. **BLS 1169**.

On damp shaded siliceous rock with slight base influence, near rivers and lakes and on damp outcrops and in seepages; shade-tolerant, sometimes in cave entrances or below several layers of boulders; rare. W. Britain, one old record for Ireland.

Characterized by the greenish grey thallus, the pale perithecia which are translucent when moist and the 7-septate ascospores. *P. lectissima* has 3-septate ascospores.

Porina atlantica (Erichs.) P.M. Jørg. (2000) **Nb**



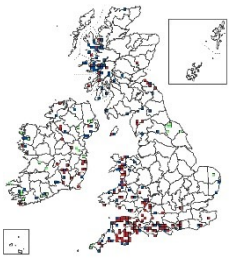
Thallus superficial, pale brownish cream, often with lightly convex areas separated by furrows; isidia present, discrete or crowded, isodiametric when young, soon ± cylindrical, branched and coralloid, fragile, to 0.5 mm high, branches 50-80 µm diam., appearing papillose under the microscope, with a cortex which has numerous projecting cells; perithecia frequent, mostly immersed (in Irish material) to prominent, apex light reddish brown; involucrellum containing numerous large crystals, orange

(Porina-yellow); exciple yellow. Ascus apex rounded, without a ring structure. Ascospores 6- to 9 (-10)-septate, 56–66 × 11–14 µm. **BLS 1768**.

On base-rich bark of *Quercus*, sometimes overgrowing bryophytes, rarely rock; very rare. S.W. Ireland (N. Kerry, W. Cork, Limerick).

Sterile material can be distinguished from *P. hibernica* by the often larger isidia with a papillose surface.

Porina borreri (Trevis.) D. Hawksw. & P. James (1980) **Nb**

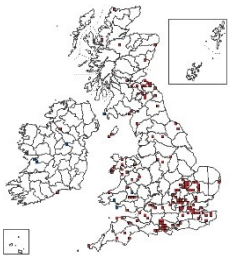


Thallus superficial, well-developed, grey-brown to green-brown or blackish olive, continuous to cracked. Perithecia 0.2–0.36 (–0.5) mm diam., black, prominent (one third to half immersed in the thallus); involucrellum purple-violet to purple-brown or brown, dulling in K, or K+ grey-brown to brown, containing some photobiont cells; exciple colourless or faintly brown below. Ascus apex truncate, with a ring structure. Ascospores 6-7 (-8)-septate, (22.5–) 28–35 (–40) × (3–) 4.5–5 (–5.5) µm. Conidia cylindric-ellipsoidal, 2–3.3 × *ca* 1.2 µm. **BLS 1170**.

On base-rich bark of old trees, especially in wound tracks; particularly on *Quercus*, *Fagus*, *Ilex*, *Fraxinus* and *Acer pseudoplatanus*, in old woodlands and parklands; also on wounds on bark of shrubby trees (*Corylus* and *Sorbus aucuparia*), rarely spreading to bryophytes; widespread but local. S. & S.W. England, Wales, Scotland, Ireland.

P. aenea has markedly smaller perithecia and *P. byssophila* has slightly smaller but often clustered perithecia; both have 3-septate ascospores.

Porina byssophila (Körb. ex Hepp) Zahlbr. (1903) **Nb**

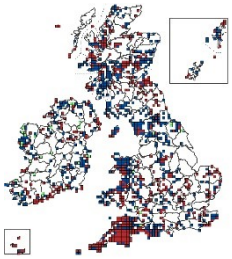


Thallus superficial, well-developed, dull grey-green to green-brown or grey-brown, smooth to uneven, continuous to cracked. Perithecia one tenth to half-immersed, 0.13–0.3 mm diam., often grouped and partly merged; involucrellum purple-violet to purple-brown, K+ blue-grey to dark grey-brown; exciple dark. Ascus with a ring-structure. Ascospores 3 (-7)-septate, (17–) 18.5–24 (–29) × (3.5–) 4–5.5 (–6) µm, (3.5–) 4–5 (6.5) times as long as wide. Conidia cylindrical, 2.9–3.3 × *ca* 1.2 µm. **BLS 1614**.

On limestone and on slightly basic siliceous rocks, on shaded rocks and stones, usually on surfaces sheltered from rain; recently found also to be widespread on old, usually base-rich bark, typically in wound tracks. Throughout England, Wales, S.W. Scotland, W. Ireland.

Most collections have only 3-septate ascospores. Close to *P. linearis*, which differs in the endolithic thallus. *P. aenea* and *P. chlorotica* differ in the usually browner and thinner thallus and the different pigment in the involucrellum. On bark, the often grouped perithecia are a good indication of potential candidates.

Porina chlorotica (Ach.) Müll. Arg. (1884) **LC**



Thallus thin, superficial, dull brown to dark green-brown or blackish, continuous or cracked. Perithecia black, 0.14–0.22 (–0.3) mm diam.; involucrellum purplish brown, dulling in K, or K+ grey-brown. Exciple dark. Ascospores 3-septate, (12.5–) 14.5–18 (–32) × 3.5–4.5 (–6) µm. Conidia cylindric-ellipsoidal, 2.5–3.7 × 1–1.2 µm. **BLS 1171**.

On siliceous rocks and stones, rarely brickwork, often in shade and in damp situations, in woodland and beside rivers and lakes; occasionally on smooth bark; frequent. Throughout the British Isles, especially N. & W.

This species and *P. aenea* appear to form a complex of several species which need more study; saxicolous British and Irish collections corresponding to this morphology fell into at least four separate clades as studied by Orange *et al*. (2020).

Porina chlorotica f**. tenuifera** (Nyl.) Swinscow (1962) differs in the ascospores 25–35 × 3–4 µm. Its status needs further investigation.

Porina collina Orange, Palice & Klepsland (2020) **NE**

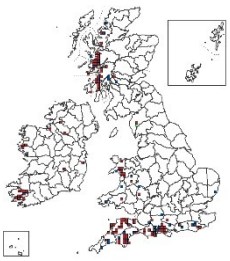
Thallus superficial, thin, light to dull greenish orange-brown, continuous or with a few cracks; isidia abundant, at first arising singly, later confluent, forming pale dull orange patches which are finely granular to densely coralloid, the individual isidia not distinguishable. Isidial patches disintegrating in water into irregularly shaped granules 30–150 (–250) × 30–125 (–150) µm, hyphae sparse within the granules, not completely enclosing the

photobiont cells. Perithecia black, the base immersed in the thallus, 220–420 µm diam.; involucrellum absent, exciple dark purplish brown, K+ grey to dark grey-brown to dark greenish grey, inner part yellowish, K+ intensifying. Ascus apex rounded, with thickening or a refractive ring. Ascospores 3-septate, 24–43 × 5.5–6 µm. **BLS 2766**.

On steep or slightly overhanging siliceous rocks in upland situations, perhaps with slight base-enrichment, rare or overlooked. N. England (Helvellyn), Mid Wales. Also recorded from Norway and the Czech Republic.

When perithecia are absent this can be confused with other species with vegetative propagules. *Porina rosei* has isidia with a distinct cortex with bulging cells, *P. hibernica* has more robust isidia 30–100 µm diam. which retain traces of branching in microscopic preparations, *P. pseudohibernica* [a central and S.E. European species] has rather discrete isidia which are less fragile, and *P. multipuncta* usually has soredia although these rarely aggregate into very fragile structures which do not form discrete patches. *Gyrographa gyrocarpa* (Arthoniales: Roccellaceae) has soralia that are often a more vivid orange, and are C+ red.

Porina coralloidea P. James (1971) **Nb IR**

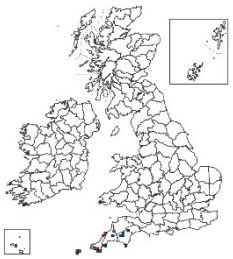


Thallus superficial, dull dark grey with a pinkish or purplish tinge; isidia present, often crowded, rarely branched, cylindrical or elongate-ovoid, usually tapering to the apex, 160–210 × 40–70 µm, the apex often pale, formed of a tuft of colourless filamentous hyphae. Perithecia black, 0.3–0.4 mm diam., one to three quarters immersed, scattered and sometimes not obviously associated with the thallus; involucrellum dark purplish-brown, K+ grey-brown; exciple yellow (Porina-yellow), or with some pigment like the involucrellum. Ascospores (6-) 9- to 11 (-12)-septate, (35–) 40–57 (–63) × (5–) 8–13 (–15) µm. **BLS 1172**.

On bark of medium-aged to very old trees, especially *Quercus*, also on *Fraxinus* and *Fagus*, in old forests and parklands; local. S. England (especially New Forest in Hampshire), N.W. England (Lake District), Wales, W. Scotland.

Recognized in the field by the dark colour and the pointed and tufted isidia; the dark purplish brown thallus resembles that of *Catinaria atropurpurea*, which occurs in similar habitats, but which has no isidia. *Jamesiella anastomosans* has pointed isidium-like structures, but these are pale grey and contain a trebouxioid photobiont.

Porina curnowii A.L. Sm. (1911) **NT**

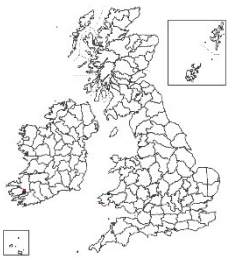


Thallus superficial, thin, dull grey-brown, cracked. Perithecia black, prominent, 0.3–0.5 mm diam.; involucrellum dull purple-violet, K+ dark grey or grey-brown. Ascospores 7-septate, 37–52.5 × 3–5 µm, 9.5–13 times as long as wide. **BLS 1173**.

Mainly on siliceous coastal rocks in sheltered damp sites and in seepage tracks; very local. S.W. England, S.W. Wales, Isles of Scilly, Channel Isles, S.W. Ireland.

Similar to *P. guentheri* var. *guentheri*, which has wider ascospores.

Porina effilata Brand & Sérus. (2007) **CR (D)**



Thallus superficial, well-developed, ± smooth to granular or verrucose, dull grey-green to dull orange-brown, orange or pinkish when fresh, pale grey to green-grey in dried collections. Perithecia 0.36–0.9 mm diam., pale pinkish cream to orange-pink, pale pink-brown or yellow-brown, one to three quarters immersed in the thallus, sometimes pruinose when prominent; involucrellum and exciple yellow (Porina-yellow). Ascus apex ± truncate to rounded, without a ring structure. Ascospores 7- to 14-septate, 40–90 × 8–12 µm. **BLS 1177**.

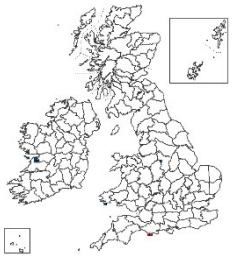
On base-rich bark, on sheltered bases of mossy trees, especially *Quercus* in old woodland, or on slightly calcareous siliceous rock in overhangs (often overgrowing bryophytes); rare, very locally frequent. S.W. Ireland, W. Wales (Cardigan, Merioneth), S.W. England (N. Devon).

Characterized by the large pale perithecia and the large ascospores. *P. atlantica* differs in the shorter ascospores and presence of isidia.

Porina ginzbergeri Zahlbr. (1903) **Nb**

Thallus mostly immersed and inconspicuous, to superficial and then cracked; pale green-grey to orange-brown,

rarely greyish black. Perithecia 0.25–0.4 mm diam., one quarter immersed to prominent and more or less sessile; involucrellum violet, K+ blue-grey, also with Porina-yellow at the apex of the exciple; exciple otherwise violet. Ascus apex rounded, without a ring structure. Ascospores (5-)7(-8)-septate, (19–) 21.5–40 (–45) × 4–7 µm. **BLS 1615**.

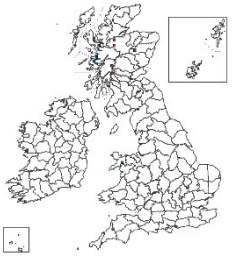


On shaded limestone and calcareous siliceous rocks, rare. England (Dorset, Derbyshire), S. Wales (Pembrokeshire, Carmarthenshire), W. Scotland (Skye), W. Ireland (Co. Clare).

P. byssophila and *P. linearis* differ in the ascus with a ring structure in the apex and in the smaller, 3-septate ascospores, but some specimens of *P. ginzbergeri* can have a proportion of the ascospores relatively short.

Porina grandis (Körb.) Zahlbr. (1922) **Nb**

Thallus brown, continuous or cracked. Perithecia 0.4–0.8 mm diam., one quarter immersed in the thallus; involucrellum purple-brown to purple-grey, dulling in K or K+ dark grey. Ascus apex truncate, with a ring structure. Ascospores (6-)7-septate, (30.5–) 33.5–40.5 (–50) × (6–) 7–9 (–10) µm, 4–5(–5.5) times as long as wide. **BLS 1175**.

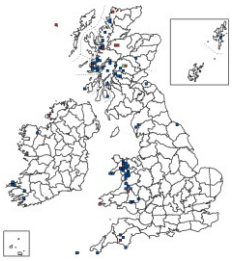


On damp rocks by streams, sometimes in woodland; rare. N. Wales, N. & W. Scotland.

Distinguished from *P. guentheri* by the wider ascospores and different ascus apex. Some specimens of *P. grandis* have larger perithecia than *P. guentheri*, but others are similar in size.

Porina guentheri (Flot.) Zahlbr. (1922) **Nb**

Thallus superficial, well-developed, continuous or cracked, dull green-brown to dark purple-grey. Perithecia black, 0.3–0.7 mm diam., one quarter to half-immersed; involucrellum purple-violet to purple-brown, K+ dark grey to brown. Ascus apex rounded, without a ring structure. Ascospores (6-)7 (9)-septate, (28–) 32–45 (–49) × (4.5–) 5–6.5 µm, (4.5–) 5.5–8 (–9.5) times as long as wide. **BLS 1174**.

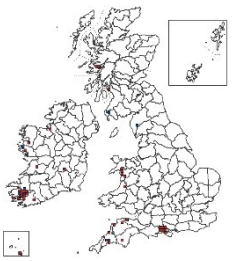


On damp siliceous rocks on shaded outcrops and by lakes and upland rivers. Local in W. Britain and W. Ireland; rare elsewhere.

Porina lucens (syn. *P. guentheri* var. *lucens*) has slightly wider ascospores with a proportion submuriform; it occurs in similar habitats.

Porina hibernica P. James & Swinscow (1962) **NT IR**

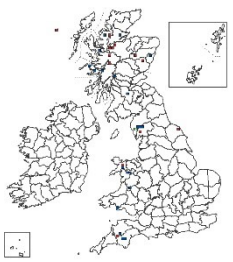
Thallus superficial or partly immersed, thin, grey-green to grey-ochre or pale orange; isidia present, uniformly dull orange, isodiametric when young, becoming cylindrical and branched, fragile, remaining discrete or forming nodular-coralloid mats in which the individual isidia are difficult to distinguish, never forming distinct rounded mounds; isidia to 290 µm high, branches 30–100 µm diam., with a thin and inconspicuous cortex. Perithecia occasional, black, half to three quarters immersed, to 0.7 mm diam.; involucrellum purplish brown, K+ dark grey-brown. Asci rounded at the apex, without a ring structure. Ascospores (7–) 12–16 (–17)-septate, (55–) 60–90 (–95) × 5–7 (–8) µm. **BLS 1178**.



On moderately flushed base-rich bark of mature *Quercus*, rarely *Fagus*, in old growth woodland, sometimes overgrowing bryophytes; rare, very locally frequent. S. England (Burnham Beeches, Buckinghamshire, New Forest, Hampshire to E. Cornwall), N. Wales (Merioneth, Cardigan), Lake District, W. Ireland. There was past confusion with *Coenogonium confusum* and some records potentially refer to this taxon.

Sterile specimens are similar to *P. rosei*, which differs in the isidia forming mounds when well-developed, while the individual isidia are narrower with a well-developed cortex forming a colourless layer around the photobiont. The taxon which was commonly misidentified as *P. rosei* (now referred to *Coenogonium confusum*) also has mounded isidia but these are green to ochre, not orange and also have a well-developed cortex forming a outer colourless layer, but the isidia are less slender and overlap with smaller *P. hibernica* isidia in width.

Porina interjungens (Nyl.) Zahlbr. (1922) **NT**

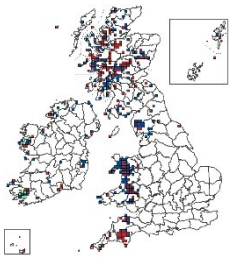


Thallus superficial, grey to dark brown, continuous to cracked. Perithecia black, 0.22–0.4 mm diam., one third to half immersed in the thallus, involucrellum purple-brown, K+ grey or grey-brown or bluish grey; exciple almost colourless below, yellow above (Porina-yellow). Ascospores narrowly ellipsoidal, with (4-) 5 to 7 transverse septa and 1-4 longitudinal septa, 20.5–29 (–34.5) × (6–) 7–8 (–10) µm, 2.5–4.5 times as long as wide. **BLS 1179**.

On damp siliceous rocks, shaded or unshaded, on cliffs and by rivers and lakes; rare. Scotland, N.W. England (Lake District), Wales, S.W. England (Devon).

P. lucens also has longitudinal septa in some of the ascospores, but the ascospores in that species are longer and narrower.

Porina lectissima (Fr.) Zahlbr. (1903) **LC**

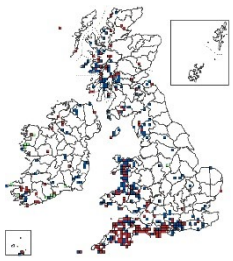


Thallus superficial, well-developed, continuous or cracked, pale ochre to orange-brown, reddish brown or brownish green. Perithecia red-brown (brighter red when wet) to black (often black only at the apex), one quarter to one third immersed, 0.22–0.5 mm diam.; involucrellum thick, containing photobiont cells, either completely orange (Porina-yellow), or frequently also purple to violet, K+ dark blue-grey (Sagedia-red) at the surface. Asci with a ring structure. Ascospores 3-septate, (21·5–) 22–31 × 4·5–6·5 µm. Pycnidia orange, ± immersed; conidia narrowly ellipsoidal to cylindrical, 3–4.5 × 0.7–1 µm. **BLS 1180**.

On damp siliceous rocks on water-flushed outcrops and in seepages and beside rivers and lakes, often forming extensive patches; locally abundant. N. & W. Britain and Ireland.

Usually recognized in the field by the large perithecia which are orange or reddish when wet, but morphs with black perithecia could be mistaken for *P. guentheri* or others. *P. ahlesiana* differs in the 7-septate ascospores, *P. leptalea* differs in the smaller perithecia.

Porina leptalea (Durieu & Mont.) A.L. Sm. (1911) **LC**

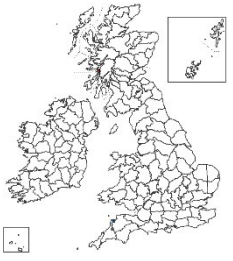


Thallus superficial, very thin, smooth or finely granular, grey-green to dark olive-green. Perithecia 0.1–0.3 mm diam., one quarter to one half immersed, brownish orange; involucrellum orange (Porina-yellow), containing numerous photobiont cells; exciple colourless to yellow. Ascospores 3-septate, 14.5–23 × 3.5–5 µm. Pycnidia *ca* 100 µm diam., red-brown; conidia ellipsoidal to cylindrical, straight to slightly curved or dumb-bell-shaped, 1.7–2.5 × *ca* 1 µm. **BLS 1181**.

On bark of broad-leaved trees (*Alnus, Fagus, Ulmus, Corylus, Ilex* and others), but also frequent on the bases of conifers in plantations; also on damp rocks and stones, shade-tolerant; frequent. W. Britain, Ireland.

P. lectissima has larger perithecia and ascospores, and *P. aenea* and *P. chlorotica* have blackish perithecia. *Thelopsis rubella* also has red perithecia, but these are larger and contain multispored asci. Morphs with dark red-black perithecia, which are bright red when wet, occur in wound tracks on veteran *Ilex* and *Fagus* and are frequent in the New Forest, but are otherwise similar. Another morph has brighter red perithecia, narrower spores and an orange finely sorediate thallus and has been recorded in the north of Ireland. Their taxonomic status is unclear and is under investigation.

Porina leptospora (Nyl.) A.L. Sm. (1864) **NT**



Like *P. borreri*, but with narrower ascospores 30–55 × 2.5–3.5 (–4) µm. **BLS 1886**.

On bark of *Corylus*, *Hedera* and *Ilex*. N. Devon, S.W. Scotland, S.W. Ireland (Killarney).

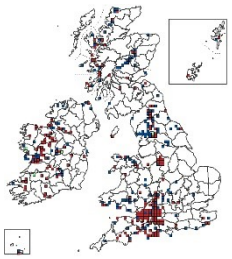
Porina linearis (Leight.) Zahlbr. (1922) **LC**

Thallus endolithic to thinly superficial in part, continuous or cracked, pink, grey or discoloured brownish. Perithecia black, 0.24–0.4 mm diam., one half immersed in pits in the rock to ± superficial; involucrellum purple-violet to purplish brown, K+ dark blue-grey to grey-brown. Ascospores 3-septate, (15.5–) 16.5–22 (–23.5) ×

(3.5–) 4–6 (–7) µm. Pycnidia black, ± immersed in pits; conidia cylindrical, straight to slightly curved, 3.3–4.5 × *ca* 1.2 µm. **BLS 1182**.

On shaded and sheltered hard limestone, sometimes forming extensive patches under shaded overhangs; locally frequent. Throughout Britain and Ireland.

Saxicolous forms of *P. byssophila* differ in the well-developed epilithic thallus. Easily confused in the field with *Naetrocymbe saxicola*, which has 1-septate spores and a different pigment in the perithecial wall. Sparsely fertile morphs could be confused with poorly developed thalli of *Gyalecta* (*Belonia*) *nidarosiensis* or *G. jenensis*.



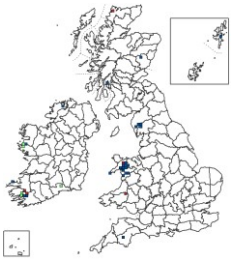
Porina lucens (Taylor) A.L. Sm. (1911) **Nb**

Porina guentheri var. *lucens* (Taylor) Swinscow (1962)

Similar to *P. guentheri* but the ascospores are (6–)7(–8)-septate, some with 1-2(-3) longitudinal septa, (29–) 31.5–40 (–43.5) × (6–) 6.5–7 (–7.5) µm, (4–) 4.5–5.5 (–6) times as long as wide. **BLS 1176**.

On periodically inundated siliceous rocks by rivers and lakes, in shaded or unshaded sites, often on steep faces. Very local in W. Britain & W. Ireland; rare in Scotland, N.W. & S.W. England, locally frequent in N.W. Wales.

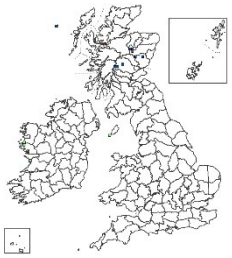
This has been treated as a variety of *P. guentheri*, but differs in the presence of longitudinal septa in at least some ascospores; the ascospores are also slightly wider. It is more strictly confined to rivers and lake shores than *P. guentheri*.



Porina mammillosa (Th. Fr.) Vain. (1922) **NT**

Thallus smooth or granular, rather thick, nodular, warted, rarely inconspicuous. Perithecia 0.3–0.5 mm diam., globose, partly covered by a thalline layer; involucrellum thick, dark, with purple, K+ blue-grey pigment (Sagedia-red), inner layers pinkish orange (Porina-yellow); exciple yellow to pale orange. Ascospores 3-septate, 25–40 × 4–6 µm. Pycnidia unknown. **BLS 1183**.

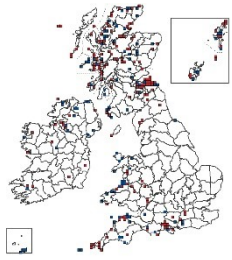
On bryophytes, small woody plants and soil in ± protected or sheltered soil crevices of mountain rocks, also at lower altitudes; rare. N. England (Helvellyn), N. Scotland (Central Highlands, Kintail, St Kilda), W. Ireland (Connemara, Galway).



Porina multipuncta (Coppins & P. James) Ertz, Coppins & Frisch (2019) **LC**

Opegrapha multipuncta Coppins & P. James (1992)

Thallus thin, wide-spreading, smooth or somewhat sparingly rimose-cracked, or scurfy, superficial or partly immersed, effuse, dull or dark red-brown, rarely paler, becoming grey and discoloured in dried collections; soralia bright orange when fresh, usually evenly coloured with little green colour showing unless damaged, fading to pale dull cream-grey in dried collections, 0.1-0.3 mm diam., small, rounded or sigmoid, punctiform, very numerous, erose to excavate, discrete, becoming confluent or forming a minute mosaic of tiny irregular soralia; soredia very fine, 15–45 × 13–25 µm in size, photobiont partly enclosed by hyphae, fungal cells sometimes conical, giving an angular appearance to the soredia; rarely propagules arise singly on the thallus and develop into very fragile aggregations of minute granules 25–50 × 25–37 µm in size. Ascomata very rare (known from S.W. & Mid Wales), 200–280 µm diam., brown, immersed below; exciple brown, K –, orange within and K+ orange-red. Ascus with ring structure. Ascospores 16–22.5 × 3–5.5 µm. Soralia C–, K–, KC–, Pd–, UV– (no lichen products detected by TLC). **BLS 1636**.



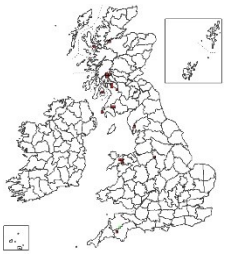
On small branches of scrub-trees, including *Crataegus*, *Hebe*, *Juniperus*, *Salix* spp. and *Ulmus glabra*; in damp, often sheltered or boggy sites in the north west, on base rich bark on veteran trees, mainly *Quercus*, in the south; scattered. Also on deeply shaded rock and below overhangs, especially on or near the coast. W. Britain, from the Isles of Scilly to Shetland (Unst), also scattered throughout Ireland.

P. multipuncta is characterized by the wide-spreading thallus studded with numerous tiny bright orange soralia; it is the only sorediate species of the genus in Britain. Young material of *O. multipuncta* may resemble *Zwackhia sorediifera* (Arthoniales: Lecanographaceae), which has a paler thallus and generally paler soralia, with the

soredia coarser, more strongly green internally and C+ reddish. *Thelopsis corticola* (Ostropales: Gyalectaceae) and *Francisrosea bicolor* (Ostropales: Gyalectaceae) are C–, but both have non confluent, persistent, defined and roughly circular soralia. The former also has fine soralia but these are pale ochre with green tinges, while the latter has coarser orange and green soralia. *P. multipuncta* is often locally frequent and dominant in favoured sites in the N. & W.

Porina rivalis Orange (2015) **NE**

Thallus light orange-brown to grey-brown or dark grey (orange tints disappearing on storage), thin, 20–70 µm thick, continuous or with scattered cracks. Photobiont trentepohlioid. Perithecia prominent, 160–400 µm diam., dark brown or black, sometimes orange-brown or brown at the extreme base. Involucrellum of isodiametric thick-walled cells, enclosing numerous photobiont cells, without crystals; inner part yellow to orange, K+ orange-red (Porina-yellow), near the upper surface dark grey to purplish red, K+ dark grey or bluish grey (Sagedia-red at least in part), a small area adjacent to the ostiole often dark dull violet. Exciple colourless or yellow (Porina-yellow). Asci ± cylindrical, thin-walled, I–, with a truncate apex with a ring structure. Ascospores 3-septate, narrowly ellipsoidal, 13–17.5 (–18.5) × 4–5.5 µm. **BLS 2661**.



On frequently inundated siliceous rocks beside streams that are neither strongly acidified nor nutrient-enriched. N. Wales, also S.W. and N. England and W. Scotland. Endemic.

Distinguished by the range and distributions of pigments in the involucrellum, and the riverine habit.

Porina rosei Sérus. (1990) **NE**

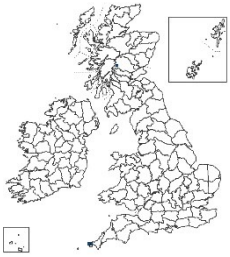
Thallus superficial, thin, grey-green to grey-brown; isidia present, mainly bright orange-brown when fresh, green in deep shade, matt and soft looking, scattered to crowded, frequently becoming branched and coralloid, often forming mounds of congested branches, up to 0.18 mm high, branches 15–27 µm diam., usually containing only a single filament of the photobiont, with a well-defined loose cortex which often forms a colourless surround to the branch, with irregularly rounded sometimes slightly projecting cells. Perithecia occasional, pale dull orange, sometimes the same colour as the thallus below, 0.36–0.4 mm diam., one quarter to one half immersed; involucrellum and exciple yellow (Porina-yellow). Ascus apex with a ring structure. Ascospores 3-septate, 22–37 × 4–6 (–7) µm. **BLS 1671**.

On base-rich bark of *Fagus* and *Taxus*, or on base-rich rock, in old growth woodland and ravines; distribution not fully known but appears very rare. S. England (New Forest, Hampshire), S. Wales (Wye Valley, Monmouth) and Scotland (Den of Airlie, Angus).

Occasionally fertile. Sterile specimens are similar to *P. hibernica*, which typically has darker orange-brown, larger isidia with a poorly defined cortex, which form an even crust rather than mounds. Most past British and possibly all Irish records are of sterile material now known to belong in *Coenogonium*, which is under continuing investigation; it has been given the unpublished name *C. confusum*. This looks similar, but the mounds of isidia are normally predominantly green, sometimes orange-ochre when well lit. The isidia have a shiny, not matt, surface, are wider (20 – 55 µm diam.), and have a compact and smooth clear cortex several cells thick around up to four algal strands. This species is much more frequent than *Porina rosei* [as defined here] and grows on a wide range of tree species on base-rich bark as well as on mossy rocks. *Enterographa brezhonega*, which was thought to be parasitic on *Porina rosei* has not been recorded from the genuine species; all occurrences have been on the *Coenogonium***.**

Porina sudetica (Körb.) Lettau (1912) **VU D2**

Thallus overgrowing bryophytes. Perithecia black; involucrellum dull purple, K+ dark grey to brown. Ascospores 3- to 5–septate (up to 7-septate when over-mature), 25–39 × 3.5–8 µm. **BLS 1672**.



On bryophytes on slightly basic siliceous montane rock, or on maritime heavy-metal-rich scree; very rare. S.W. England (W. Cornwall), Scotland (Mid Perthshire). Recently searched for without success at the Cornish site.

Apparently close to *P. mammillosa*, which differs in the 3-septate ascospores. The pigments in British material of *P. sudetica* may also differ from those in *P. mammillosa*; a wider range of material of the two species should be compared.

Literature

Baloch, E. & Grube, M. (2006). Evolution and phylogenetic relationships within Porinaceae (Ostropomycetidae), focusing on foliicolous species. *Mycological Research* **110**: 125–136.

Baloch, E., Lücking, R., Lumbsch, H.T. & Wedin, M. (2010). Major clades and phylogenetic relationships between lichenized and non-lichenized lineages in Ostropales (Ascomycota: Lecanoromycetes). *Taxon* **59**: 1483–1494.

Ertz, D., Sanderson, N., Coppins, B.J., Klepsland, J.T. & Frisch, A. (2019). *Opegrapha multipuncta* and *Schismatomma quercicola* (Arthoniomycetes) belong to the Lecanoromycetes. *Lichenologist* **51**: 395–405.

Hafellner, J. & Kalb, K. (1995). Studies in the Trichotheliales *ordo novus*. *Bibliotheca Lichenologica* **57**: 161–186.

Lücking, R. (2008). Foliicolous lichenized fungi. *Flora Neotropica* **103**: 866 pp.

Lücking, R., Hodkinson, B.P. & Leavitt, S.D. (2016). The 2016 classification of lichenized fungi in the Ascomycota and Basidiomycota - approaching one thousand genera. *Bryologist* **119**: 361–416.

McCarthy, P.M. (2000). Key to the saxicolous taxa of *Porina*. *Lichenologist* **32**: 1–13.

McCarthy, P.M. & Malcolm, W.M. (1997). The genera of the Trichotheliaceae. *Lichenologist* **29**: 1–8.

Nelsen, M.P., Lücking, R., Andrew, C.J., Aptroot, A., Cáceres, M.E.S., Mercado-Díaz, M.J., Rivas Plata, E. & Lumbsch, H.T. (2014). Molecular phylogeny reveals the true colours of Myeloconidaceae (Ascomycota: Ostropales). *Australian Systematic Botany* **27**: 38–47.

Orange, A. (2013). *British and Other Pyrenocarpous Lichens*. Cardiff: National Museum of Wales.

Orange, A. (2015). A new freshwater *Porina* (Porinaceae, Ostropales) from Great Britain. *Lichenologist* **47**: 351–358.

Orange, A., Purvis, O.W. & James, P.W. (2009). *Porina*. In *Lichens of Great Britain and Ireland* (Smith, C.W., Aptroot, A., Coppins, B.J., Fletcher, A., Gilbert, O.L., James, P.W. & Wolselsey, P.A. eds): 729–737. London: British Lichen Society.

Orange, A., Palice, Z. and Klepsland, J. (2020) A new isidiate saxicolous species of *Porina* (Ascomycota, Ostropales, Porinaceae). *Lichenologist* **52**: 267–277.

Sérusiaux, E., Berger, F., Brand, M. & van den Boom, P. (2007). The lichen genus *Porina* in Macaronesia, with description of two new species. *Lichenologist* **39**: 15–33.